Initial Environmental Examination

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

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CURRENCY EQUIVALENTS

(as of 23 August 2021)

Currency unit	–	Bhutanese Ngultrum (Nu)
Nu1.00	=	$0.01
$1.00	=	Nu74.29

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^2	-	square kilometer
m^2	-	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 Rinchending Subproject, which is one of the 9 subprojects to be financed under the project. This subproject involves construction of 18 3-storey residential buildings comprising of 108 units, with internal access road and parking. Expectedly, 108 families will benefit from this subproject, and this translates to around 540 beneficiary citizens (i.e., approximately 5 members per family). This housing complex will be constructed within a 5-acre residential plot located in Rinchending 4.5 km from the center of Phuentsholing town. The table below summarizes in detail the components of the subproject.

Details of the Housing Complex (Rinchending, Phuentsholing)

Sl. No.	Building Type	Number of Buildings	Total No of Units	Measurements
1	Category III (Type I)	10	60 (10 Bldgs. x 3 floors x 2 units)	Plinth area (1st floor): 201.07 m^2 (2,164.3 sq. ft.) Unit area: 100.50 m^2 (1,081.70 sq. ft.)
2	Category IV (Type I)	8	48 (8 Bldgs. x 3 floors x 2 units)	Plinth area (1st floor): 132.50 m^2 (1,426.22 sq. f.t) Unit area: 66.25 m^2 (712.85 sq. ft.)
	Total	18	108	
	Facilities			
4	Service Center (2 floors); Plinth area: 194 m^2 (2,087.44 sq.ft.)			
	Waste Station (1 floor); Area: 179.58 m^2 (1,932.28 sq.ft.)			
5	Internal road and parking (To fit 72 light vehicles and 64 2-wheelers)			
6	Other facilities • Pedestrian footpath • Recreational area/Green space • Drinking water storage tanks • Rainwater harvesting tank • Power supply sub-station			

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 is to categorize the subproject based on its likely impacts of its most environmentally sensitive component(s) at all phases of implementation. Using ADB 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 provides 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 at Rinchending in the Phuensholing district. The site is 4.5 km from the city center, along the proposed access road from Phuentsholing to Pasakha. This area falls under the municipal and local area plan. The permissible land use is Urban Village Low Density, which means that it is planned as a built-up area in the future. Although the area is not as developed as other parts of Phuentsholing, a number of new residential buildings have been constructed, and are under construction. 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 located in secondary degraded forest land, but not within or 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 key biodiversity area (KBA) within 1 km from the subproject site, but 31 IUCN Red List species of concern are identified within 50km of the area of analysis. These specifies of concern were assessed to determine the likelihood of them being found at the subproject site. While the subproject site is already in the relatively developed area of Bhutan, the probability of

these species being found at the site is very low. Nevertheless, the assessment included necessary discussions with the Department of Forest, which confirmed that none of these species are found or sighted at the subproject site. Accordingly, these species are found or dwell at farther areas in Bhutan. Although not included in the IUCN Red List of species of concern, two vulnerable snake species (King Cobra and Burmese Python) were confirmed to have been sighted or found at the subproject site and its vicinity.

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 mitigation, 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 agency 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 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. PIUs will be established at the local level or municipalities where the subprojects under the project are

located. In 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[1] 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 through the PMU will submit to ADB the following documents for disclosure on ADB's website:[2] (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 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

[1] 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.

[2] 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 office of the PMU.

Monitoring and Reporting. EMP compliance monitoring will be undertaken by the PMU, with support of external experts or consultants. Consistent with reporting requirements set out in the Project Administration Manual, 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. PIU will submit quarterly environmental monitoring reports to PMU, which will include summary of daily monitoring activities of Contractor and results of its independent monitoring or inspection activities. PMU shall consolidate quarterly reports from the PIUs, which include reports from the PIU for the Rinchending 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.

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.

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 live 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. For example, an estimated 10% of Bhutan's capital city (Thimphu) population lives in informal settlements. About a quarter of households (41,039) lacks 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.[3]

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.[4] 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.[5] 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 Nu3,500 ($50) per month are faced with rental stress, as they need to spend between an estimated 40%–60% of their income on housing costs.[6] Likewise, majority of the urban poor including low-income contract workers (noncivil 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.[7] 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

[3] Ministry of Works and Human Settlement. 2016. National Report, The 3rd UN Conference on Housing and Sustainable Urban Development. Thimphu.

[4] 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.

[5] Government of Bhutan, NSB. 2017. *Bhutan Living Standards Survey Report 2017*. Thimphu.

[6] Government of Bhutan, NSB. 2017. *Bhutan Poverty Analysis Report 2017*. Thimphu. Civil servants are provided with rental housing allowance.

[7] ADB. 2017. *Housing Finance Feasibility Study*. Consultant's report. Manila (SC107332); and ADB. 2018. *Housing Finance Feasibility Study*. Consultant's report. Manila (SC 107332).

settlements),[8] or live in adjacent countries (footnote 3).[9] 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.[10] The PBL subprogram 1, approved in 2019 for the financial market development program, supported the revision of the National Housing Policy (NHP).[11] 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.[12] 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.**[13] Output 1 will support

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

[9] At least 26% of urban households live in shared accommodation with basic infrastructure services (footnote 3).

[10] 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.

[11] Government of Bhutan, MOWHS. 2020. *National Housing Policy.* Thimphu.

[12] Government of Bhutan, MOWHS. 2020. *Long Term Strategy for Housing*. Thimphu.

[13] 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.

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 high-priority investments as subprojects.[14] 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.[15] 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.[16] The housing designs reflect local cultural heritage values and traditional architecture.[17] 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 Subprojects

	Location	District	Area (Acres)	Typology	Housing blocks	No. of Units	Service Centers
1	Tading	Samtse	9.00	G+2	37/34	444/408	

[14] Priority subprojects are located in Nganglam; Phuentsholing (Amochu, Rinchending and Drungpa's Residence); Samtse (Tading); Samdrup Jongkhar (Dradulthang and Toed); Thimphu (Semtoka); and Trashiyangtse.

[15] 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.

[16] EDGE.

[17] Government of Bhutan, MOWHS. 2014. *Bhutanese Architectural Guidelines.* Thimphu.

2	Amochu (Bangay)	Phuentsholing	0.98	G+5	5	120	
3	Rinchending	Phuentsholing	5	G+2	18	108	Yes
4	Drungpa Residence Area	Phuentsholing	0.85	G+5	4	96	
5	Dradulthang	Samdrup Jongkhar	0.8	G+3	4	32	
6	Samdrup Jongkhar Toed	Samdrup Jongkhar	2	G+3	11	88	Yes
7	Nganglam	Pema Gatshel	2.82	G+1	8	32	
8	Semtokha	Thimphu	1.93	G+4	8	110	Yes
9	Trashiyangtse	Trashiyangtse	2.48	G+1	8	32	
			25.86		**103/100**	**1,062/1,026**	

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 is as follows:

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

E. Structure of the Report

15. The IEE is presented in twelve chapters 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, 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 Subproject, 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 for 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.[18] 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 project will not cause any significant negative environmental impacts and that most impacts are site specific, temporary and therefore the project is classified as B as per ADB SPS.

19. For Category B project, ADB SPS, 2009 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 project 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 project 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 project design.

[18] 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 before 2 weeks of 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. NHDCL, through the PMU, will submit to ADB the following documents 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 official website of NHDCL after approval of the documents by 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. The notice will be issued by PMU in local or national newspapers one month ahead of the implementation works. 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 work place, 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.** The PMU is must identify and avoid significant damage to any Physical Cultural Resources by the project. Chance find procedures 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

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
Environmental assessment						
Environmental Assessment Act 2000	Establishes procedures for the assessment of potential environmental impacts and aims to determine the measures to avoid, mitigate, reduce the adverse impacts, and promote environmental benefits of projects, plans, and policies.	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.		
Waste Management						
Waste Prevention and Management Act of Bhutan 2009	Institutional framework on waste management to reduce generation at source, promotes segregation, reuse, and recycling, storage, transportation, environmentally-sound treatment and disposal of waste, and monitoring procedures and coordination at every organizational level	Waste disposal permit Demolition Permit	Thimphu 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 Act2009.					
Water						
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 near a surface water (Olarongchhu) and needs to comply with this	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
	equitable, and environmentally sustainable manner.	Act and regulation.		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.		
Forestry and Biodiversity						
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.	Thimphu Thromde, Environment Division/Forest Range Office	The subproject will not impact any protected areas, critical habitats or endangered species. However, the subproject is expected to cut 25 trees at the site, which	Design Phase / Pre-construction Phase	PMU, PIU, Contractor

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	and surface soil from forested areas.			requires permission from the Forest Department.		
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.			The subproject will not impact any protected areas, critical habitats or endangered species. However, the subproject is expected to cut 25 trees at the site, which requires permission from the Forest Department.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
Biodiversity Act 2003	Sets forth national sovereignty over genetic resources; ensures conservation and sustainable use of biochemical and genetic resources; promotes equitable sharing of benefits derived from genetic resources; promotes technology transfer and capacity building; recognizes and protects traditional knowledge, innovation, and practices of local communities associated with biodiversity; regulates the collection of genetic resources and prevents illegal access; recognizes and protects farmers' and breeders' rights; and regulates plant variety and property rights and use.	No specific permit required, but any development project needs to comply with the provisions of this Act.	National Environment Commission	Subproject is not located in ecologically sensitive areas. 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.	Design Phase / Pre-construction Phase	PMU
Occupational Health and Safety						
Bhutan Constitution 2008	The following are relevant provisions on protection of workers:	No specific permit required, but any development project needs to comply with the	N/A	The subproject will involve workers. These provisions of the constitution on	Design Phase / Pre-construction Phase / Construction	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	• Article 5 (2.d) ensures a safe and healthy environment. • Article 9 (12) endeavors to ensure the right to work, vocational guidance and training and just and favorable conditions of work. • Article 9 (13) endeavors to ensure the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay. • Article 9 (14) ensures the right to fair and reasonable remuneration for one's work. • Article 9 (17) takes appropriate measures to eliminate all forms of discrimination and exploitation against women including	relevant provisions of the constitution.		workers' occupational health and safety will be complied by the subproject.	Phase / Operation Phase	

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	trafficking, prostitution, abuse, violence, harassment and intimidation at work in both public and private spheres. • Article 9 (18) takes appropriate measures to ensure that children are protected against all forms of discrimination and exploitation including trafficking, prostitution, abuse, violence, degrading treatment and economic exploitation. • Article 9 (22) provides security in the event of sickness and disability or lack of adequate means of livelihood beyond one's means of control.					
Labour and Employment Act (LEA) 2007	Provides for the regulation of employment and	Foreign worker permit	Ministry of Labor and Human Resources	The subproject will involve contractors and	Design Phase / Pre-construction Phase /	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	working conditions, including occupational health and safety, labor protection and relations as well as setting of occupational standards and certification. The Act aims to improve employees' work environment and working conditions to safeguard and keep work ability, prevent occupational accidents, diseases, and other physical or mental problems related to work.			workers. PMU will ensure that Contractor(s) comply with the relevant provisions of this Act	Construction Phase / Operation Phase	
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	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	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. The PMU will monitor compliance of the Contractor(s) in providing for safe and healthy working conditions during construction of the buildings.	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
Service Industries 2006)	as well as other persons at workplaces from work-related risks to 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	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	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	risks to their health, safety, and wellbeing. It also prescribes the roles and responsibilities of the workers and employers in ensuring health and safety at the site.			safety and protection equipment, where needed. PMU 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	No specific permit required, but any development project needs to comply with the provisions of this Act.	Thimphu Thromde	The subproject is a housing project requiring designs to ensure disaster resiliency. Provisions for disaster resilience will be included in the infrastructure designs. Project will be also guided by the Phuentsholing Thromde Disaster	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	respond to emergencies.			Management Committee (DMC) in case of any emergency.		
Others						
Bhutan Building Regulation 2018	This regulation defines the set of 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: (i) prescribe standards for the construction and demolition of buildings, (ii) prescribe requirements for the design and siting of single dwellings and associated buildings, (iii) prescribe standards and matters relating to the maintenance of fire safety and safety measures, (iv) provide for matters relating to the accreditation of building products,	Building construction approval / permit	Thimphu Thromde	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.	Design Phase / Pre-construction Phase	PMU

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	construction methods, designs, components and systems connected with building work, and (v) prescribe qualifications and 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			The subproject involves building construction. Although not mandatory, the		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	basic concepts, sustainable green principles and approaches that will be practical for consideration in the design and 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.			subproject may use this set of guidelines as reference during design phase.		
Bhutanese Architecture Guidelines 2014	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			The subproject involves building construction. Although not mandatory, the subproject may use this set of guidelines as		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	architecture and its values while providing a guide to what could be appropriate for new design and construction in Bhutan according to the values found in traditional architecture of Bhutan.			reference during design phase.		

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.[19] 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.[20] 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;

[19] 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
[20] 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 these conventions, the most relevant to the subproject are in Table 4. There are no elements of the project that contravene the direction and intentions of these conventions.

Table 4: International Environmental Agreements

	International Environmental Agreement	Ratified	Relevance	Remarks
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 in case of chance finds.

	International Environmental Agreement	Ratified	Relevance	Remarks
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 Transboundary 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 follow NEC requirements, including 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

	International Environmental Agreement	Ratified	Relevance	Remarks
				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 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 ADB SPS Requirements and National Environmental Regulations

	ADB SPS Principles	National requirements	Extent of Equivalence or Gaps	Gap-filling Measures
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	No gaps	None required

	ADB SPS Principles	National requirements	Extent of Equivalence or Gaps	Gap-filling Measures
		environmental assessment documents to the CA where the project is classified 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	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). 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. 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". 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."	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

	ADB SPS Principles	National requirements	Extent of Equivalence or Gaps	Gap-filling Measures
				independently 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.	Forest and Nature Conservation Act, 1995; Forest and nature Conservation Rules, Sections 62, 70 and EAA and RECOP relate to this issue. 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 MoA, 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.	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	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	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	To ensure equivalence, the project should: (i) comply with the stricter internationally recognized standards or provide justification

	ADB SPS Principles	National requirements	Extent of Equivalence or Gaps	Gap-filling Measures
	Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices.	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)	values of the national standards are less strict than the 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	if the option under the project is to use the national standards; and (ii) require the adoption of cleaner technologies and energy efficiency measures.
11	Safe working conditions	The Labour 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 Ministry of Home and Cultural Affairs (MH&CA) Any valuable cultural property discovered must be immediately reported to the Department of Culture, Ministry of Home and Cultural 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. The Drinking Water Quality Standards, 2016, was developed in accordance with Section 13 (f) and Section 42 (a) and (b) of the Water Act of Bhutan, 2011, with the aim of ensuring safe drinking water and to protect consumer health. The standard describes the quality parameters set for drinking water and the maximum permissible limit for each of the set parameters, in order to limit the level of contaminants in drinking water.

48. 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^3)			**WHO Air Quality Guidelines** (µg/m^3)	
					Global Update^ 2005	**Second Edition ^^ 2000**
		Industrial Area	Mixed Area***	Sensitive Area****		
TSP	Annual	360	140	70	-	-
	24-hour	500	200	100	-	-
PM_{10}	Annual	120	60	50	20	-
	24-hour	200	100	75	50	-
$PM_{2.5}$	1-year	-	-	-	10	-

Parameter	Averaging Period*	Bhutan's Ambient Air Quality Standard, 2010**(µg/m^3)			WHO Air Quality Guidelines (µg/m^3)	
					Global Update^ 2005	Second Edition ^^ 2000
	24-hour	-	-	-	25	-
SO_2	Annual	80	60	15	-	-
	24-hour	120	80	30	20	-
	10-minute	-	-	-	500	-
NO_2	Annual	80	60	15	40	-
	24-hour	120	80	30	-	-
	1-hour	-	-	-	200	-
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.
^ Source: Environmental, Health and Safety General Guidelines, 2007. International Finance Corporation, World Bank Group.
^^ 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_q 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 [a]
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

[a] Standards for Sewage Treatment Plant Effluent. Taken from Environmental Standards, National Environment Commission, Royal Government of Bhutan, November 2010.

49. 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, 4th 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^	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 ^^
	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
^ To be tested for ground and spring water only.
^^ 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/m3	10
Respirable suspended particulate matter RSPM (PM_{10})	8-hour average	mg/m3	5
$PM_{2.5}$ *	24-hour average	mg/m3	25
	1 Year average	mg/m3	10
Sulfur dioxide (SO2)	8-hour average	mg/m3	1
Nitrogen Oxide (NOx)	8-hour average	mg/m3	1
Carbon monoxide (CO)	1 hour average	mg/m3	5
Pb 17**	1 hour average	mg/m3	0.0005

Parameter	Period	Unit of measure	Standard
Ozone***	8-hour average	mg/m3	0.08

Source: Environmental Standards, National Environment Commission, Royal Government of Bhutan, November 2010.
PM 2.5 *- Gravimetric/light-scattering/beta attenuation-based instruments
**National Institute of Occupational Safety and Health (NIOSH) Method 7303
***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 PROJECT

A. Subproject Location and Area

50. The Thromde lies within Phuentsholing Dzongkhag (District), which is administratively part of the 1882.38 km^2 ChukhaDzongkhag.[21] Phuentsholing Thromde is located on the southwestern border of the country. It is the western point of entry by road and the primary gateway from India to Bhutan and because of this, it has easy access to cheap labor and raw material. It is the western

[21]http://www.chhukha.gov.bt/index.php/about-district.

commercial and economic capital as well as an industrial hub due to the Pasakha Industrial area where much of the production and manufacturing industries are located.

51. Phuentsholing was established as a Class A Thromde by the Parliament in 2010 with an area of 15.6 km^2 [22] and development in the municipality was guided by the Phuentsholing Urban Development Plan (PUDP) 2002-2017 wherein Phuentsholing was demarcated into various zones (residential, commercial, mixed use). Changes made in the PUDP 2002-2017 and harmonized in the Phuentsholing Structure Plan (PSP) 2013-2028.[23] Under the PSP, the thromde area was defined by precincts and 11 Local Area Plans (LAPs).

[22] MOWHS, 2010. Approved Thromdes and Boundaries
[23] Department of Human Settlement, 2016. Compliance and development review Phuentsholing Throm. MOWHS.

Figure 1: Map Showing Project Location

Sources. Phuentsholing Thromde and NHDCL

52. Phuentsholing Thromde 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.

53. The project site is located at Rinchending, which is is 4.5km from Phuentsholing town LAP (26°50'31.5" N 89°39'53.4" E) at an elevation of 250m. The site is about 250m away from the Indian-Bhutan border. The site is accessible from the Phuentsholing-Pasakha access road, which takes off from the main highway below Kharbandi Monastery and Rinchending Goenpa.

Figure 2: Ground Level View at Subproject Site

B. Subproject Rationale

54. 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 district with the second highest population in the country. 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, and travel into Bhutan to work each day. The Dzongkhag 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.[24] Since the COVID 19 pandemic affected Bhutan, the government urged Bhutanese to move 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.

55. Under the 12 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.

C. Subproject Alternatives and Site Selection

56. Within the municipality/district, this site has been chosen in addition to two other sites, which together combined are still inadequate to sufficiently provide affordable housing for the target beneficiaries. There are no project alternatives because of the shortage of housing in the

[24] Rai, Rajesh. 'Bhutanese residing in Jaigaon starts moving to Phuentsholing', Kuensel, March 17, 2020.

city. The government has placed great emphasis on improving livability and reducing disparities in access to affordable housing for low-income groups, and this subproject is part of the government's effort to reduce housing shortage.

57. 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 works within or near environmentally sensitive locations (must be at minimum distance of 500 m), including sites with national or international designation for nature conservation, cultural heritage, or any other purposes.[25]
(iv) 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.
(v) Does not lead to degradation of cultural properties, and loss of cultural heritage values and tourism revenues.
(vi) 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);
(vii) Does not lead to alteration of surface water hydrology of streams/waterways through diversion of flow or reclamation;
(viii) 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),
- 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;[26]

(ix) 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;
(x) Avoids area with risk of landslides, unstable lands, etc. based on historical data, including geotechnical studies, if possible;
(xi) 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;

[25] The subproject shall comply with Thimphu's DCR-2016 particularly on sanctions pertaining to allowed locations for housing developments.
[26] US EPA: Questions and Answers About Electric and Magnetic Fields (EMFs).

(xii) Area that is included in territorial jurisdiction of the municipality/town/city (Thimphu city for this subproject), compliant with land use regulations, and any urban development plans or master plans of the national or local government;

(xiii) 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;

(xiv) 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.;

(xv) 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

(xvi) 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

58. The subproject in Rinchending (that is the focus of this IEE) is one of 9 subprojects designed by the NHDCL that will provide affordable housing in six dzongkhags (districts), bringing the above benefits (and others) to an estimated 1,026 – 1,062 urban households - mostly low-income civil servants, corporate employees and wage workers.

59. For Rinchending, the subproject involves construction of 18 three-storey residential buildings comprising of total 108 units, with internal access road, parking, creation of a green space and a service center. Table 13 below shows the size of the various components of the subproject, while Figure 3 shows the layout.

Table 13: Details of the Housing Complex in Rinchending

Sl. No.	Building Type	Number of Buildings	Total No of Units	Measurements
1	Category III (Type I)	10	60 (10 Bldgs. x 3 floors x 2 units)	Plinth area (1st floor): 201.07 m^2 (2,164.3 sq. ft.) Unit area: 100.50 m^2 (1,081.70 sq. ft.)
2	Category IV (Type I)	8	48 (8 Bldgs. x 3 floors x 2 units)	Plinth area (1st floor): 132.50 m^2 (1,426.22 sq. f.t) Unit area: 66.25 m^2 (712.85 sq. ft.)
	Total	18	108	
	Facilities			
4	Service Center (2 floors); Plinth area: 194 m^2 (2,087.44 sq.ft.)			
	Waste Station (1 floor); Area: 179.58 m^2 (1,932.28 sq.ft.)			
5	Internal road and parking (To fit 72 light vehicles and 64 2-wheelers)			

Sl. No.	Building Type	Number of Buildings	Total No of Units	Measurements
6	Other facilities • Pedestrian footpath • Recreational area/Green space • Drinking water storage tanks • Rainwater harvesting tank • Power supply sub-station			

Figure 3: Layout Plan

Source: NHDCL

60. **Building design.**[27] The buildings are designed keeping in mind the location within the Local Area Plan and Development Control Regulation 2016, Building Regulation, 2018 and the Bhutan Building Code, 2018. These rules and regulations set out the requirements which apply to the construction of buildings, and 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.

[27] 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.

61. 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).

62. 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.

63. **The Category III (Type I) building** will include 1 Living room, 2 Bedrooms, 2 Toilets, 1 Kitchen and 2 Balcony.

64. **The Category IV (Type I) building**willinclude1 Living room, 2 Bedrooms, 2 Toilets, 1 Kitchen and Balcony.

65. **Service Center**. The Service Center will be centrally located and accessible to all buildings and will have two floors with specific subcomponents and dimensions in Table 14 below.

Table 14: Dimensions for Service Center

	Service Center Subcomponents	Measurements
Ground Floor		
1	Reception area with information desk	7950m x 4240m
2	Youth Library	7950m x 4995m (2650m)
3	Clinic	6300m x 3900m
4	Sleeping Bay	4175m x 4500m
5	Pantry	2000m x 4500m
6	Indoor play area	6300m x 5150m
7	Store	2500m x 4870m
8	Community Police Office	5200m x 4870m
9	Male and female toilets (4numbers)	6300m x 2625m
10	Outdoor play area/Creche	6500m x 11300m
First Floor		
1	Lobby/Service Area	5925m x 533 m
2	Community Integration Hall	14500 m (8050m) x 6575m
3	Counseling room	3950 m x4360 m
4	Recreational room	7950m x 4880m
5	Youth hostel	6425 m x 3250m
6	Women's hostel	4125 m x 3250m
7	Toilets (M and F)	2700m x1500 m
8	Toilets (M and F)	4125m x 2525m

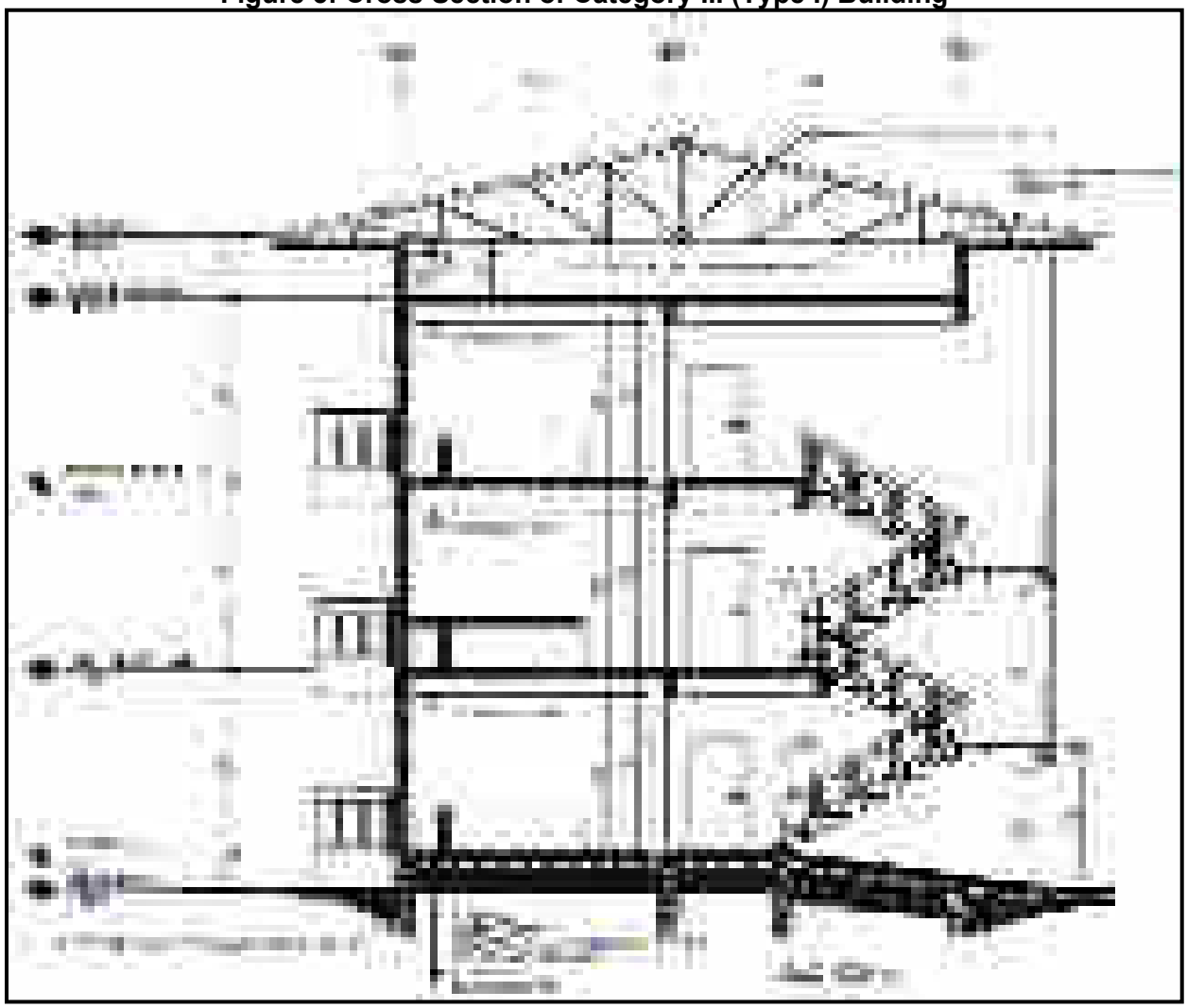
66. **Waste station**. The waste station is located towards the entry of the site. It will have the following subcomponents: (i) a waste segregation area (7.15m X 5m), (ii) sorting and storage area

(5.125m X 5m), (iii) office space (6.44m X 5m), (iv) training room(7.785m X 5m), (v) composting space (4m X 3.4m), and (vi) one washroom each for male and female.

Figure 4: Front elevation of the Category III (Type I) Building[28]

[28] See footnote 35.

Figure 5: Cross Section of Category III (Type I) Building[29]



[29] See footnote 35.

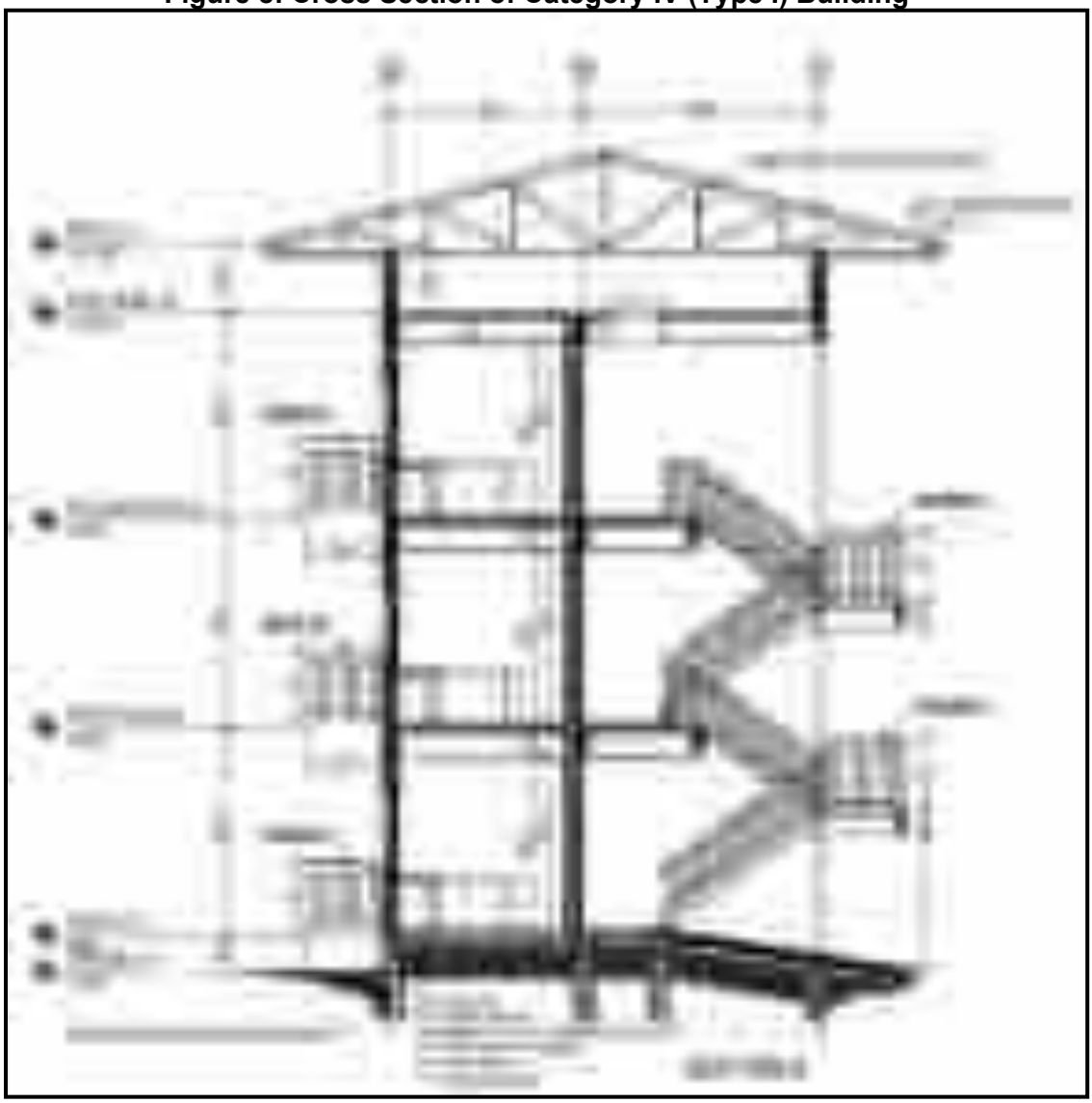
Figure 6: Layout / Floor Plan of Category III (Type I) Building[30]

[30] See footnote 35.

Figure 7: Front View of Category IV (Type I) Building[31]

[31] See footnote 35.

Figure 8: Cross Section of Category IV (Type I) Building[32]



[32] See footnote 35.

Figure 9: Layout / Floor Plan of Category IV (Type I) Building[33]

[33] See footnote 35.

Figure 10: Layout / Floor Plan for the Service Center - Ground Floor[34]

[34] See footnote 35.

Figure 11: Layout / Floor Plan for the Service Center - First Floor[35]

67. **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 this period, the drinking water pipes and electrical lines will be shifted out of the site boundary in consultation and with the assistance of the Thromde and the Bhutan Power Corporation (BPC). Prior to any shifting works, the subproject will check if the existing water pipes (or any portion thereof) in the area are asbestos cement (AC) pipes. When AC pipes are found, the subproject will engage a competent expert to undertake risk assessment and develop asbestos management plan. Such plan will be used during the site preparation works to ensure the appropriate handling of AC pipes.

Figure 12: Drinking Water Pipes Passing Through the Site

[35] See footnote 35.

Figure 13: Electrical Lines Passing Through the Site

68. **Design Capacity**. For this housing development, the design assumes five persons to reside in each unit which translates to about 540 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.

69. **Water supply details**. The supply of water for the housing complex will be from municipality. The municipality is responsible for ensuring regular supply of water to all buildings within the city. 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 540 total residents in this housing complex. Each building will be provided with a two numbers of 2,500-liter overhead water tanks. Thus the total storage capacity in each residential buildings is 5,000 liters. On average each person will have almost 100 liters of water. In addition to this, the service center block will also be provided with one 2,500-liter storage tank.

Table 15: Daily Water Requirement Calculation

Building	Total number of units	Number of persons	Water Consumption
Category III Type-I	60 units	60 units x 5 persons/unit = 300 persons	300 persons x 100 liters/person = 30,000 liters
Category IV Type I	48 units	48 units x 5 persons/unit = 240 persons	240 persons x 100 liters/person = 24,000 liters

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

Figure 14: Rainwater Harvesting Tank Details

71. **Electrical power supply**. Although the existing buildings at the site are already connected to the power supply, due to the substantial increase in number of apartments, this will not suffice. The NDHCL will outsource the design and technical requirements for this to the Bhutan Power Corporation that will assess the electrical requirements, provide the technical specifications and install the substation and required distribution lines. The cost of this will be borne by NHDCL.

72. **Septic tank and soak pits**. The Septic tank will receive both WC waste and Sullage from the buildings. In this housing complex there are 7 proposed septic tank and soak pit. Based on the number of building connecting to the septic tank the standard dimensions of septic tank including wall is 6.3m x 2.35m. The tank will have one soak pit (2 m diameter) and the Septic tank will have two sections; Settling chamber 1 (3.7m x 1.85m) and Settling chamber 2 (1.85mx1.85m).

Table 16: Calculation for Septic Tank Sizes

Design data	**Remarks**
Average number of persons per unit	5 for 2 bedroom, 3 for 1 bedroom
Total number of septic tanks	7
Total number of persons	540 (approx. 78 x7)

Design data	Remarks
Septic tank will receive both WC waste and Sullage	
Volume of sewage entering the tank daily	11340 liters
Ambient temperature in water	20 degrees Centigrade
Retention period for the wastewater in the septic tank	24 hours
Period between desludging	1 years
Depth of tank	1.7m
Gap between water level and underside of cover slab	0.3m
Length to breadth ration of tank	3
Calculation	
Sewage flow	126 liters
Sizing factor	1.15
Sludge and scum accumulation rate/person/year	40 liter
Volume of sludge and scum	8280liter
Required tank volume	19620
Plan area of tank	11.54m2

Figure 15: Schematic Diagram of Septic Tank and Soak Pit (3-D)

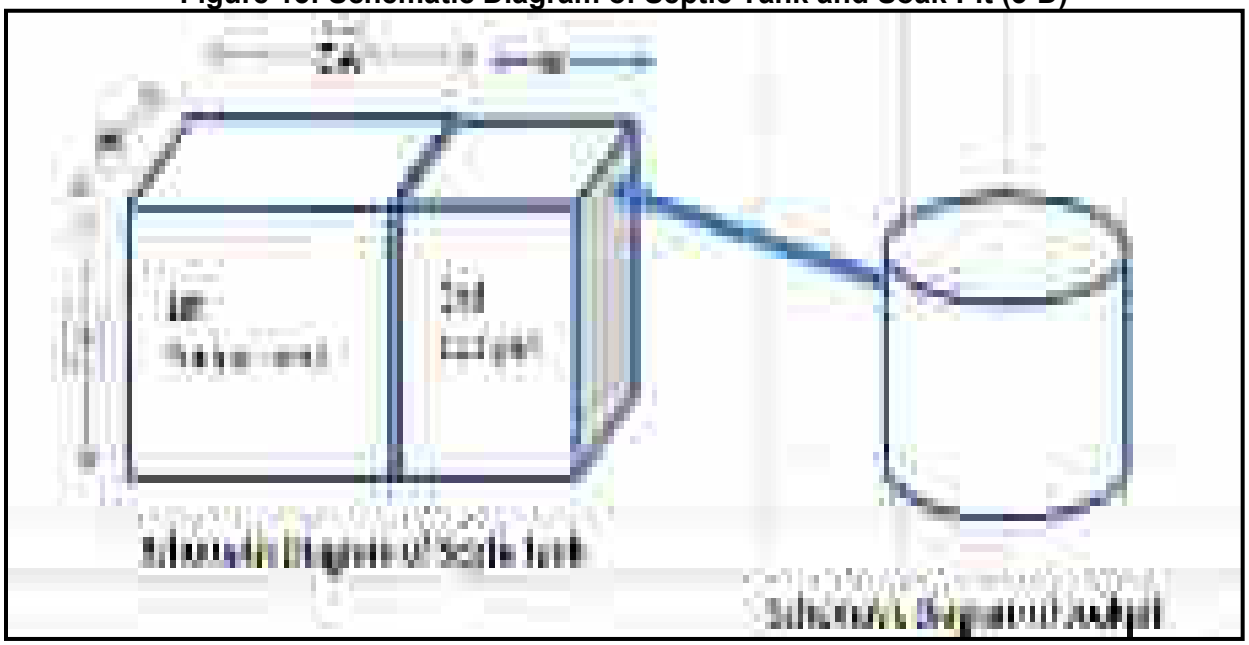


Figure 16: Schematic Diagram of Septic Tank and Soak Pit (Top View / Cross Section)

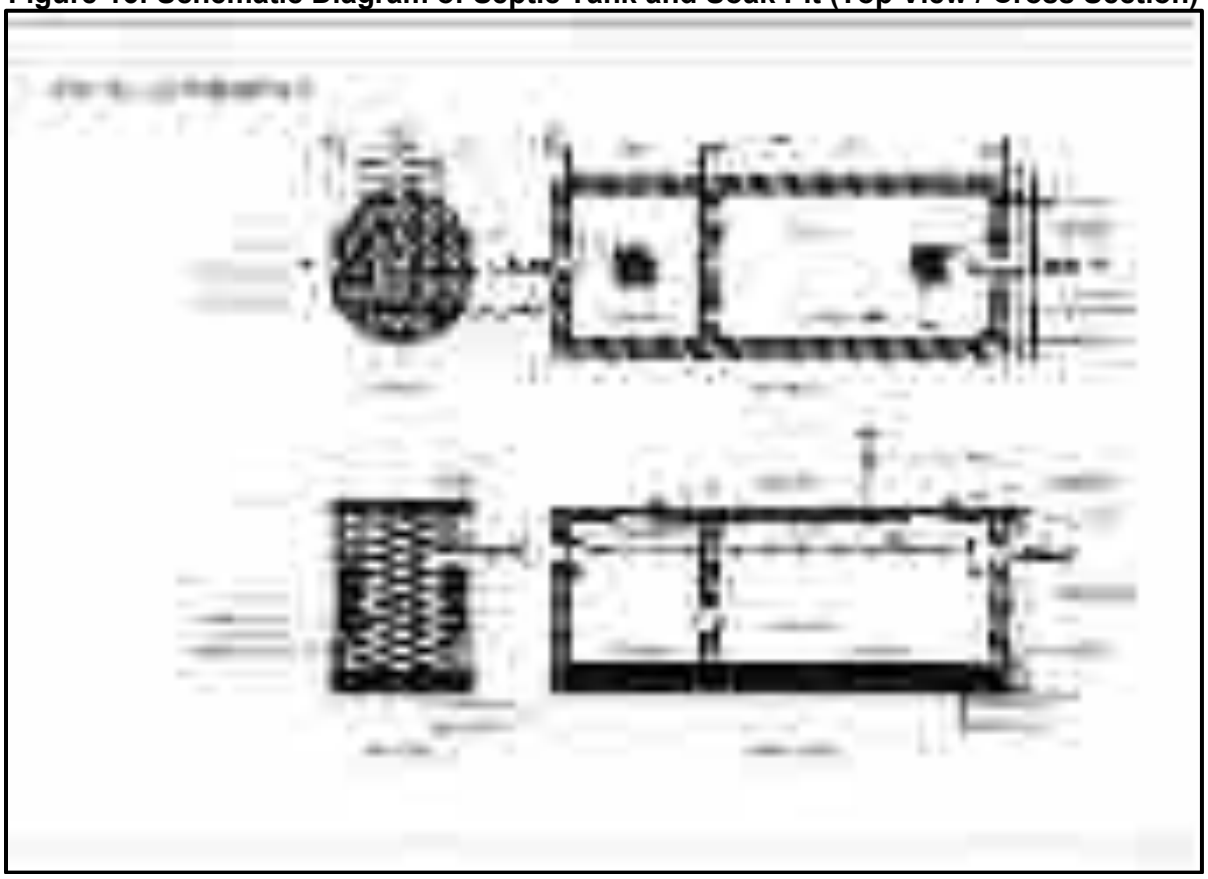


Figure 17: Schematic Diagram of Interception Pit and Manhole Chamber

73. **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 0f 450mm wide and the secondary storm water drain will be connected to main storm water drain of 900mm wide that runs N-S through the site and to the bio-swale at the end of the site.

74. **Site accessibility, entry, exit and internal roads**. The proposed main access to the site is from the proposed lap road. There will be only one entry and exit for the site. In the site the parking is designed to accommodate 72 light vehicles and 64, 2 wheelers. The following figure shows the 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.

Figure 18: Site Access, Internal Road and Pedestrian Footpaths

Figure 19: Internal Road and Parking Cross Section Details

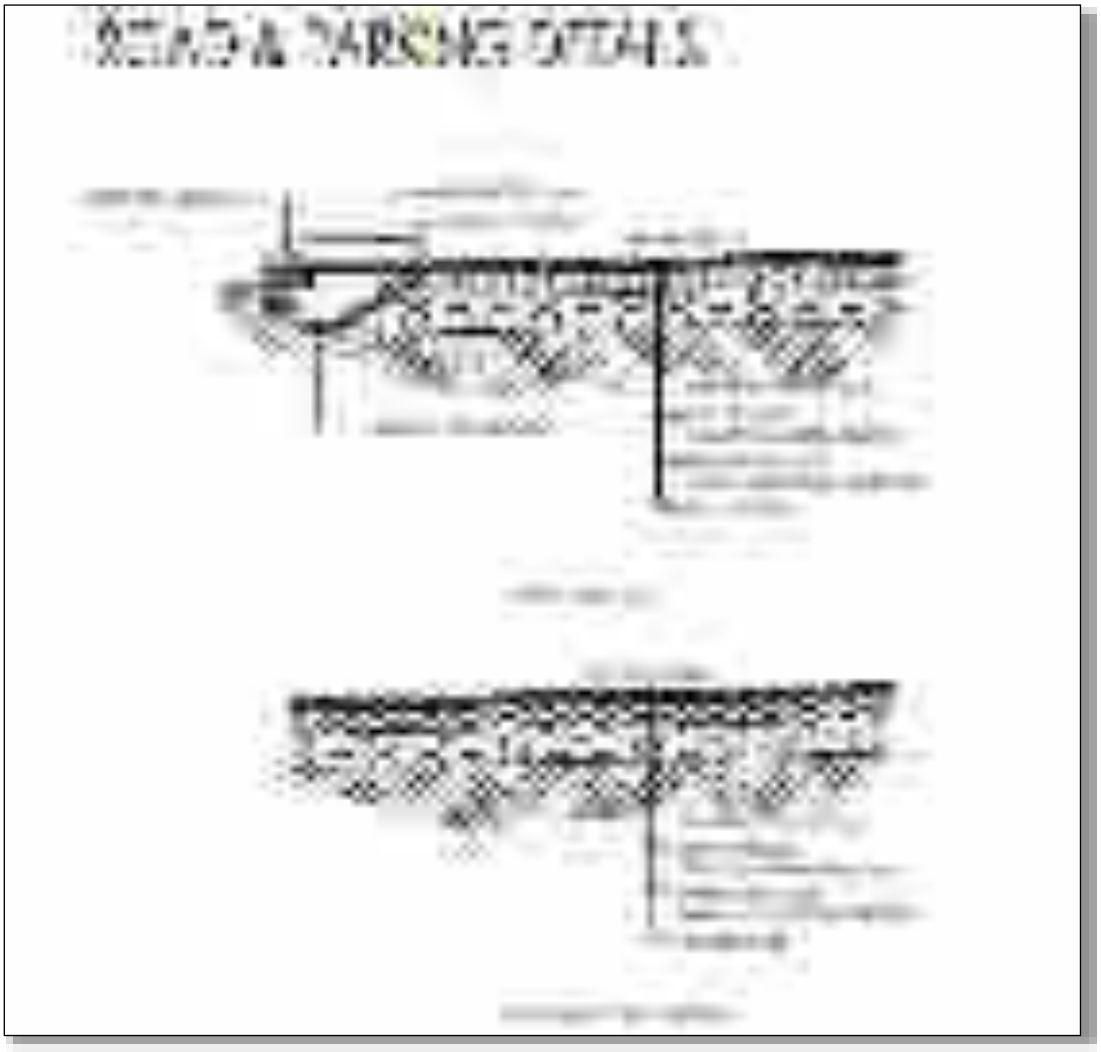
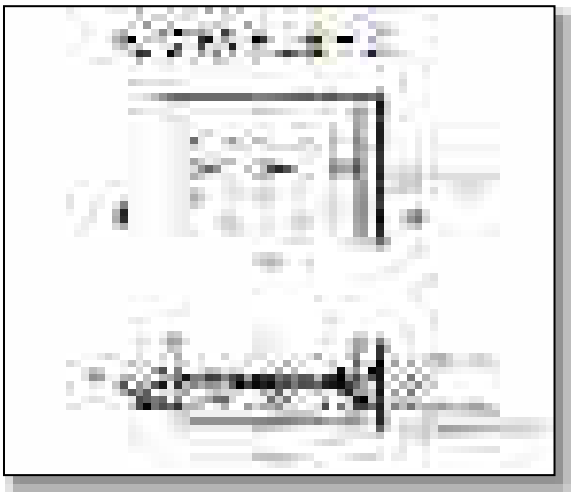


Figure 20: Drain and Footpath Cross Section Details



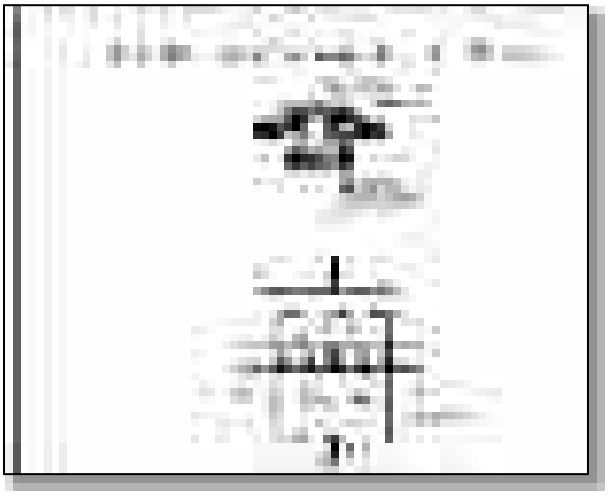


Figure 21: Boundary Wall and Chain Link Fence Details

75. **Building construction materials** This includes steel for footing, columns, beams and slab; Random Rubble Masonry (RRM) wall for foundation, hard stones for stone filling; cement, sand, graded crushed rock for concrete works, Aerated Autoclaved Concrete blocks (AAC) for walls, FRP for window frames and cornices. WPC for door frames. Tiles for flooring, Unplasticized Polyvinyl Chloride (UPVC) for windows. Mild steel for railings, Steel tubular truss, Pre-painted Galvanized Iron (PPGI) sheet roofing. For toilets and drainage Chlorinated Polyvinyl Chloride (CPVC) pipes, HDPE Pipe, Indian-type vitreous water closet squatting pan and European-type vitreous water closet pedestal for Plumbing and sanitary works. The details of the material quantities are included in annex. Materials codes, standards and specifications are as follows:

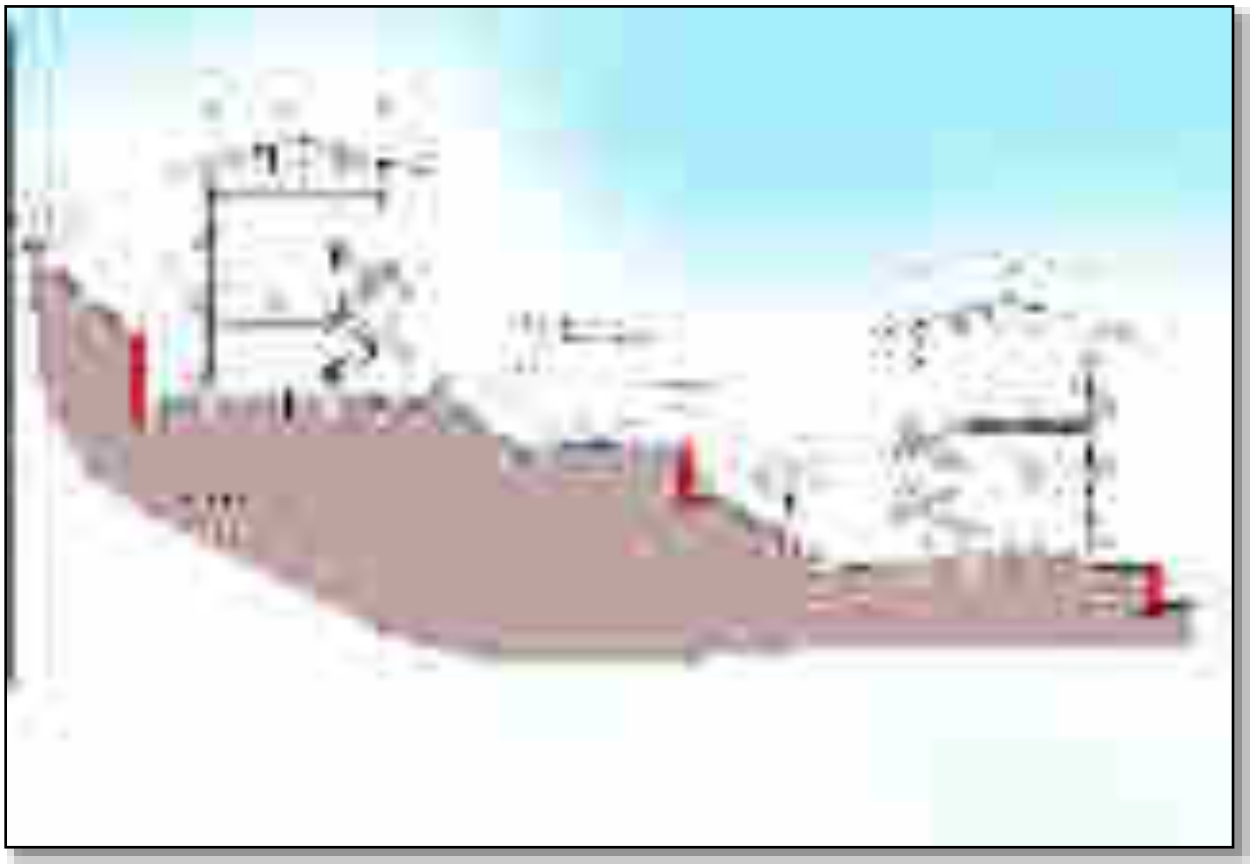
(i) Steel: IS 800:2007, SP6:1972 (Part 1-6), IS 1161:1998 (Tubular Sections), IS 808:1989;
(ii) Concrete: IS-456_2000 (Plain _ Reinforced Concrete Code of Practice);
(iii) Masonry (manufactured): IS 2185:2005 (Part 1);
(iv) Wood: IS 3629:1986, IS 883:1994; and
(v) Earth and stone: IS 2185:2005 (Part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

76. Construction materials such as aggregate, sand and stone will be a major component will be sourced from local authorized suppliers from Phuentsholing. Other materials such as plywood, tiles and bathroom fixtures will be purchased from local suppliers, if available, or directly from India.

77. **Construction Technology**. The contractors 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.

78. **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%). Site hazard mitigation measures also include storm water drains and retaining walls. The figure below shows the design of the retaining wall is shown. Retaining walls will be constructed behind and in front of the buildings. In the center, the parking will be constructed over the retaining wall.

Figure 22: Site Hazard Mitigation

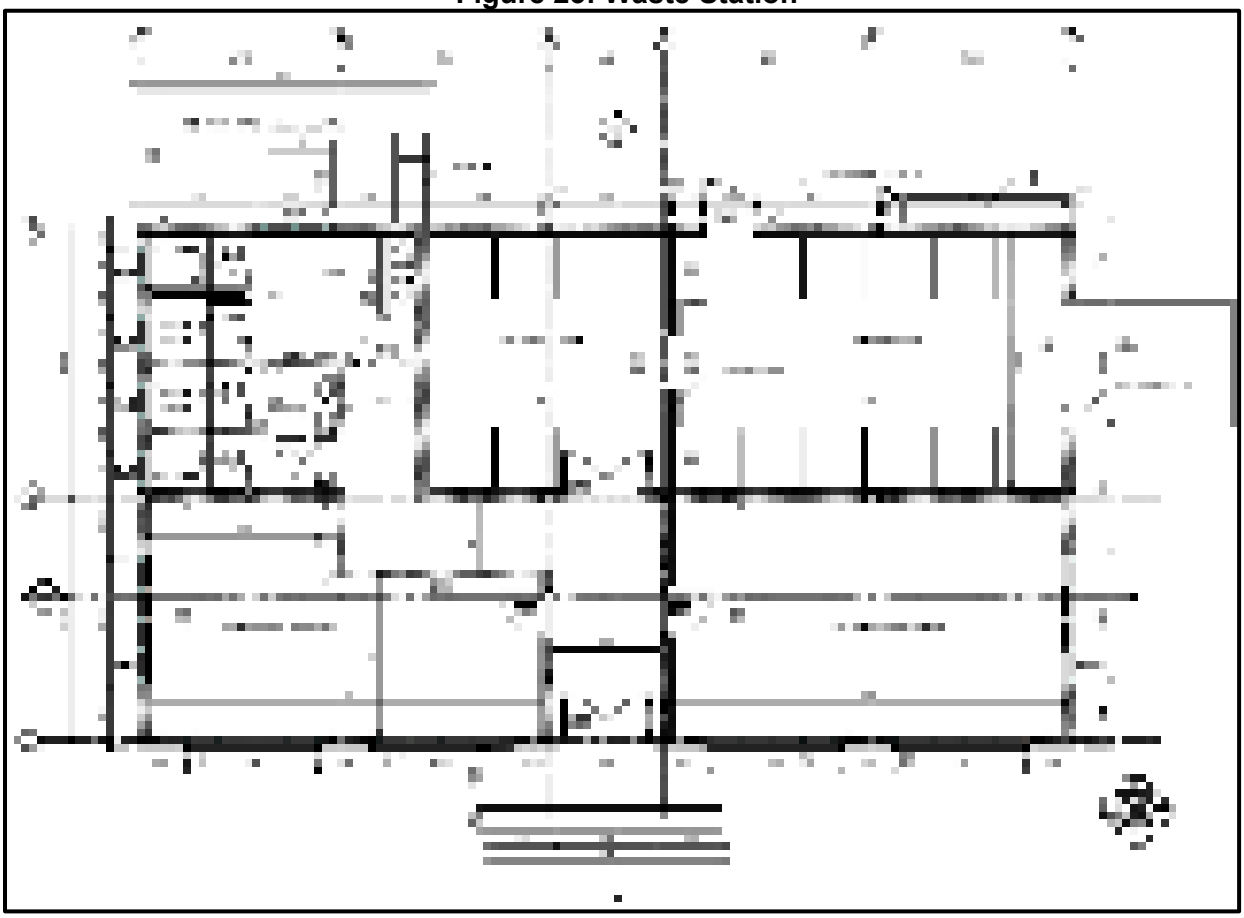


79. **Fire safety**. In terms of fire safety, the building designs are in compliance with the Bhutan Building Standard (BTS)-014 and Part 6 of the Building Code 2018. According to the Code, Exits are located so that the travel distance of 22.5m to the exit on each floor has been maintained. Each building will be provided with a fire dry hydrant, that will be utilized when the fire engines is mobilized from the Thromde during a fire emergency. A Hose pipe will be stored in the staircase landing area of the selected building.

80. **Solid Waste Management**. Currently the municipal waste collection point is near Kharbandi, near Shop #7. Due to this, a waste station is proposed wherein the waste is segregated and stored until collected by the waste trucks. The NHDCL will discuss with the municipality on the pickup services for waste.

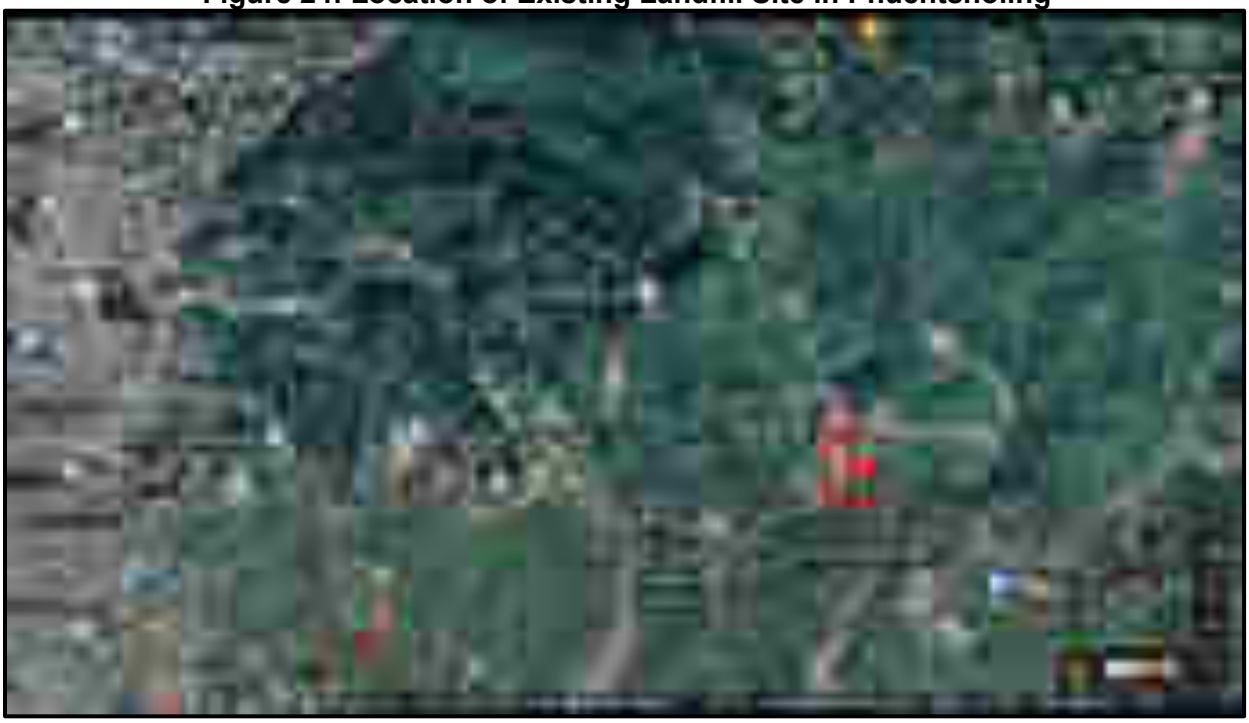
81. The waste station design comprises of single storey structure with separate compartments for sorting, segregation and kitchen waste composting. The waste station will be managed by the resident(s), who will be trained in waste management. If there are no volunteers from the residents, NHDCL will employ caretakers to manage the waste station. The caretakers will likewise be trained in waste management.

Figure 23: Waste Station



82. During construction phase, all wastes will be disposed at the landfill site of Phuentsholing Thromde, which is located in Toribari (marked W on the map below) and about 3.5 km away from the subproject site. The disposal site will be utilized after seeking the necessary permit from the Thromde, unless otherwise instructed by the Thromde to dispose in any other separate approved disposal site. The cost of transportation of the waste to the disposal site will be included under the construction cost.

Figure 24: Location of Existing Landfill Site in Phuentsholing



83. **Green area and landscaping**.47.93% of the 5 acres of land will be left as green area. The green area is located next to the service block 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.

84. **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

85. 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 complete in 24 months, after which post construction activities will be undertaken (6 months).

Table 17: Work Schedule (in months)

		Months Period				
	Activity	**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)					

	Activity	Months Period				
		1-2	3-4	4-6	6-32	33-39
6	Construction (24 months)					
7	Post development works (6 months)					

F. Resource Utilization

86. 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, autoclaved aerated concrete blocks, glass fibre reinforced concrete, glass, steel and timber. Most of the materials will be sourced from local authorized suppliers within Phuentsholing and Thimphu.

87. 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.

88. Currently, water supply line exists in the area, and the subproject construction will source water requirement from this line. However, for any bulk water supply needs for the building construction, the contractor will be responsible for outsourcing the same.

89. To cater to the increased electrical requirements, a substation will be installed at the site. This will be outsourced to Bhutan Power Corporation who will design and build the substation to cater to the new housing complex. The cost of this will be borne by NHDCL.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Baseline information

90. The Thromde lies within Phuentsholing Dungkhag (Sub divisional district), which is administratively part of the 1882.38 km^2 ChukhaDzongkhag.[36] 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 km^2.[37]

[36] http://www.chhukha.gov.bt/index.php/about-district
[37] MOWHS, 2010. Approved Thromdes and Boundaries.

Figure 25: Map Showing Project Site

Sources. Phuentsholing Thromde and NHDCL

91. Phuentsholing has been classified as a Class A Thromde[38] and extends from Amochhu to Pasakha along the south-western 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.

92. Rinchending is 4.5km from Phuentsholing town LAP (26°50'31.5" N 89°39'53.4" E) at an elevation of 250m above sea level. The site is about 250m away from the Indian-Bhutan border. The site is accessible from the Phuentsholing-Pasakha access road, which takes off from the main highway below Kharbandi Monastery and Rinchending Goenpa.

B. Project Influence Area

93. 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, 200 m from the subproject boundaries is considered as the subproject influence area. Field investigation revealed that there are no sensitive areas or receptors within this area of influence, except for some few scattered residential houses around the vicinity of the site. Other known receptors nearest the site are located outside this area of influence. Figure 26 shows these receptors.

Figure 26: Receptors Located Outside the Subproject Area of Influence

[38]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.

Table 18: Ground Level Photos of the Subproject Site and Immediate Surroundings

Farmland and private house (south) adjacent to the site	
Private Residential building – above project site-30m	
Residential house-north east-30m	
Residential house-west (30m)	

Indo-Bhutan Border (300m) South	
Existing access road to site	

C. Land Environment

94. **Topography, geology and soils**. Bhutan has very rugged terrain with elevations ranging from 160 meters to more than 7,000 meters above sea level.[39] At the particular site, the flat terrain within Bhutan barely stretches 200 m. The bottom of the site is on gentle slope with increasing steepness on the upper slopes, as can be seen from the elevational figure below.

[39] NSB. 2020. Statistical yearbook of Bhutan 2020. National Statistical Bureau.

Figure 27: Contour at the Subproject Site

95. 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.[40]

96. The geology of the area falls into Phuentsholing Formation belonging to Baxa Group of Rocks which comprises of quartzite, greenish grey, variegated and carbonaceous phyllilite. The formation falls over the Main Boundary Thrust and signs of active faulting within the formation itself has been reported.[41]

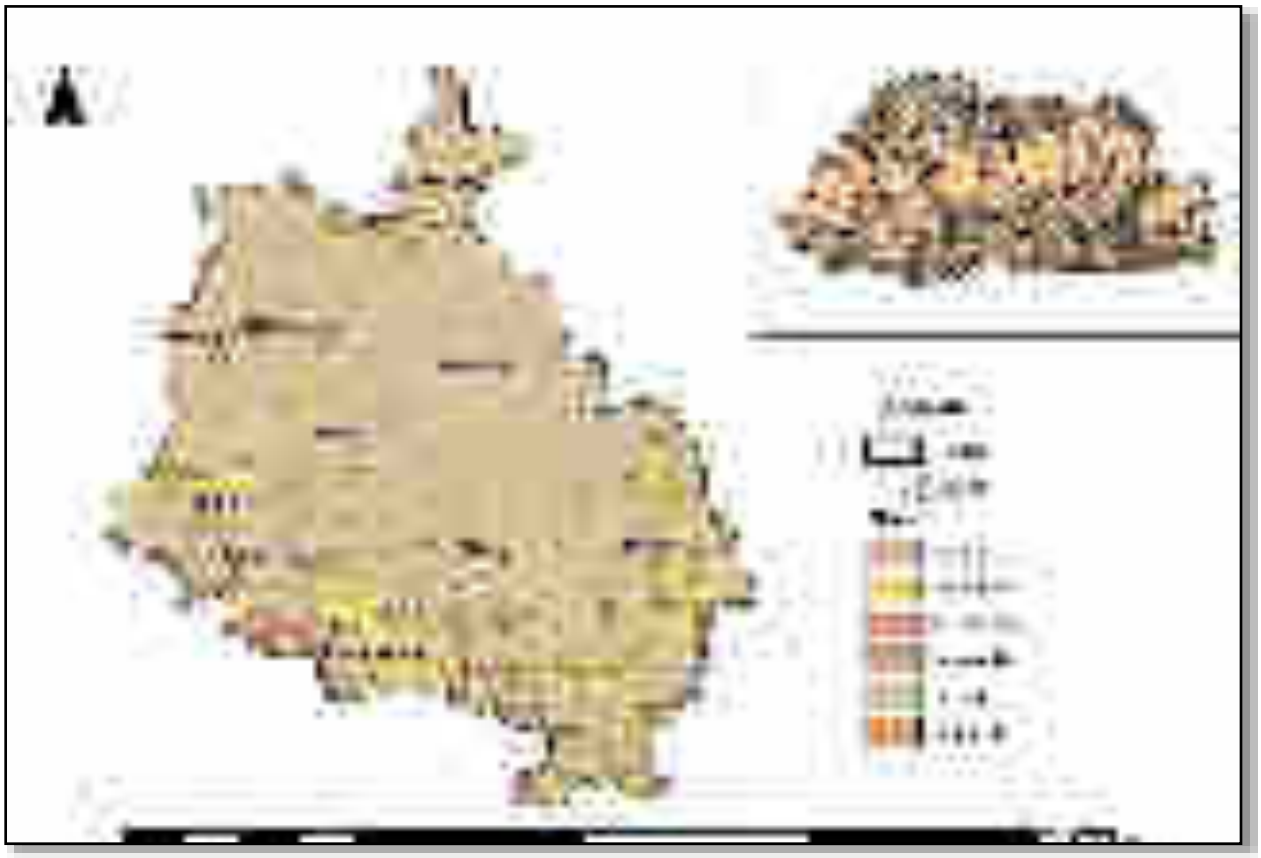
97. The soil map of the world prepared by FAO and ISRIC was used to extract the soil information for Bhutan. The scale of the latest available soil map is of 250 meters grid; therefore, it is the best available data to extract the soil information for the project areas. The figure below shows the types of soil and their coverage.[42]

[40]. UNDP/GEF. 2014. Addressing the risk of climate induced disasters through enhanced National and Local capacity for effective actions.

[41] Department of Geology and Mines, 2013. Report on the technical feasibility of four critical landslides within the extended township of Phuentsholing. Annex 4.1

[42]FAO and ISRIC (International Soil Reference and Information Centre)

Figure 28: Soil Map



Source: FAO and ISRIC (International Soil Reference and Information Centre)

98. Chukha Dzongkhag has 5 types of soil excluding the glacier/ice. Luvisols soil type[43] is found covering about 80.36% of the total area of the district. Cambisols soil type covers an area of 326.88 km^2 (17.44%) while Leptosols cover only about 13.43 km^2 (0.72%). Soil testing is being carried by the geology study team.

D. Air Environment

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

100. 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).

[43]Luvisols are technically characterized by a surface accumulation of humus overlying an extensively leached layer that is almost devoid of clay and iron-bearing minerals. Cambisols are soils at an early stage of soil formation and are categorized by the absence of a layer of accumulated clay, humus, soluble salts, or iron and aluminum oxides. The texture of the subsurface horizons is sandy loam or finer, with at least 8 percent clay by mass and a thickness of 15 cm (6 inches) or more. Leptosols are soils with a very shallow profile depth and they often contain large amounts of gravel. They typically remain under natural vegetation, being especially susceptible to erosion, desiccation, or waterlogging, depending on climate and topography

Figure 29: Monthly Average Maximum Temperature Variation in Phuentsholing

101. The monthly average minimum temperature from the year 2008 to 2020 in Phuentsholing is shown in Figure 30. 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 30: Monthly Average Minimum Temperature in Phuentsholing

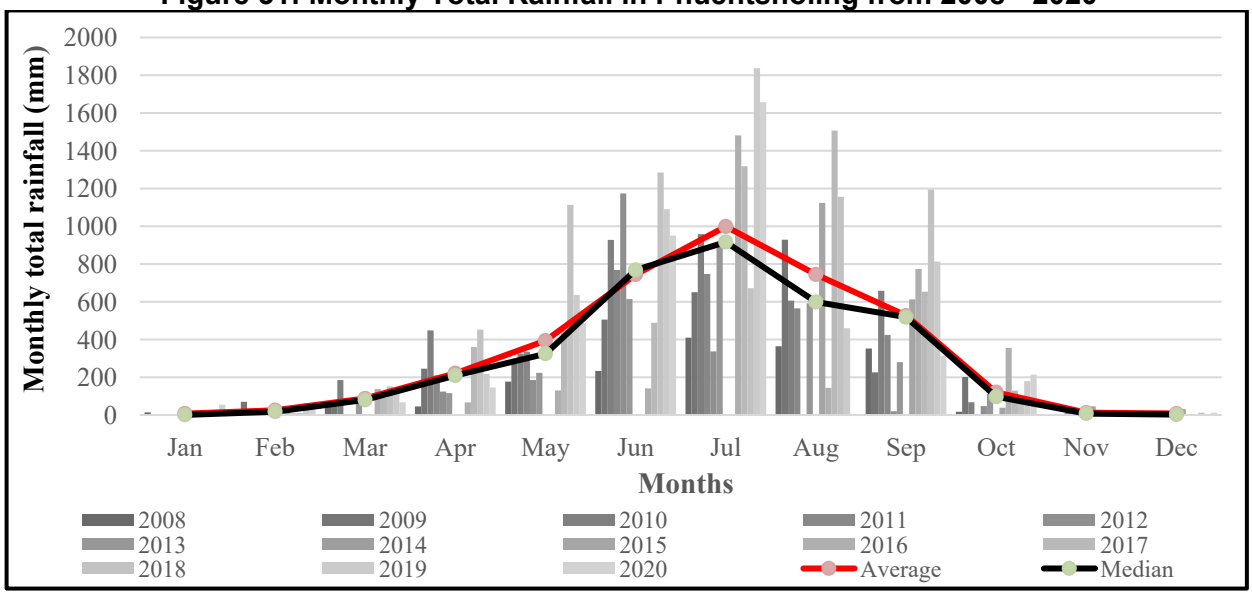
102. shows the monthly long term average maximum and minimum temperature of Phuentsholing. The highest monthly average maximum temperature in Phuentsholing was recorded in August (31.8 °C) while the lowest was recorded in January (12.5°C).

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
Avg. Tmax (◦C)	24.5	26.9	30.5	31.2	31.4	31.5	31.2	31.8	31.5	31.0	29.0	25.8
Avg. Tmin (◦C)	12.5	16.0	17.5	19.0	20.0	21.5	22.5	22.9	22.0	20.0	17.0	13.9

103. **Rainfall**. The monthly total rainfall along with the long term monthly average total rainfall from the year 2008 to 2020 is shown in Figure 31. 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 31: Monthly Total Rainfall in Phuentsholing from 2008 - 2020



104. **Ambient Air Quality**. To assess the ambient air quality, the National Environment Commission has a station at Rinchending to measure PM_{10} data each year. Although this station is about 5km from the city core, as there is no other station in Phuentsholing, this is considered indicative of the general air quality of the city center. The Kharbandi area is definitely less developed or crowded compare to the city center.

Table 20: Annual Average of the State of Air Quality in Phuentsholing, 2018 - 2019

Air quality parameters	2018	2019	Ambient air quality standard (mixed area)
Station: Rinchending, Unit: µg/m³			
Total suspended particulate matter (PM_{10})	40.48	46.30	60.00
Total suspended particulate matter ($PM_{2.5}$)	24.15	30.08	40.00

Source: Statistical Yearbook of Bhutan, 2020, NSB

105. Data for 2018 and 2019 indicate that PM_{10} and $PM_{2.5}$ levels were lower than the national standard permissible levels. Data for PM_{10} levels in 2020 averaged 34.7 µg/m³. Although this is lower than the required national standard, between November –March, the levels are much higher

but when comparing individual months; the PM_{10} levels are high on individual day, but very high in general for February.

Table 21: PM10 Data for CST, Rinchending for 2020

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
29.35	**0**	36.17	73.20	18.65	18.96	26.43	14.70	40.07	17.80	21.71	23.02
34.09		35.60	52.19	18.32	25.72		17.95		21.49	20.39	28.76
46.97		25.55	66.41	13.84	31.71	16.39	15.54		37.43	46.16	19.05
22.46		35.79	70.66	15.27	21.70	16.42	10.36	22.32	19.19	99.28	
22.22	87.44	43.26	69.48	16.09	25.72	8.70	15.75	19.44	19.22	113.83	13.18
62.79	113.02	32.12	62.90		24.79	6.72	4.83	19.33	14.96	86.40	23.14
43.54	100.40	29.43	69.24	10.61		9.32	9.15	16.66	30.36	55.24	33.03
34.89	72.95	37.26	64.87	14.54		8.08	12.25	14.88	30.38	33.24	36.70
31.38	7.19	48.67		21.42		14.30	9.40	23.81	22.99	17.95	
59.17	68.08	58.48		21.95		9.91		23.05	-99.20	27.37	57.69
61.04	62.50	72.76		28.65		5.34	8.12		-4.54	15.21	60.29
52.18	76.84	81.06	38.88	23.31		15.83	13.69	9.45	29.71	22.93	45.79
48.32	92.81	75.67	43.54	26.57		14.79	3.49	29.36	23.92	29.22	97.18
55.81	124.37	47.11	46.18	25.25				23.03	-35.00	29.73	152.00
57.7	163.35	26.86	33.72	27.46		7.55		15.41	26.77	21.76	34.22
58.59	134.16	49.47	19.32	22.73		10.39	3.84	15.68	31.65	29.75	71.55
47.09	135.32	56.53		22.84		10.20	1.41	20.60	28.56	38.05	100.52
60.93	152.35	77.81	27.54	35.46			8.28	16.78	21.50	46.40	70.52
82.615	136.69	74.49	19.52	33.69	25.61	16.30	5.67	13.02	31.98		116.89
109.23	109.15	49.32		27.58	19.05		9.37	12.46	28.44	61.50	58.14
117.17	76.24	28.75	8.88	16.60	18.36	14.13	8.52		21.17	50.32	45.39
135.13	61.21	33.46	16.08		15.58	7.76	12.88	16.26	20.40	69.47	34.09
	43.29	20.73	23.64		17.97	13.75	10.00		12.56	68.84	47.22
	38.11	20.91		35.36	22.06	11.86	8.20		11.70	41.28	33.20
	30.59	-8.45	21.32				18.90	12.67	11.86	30.98	
	12.24	39.78	10.05	22.95		36.56	10.43	11.08	-19.69		
	10.99	66.45		14.13		15.06	10.61	15.89	17.00		
	-15.23	77.66	17.89	14.42		14.28	8.08	16.51	0.61	25.54	
	-12.76	74.88	13.60	13.05	13.57	22.54	18.49	24.56	13.34	24.69	
		87.29	15.18	14.66	13.37	20.89	16.96	21.80	17.26	23.78	
		64.66		13.24		17.54	21.31		14.45		

106. Due to its location along the border, the site is also affected by the transboundary air pollution from the Indo-Gangetic plains, especially during winter months.[44] This could be one of the reasons for the high **PM_{10}** data from November to February.

107. 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

108. 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 and flows through the western Bhutan districts of Ha and Samtse before finally draining via Chukha district onto the plains of India.[45]

[44]NEC, 2016. Bhutan State of the Environment
[45]Phuentsholing Township Development Project

Figure 32: River Basins in Bhutan

Source: NEC

109. The project site is located more than 10 km from the two rivers (Amochhu River and and the Omchhu/Dhoti Khola) and apart from a small spring above the site, there are no perennial streams in the vicinity of the site.

F. Noise Environment

110. There is no information on noise levels at the site but given the distance from the city and the lack of development, there are no noise generating activities at the site apart from the construction noise from the new buildings on the upper slopes.

G. Ecological Environment

1. Forest cover and biodiversity

111. 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%[46] 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 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 havehighspecies diversity. Floristic composition consists of tropical species like *Shorearobusta, Terminalia myriocarpa, Bombax ceiba, Daubangagrandifolia, Sterculia villosa, Acacia catechu, and Terminalia nudiflora.*[47]

[46] DOFPS, 2019. Forest Facts and Figures 2019.
[47] NBC. 2014. National Biodiversity Strategies and Action Plan of Bhutan, 2014. National Biodiversity Centre, Ministry of Agriculture and Forests, Royal Government of Bhutan

112. Within the 15.6 km^2 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.

113. The Site in Rinchending is a secondary broadleaf forest which is not very dense. Using forest cover as a proxy indicator for degradation (as is being done by the Department of Forest and Park Services, Bhutan), the site is quite degraded and highly disturbed with less than 30% crown cover.[48]

114. The area is dominated more by *Albizia procera (56) mostly and by* shrub species, such as *Lantana camara, Eupatorium odoratum, Chromolaena odorata, Dryopteris filixmas* and *Saccharum officinarum.* These are mostly introduced weed species growing rampantly in the degraded secondary forest. The species recorded are listed in the table below. The southern portion of the land is currently cultivated.

Table 22: Floral Species

	List of floral species
1	*Albizia procera (56)*
2	*Bombax ceiba (4)*
3	*Bischofia javanica (2)*
4	*Albizia falcataria (1)*
5	*Bauhinia purpurea*
6	*Schima wallichi*
7	*Atrocarpus*
8	*Duabanga sp.,*
9	*Ficus sp.*
10	*Tertameles nudiflora*
11	*Lantana camara*
12	*Eupatorium odoratum*
13	*Chromolaena odorata*
14	*Dryopteris filixmas*
15	*Saccharum officinarum.*
16	*Amaranthus*
17	*Conyza sp.*
18	*Eupatorium adenophorum*
19	*Cyperus sp.*

115. **Protected Areas**. There are no legally protected areas, biological corridors of protected areas or buffer zones in the vicinity of the subproject site. The closest protected area is Phibsoo wildlife sanctuary which is more than 80km away. There is also no wetlands within the subproject area of influence.

[48] DOFPS, 2017. Drivers of Deforestation and Forest Degradation in Bhutan. To assess forest degradation, three crown cover classes were used: a) 50% crown cover – medium to dense forests, representing natural or near-natural forest conditions; b) 30-50% crown cover – semi-disturbed forests, representing typically forests which supply timber and other resources for rural households; and C) 10-30% crown cover – open forests, representing severely disturbed forests.

Figure 33: Protected Area Map of Bhutan

Source: MOWHS, 2018[49]

116. **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 project site (default area of analysis of 50 km radius). Screening results show there are no key biodiversity areas within 1 km from the subproject site and that 31 IUCN Red List of species of concern are identified within the default area of analysis. See Appendix 4 for the results of IBAT Screening.

Table 23: Assessed Presence of Species of Concern at the Subproject Site

	Species Name	Common Name	Taxonomic Group	IUCN Category	Present
1	*Indotestudo elongata*	Elongated Tortoise	REPTILIA	Critically endangered	No
2	*Batagur dhongoka*	Three-striped Roofed Turtle	REPTILIA	Critically endangered	No
3	*Manis*pentadactyla	Chinese Pangolin	MAMMALIA	Critically endangered	No
4	*Aythya baeri*	Baer's Pochard	AVES	Critically endangered	No
5	*Houbaropsis bengalensis*	Bengal Florican	AVES	Critically endangered	No
6	*Gyps bengalensis*	White- rumped Vulture	AVES	Critically endangered	No
7	*Sarcogyps calvus*	Red-headed Vulture	AVES	Critically endangered	No

[49] MOWHS, 2018. Report-on-Nganglam-Regional-Hub-Development-Plan-1

	Species Name	Common Name	Taxonomic Group	IUCN Category	Present
8	*Ardea insignis*	White-bellied Heron	AVES	Critically endangered	No
9	*Emberiza aureola*	Yellow-breasted Bunting	AVES	Critically endangered	No
10	*Gyps tenuirostris*	Slender- billed Vulture	AVES	Critically endangered	No
11	*Bulbophyllum leopardinum var. tuberculatum*		LILIOPSIDA	Critically endangered	No
12	*Ailurus fulgens*	Red Panda	MAMMALIA	Endangered	No
13	*Caprolagus hispidus*	Hispid Hare	MAMMALIA	Endangered	No
14	*Cuon alpinus*	Dhole	MAMMALIA	Endangered	No
15	*Cuora amboinensis*	Southeast Asian Box Turtle	REPTILIA	Endangered	No
16	*Elephas maximus*	Asian Elephant	MAMMALIA	Endangered	No
17	*Geoclemys hamiltonii*	Spotted Pond Turtle	REPTILIA	Endangered	No
18	*Manis crassicaudata*	Indian Pangolin	MAMMALIA	Endangered	No
19	*Melanochelys tricarinata*	Tricarinate Hill Turtle	REPTILIA	Endangered	No
20	Moschus chrysogaster	Alpine Musk Deer	MAMMALIA	Endangered	No
21	Moschus leucogaster	Himalayan Musk Deer	MAMMALIA	Endangered	No
22	*Panthera tigris*	Tiger	MAMMALIA	Endangered	No
23	*Axis porcinus*	Hog Deer	MAMMALIA	Endangered	No
24	*Amblyceps arunchalensis*		ACTINOPTERYGII	Endangered	No
25	*Perdicula manipurensis*	Manipur Bush-quail	AVES	Endangered	No
26	*Sterna acuticauda*	Black-bellied Tern	AVES	Endangered	No
27	*Haliaeetus leucoryphus*	Pallas's Fish-eagle	AVES	Endangered	No
28	Neophronpercnopterus	Egyptian Vulture	AVES	Endangered	No
29	*Aquila nipalensis*	Steppe Eagle	AVES	Endangered	No
30	*Falco cherrug*	Saker Falcon	AVES	Endangered	No
31	*Leptoptilos dubius*	Greater Adjutant	AVES	Endangered	No
32	*Laticilla cinerascens*	Swamp Grass-babbler	AVES	Endangered	No
33	Ceropegia bhutanica		MAGNOLIOPSIDA	Endangered	No
34	Hoya bhutanica		MAGNOLIOPSIDA	Endangered	No

	Species Name	Common Name	Taxonomic Group	IUCN Category	Present
35	Strobilanthesaccrescens subsp. accrescens		MAGNOLIOPSIDA	Endangered	No
36	*Tor putitora*		ACTINOPTERYGII E	Endangered	No
37	*Bos gaurus*	Gaur	MAMMALIA	Vulnerable	No
38	*Crocodylus palustris*	Mugger	REPTILIA	Vulnerable	No
39	*Lutrogale perspicillata*	Smooth coated Otter	MAMMALIA	Vulnerable	No
40	*Melursus ursinus*	Sloth Bear	MAMMALIA	Vulnerable	No
41	*Myotis sicarius*	Mandelli's Mouse-eared Myotis	MAMMALIA	Vulnerable	No
42	*Neofelis nebulosa*	Clouded Leopard	MAMMALIA	Vulnerable	No
43	*Panthera pardus*	Leopard	MAMMALIA	Vulnerable	No
44	*Prionailurus viverinus*	Fishing Cat	MAMMALIA	Vulnerable	No
45	Rhinoceros unicornis	Greater One-horned Rhino	MAMMALIA	Vulnerable	No
46	*Ursus thibetanus*	Asiatic Black Bear	MAMMALIA	Vulnerable	No
47	*Arctictis binturong*	Binturong	MAMMALIA	Vulnerable	No
48	*Rusa unicolor*	Sambar	MAMMALIA	Vulnerable	No
49	*Aonyx cinereus*	Asian small-clawed Otter	MAMMALIA	Vulnerable	No
50	*Ingerana borealis*	Rotung Oriental Frong	AMPHIBIA	Vulnerable	No
51	*Wallago attu*		ACTINOPTERGII	Vulnerable	No
52	*Bagarius yarrelli*		ACTINOPTERGI	Vulnerable	No
53	*Oligodon juglandifer*	Walnut Kukri Snake	REPTILIA	Vulnerable	No
54	*Ophiophagus hannah*	King Cobra	REPTILIA	Vulnerable	Yes
55	*Python bivittatus*	Burmese Python	REPTILIA	Vulnerable	Yes
56	*Anacyclus pyrethrum*	Atlas Daisy	MAGNOLIOPSIDA	Vulnerable	No
57	*Francolins gularis*	Swamp Francolin	AVES	Vulnerable	No
58	*Arborophila mandelli*	Chestnut breasted Partridge	AVES	Vulnerable	No
59	*Aythya ferina*	Common Pochard	AVES	Vulnerable	No
60	*Mulleripicus pulverulentus*	Great Slaty Woodpecker	AVES	Vulnerable	No
61	*Buceros bicornis*	Great Hornbill	AVES	Vulnerable	No
62	*Aceros nipalensis*	Rufous-necked Hornbill	AVES	Vulnerable	No
63	*Grus antigone*	Sarus Crane	AVES	Vulnerable	No

	Species Name	Common Name	Taxonomic Group	IUCN Category	Present
64	*Gallinago nemoricola*	Wood Snipe	AVES	Vulnerable	No
65	*Stema Aurantica*	River Tern	AVES	Vulnerable	No
66	*Clanga clanga*	Greater Spotted Eagle	AVES	Vulnerable	No
67	*Aquila heliaca*	Eastern Imperial Eagle	AVES	Vulnerable	No
68	*Leptotilos javanicus*	Lesser Adjutant	AVES	Vulnerable	No
69	*Turdus feae*	Grey-sided Thrush	AVES	Vulnerable	No
70	*Saxicola insignis*	White-throated Bushchat	AVES	Vulnerable	No
71	*Sitta formosa*	Beautiful Nuthatch	AVES	Vulnerable	No
72	*Chaetomis striata*	Bristled Grassbird	AVES	Vulnerable	No
73	*Chrysomma altirostre*	Jerdon's Babbler	AVES	Vulnerable	No
74	*Chatarrhaes longirostris*	Slender – billed Babbler	AVES	Vulnerable	No
75	*Ploceus megarhynchus*	Finn's weaver	AVES	Vulnerable	No
76	*Clanga hastata*	Indian Spotted Eagle	AVES	Vulnerable	No
77	*Ophiocordyceps sinensis*	Chinese Caterpillar Fungus	SORDARIOMYCETES	Vulnerable	No
78	*Drepanostachyum annulatum*		LILIOPSIDIA	Vulnerable	No
79	*Corallodiscus cooperi*		MAGNOLIOPSIDA	Vulnerable	No
80	*Oryza malampuzhaensis*		LILIOPSIDIA	Vulnerable	No
81	*Cinnamomum impressinervium*		MAGNOLIOPSIDA	Vulnerable	No
82	*Capricornis sumatraensis*	Mainland Serow	MAMMALIA	Vulnerable	No
83	*Paris polyphylla*	Love Apple	LILIOPSIDIA	Vulnerable	No

H. Socio-economic Environment

117. **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.[50] In total there are 6817 households within 15.6 km^2.[51]

118. There are no population estimates specific for the Richending area.

[50] MOWHS, 2019. Annual information bulletin
[51] GNHC, 2017. 12th-FYP_Vol-III_Phuentsholing-Thromde

119. **Educational and health facilities**. Within the Thromde, there are 4 private ECCD centers, 1 Lower Secondary School, 1 Middle Secondary School, 3 Higher Secondary Schools (2 are privately owned) and3 autonomous schools (Primary, middle and secondary schools). Within these there is 4749 student (2359M, 2390F). The closest school is 2.4 km from the project site.

120. There is only one general hospital serviced by 12 doctors, 39 nurses and 7 health assistants. This is 7km from the project site.

121. **Municipal Services and Amenities**. In total 1410 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-2000M^3; North treatment plant-2000M^3 and Kharbandi treatment plan 500M^3). 1190 households have 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.

122. For the subproject site, the water reservoir is located at the College of Science and Technology, Kharbandi. There are five storage tanks with a capacity of 1,090 m^3.[52] Water supply and electricity is available through the municipal water supply and Local electrical system of the Bhutan Power Corporation. Almost half of the households (3,311 of 6,817 households)[53] are not connected to the sewerage network.

123. The total length of road within the Thromde (including all types of roads) is 57.15km.[54] 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.

124. The subproject area falls under the Urban Village Low Density UV-2 (LD) of the Local Area Plan (LAP). It is very close to the southern border and within walking distance to the town of Jaigaon. Apart from a few residential buildings that have recently been constructed around the vicinity, the area is not developed and far from amenities such as school, hospital or banks, or services such as waste management. The closest shops are located on the highway, near Karbandi monastery. There are plans to further develop the existing approach road into a Local Access Road, which will greatly improve site connectivity.

125. According to the locals,[55] there is no waste collection service. Organic waste is reused on the farm but other waste is mostly burnt onsite. Water is readily available through pipelines and so is electricity.

I. Physical and Cultural Resources

126. There are Government-owned Temples/Lhakhang's in Phuentsholing. These are the PaldenTashiCholingShedra (monastic school), which is more than 10 km away from the subproject site; the Zangto Pelrii in the center of the city, which is more than 5km away from the subproject site; and the Rinchending Geonpa and Kharbandi Lhakhang, which are about 1km away from the subproject site. With these distances, the subproject activities are not expected to impact these physical cultural resources.

[52]MOWHS 2019. Annual Information Bulletin 2019
[53]GNHC, 2017. 12th-FYP_Vol-III_Phuentsholing-Thromde
[54]Phuentsholing Thromde, 2017. Annual performance reporting for the year 2017.
[55]Personal communication April

J. Natural hazards

127. 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 34** below.

128. 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 infrastructure[56]), September 2011 during the Sikkim earthquake (causing widespread damage to rural homes and government infrastructure) and in 2015.[57]

Figure 34: Seismic Hazard Map of Bhutan

Source: Indian Institute of Technology. Roorkee, India

129. A number of floods have occurred in Phuentsholing in the past. However, with respect to the project site, as it is not in close prioximity to any river, flood risks are 'Low''

130. In Phuentsholing, the Technical Feasibility Study on four Critical Landslides within the Extended Township of Phuentsholing, by the Department of Geology and Mines, found that the triggering factors are invariably excessive water, earthquakes, and ruggedness of the topography. Landslide are caused in Bhutan by (i) geological causes (weak, weathered, sheared materials,

[56]Chukha Dzongkhag 2018. Disaster Management and Contingency Plan 2018
[57]Phuentsholing Thromde 2018. Thromde Disaster Management and Contingency Plan 2018

and contrast in permeability of materials); (ii) morphological causes (fluvial, erosion of slope toe, tectonic uplift, erosion of marginal sides; (iii) physical causes (intense rainfall, prolonged or exceptional precipitation, earthquake, and snowmelt); and (iv) human causes (deforestation, irrigation, road construction, water leakage, land use changes).

131. The main trigger however, is intense rainfall during monsoon period when the region receives more rainfall than it can accommodate (with areas exceeding 6,000 mm especially in and around Phuentsoling area). The closest active landslide area is near Rinchending Goenpa measuring almost 17 acres,[58] where implementation of mitigation measures has been underway since 2009 to contain the landslide.

[58]Annex 4.1.

V. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

132. 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

133. 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.

134. 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 24: 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 25: 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

135. **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 26: 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

136. **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 27: 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

137. 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 28: Summary of Rating of Potential Impacts

Activity/ Impact	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Design and Pre-Construction phase								
Land Acquisition – Change in land use	Long term	Local	Yes	Unlikely	Medium	Mild	Moderate	Low
Disruption of utilities and services	Short term	Local	Yes	Certain	Medium	Mild	Low	Negligible
Tree Removal	Long term	Local	No	Certain	Medium	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[a]	Major	Mild	Moderate	Low
Community Awareness	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Construction Phase								
Worker recruitment -Occupational Health and Safety	Short term	Local	Yes	Certain	Medium[59]	Mild	Moderate	Negligible
Construction of site office, worker camps and storage sheds, stockpile areas	Short term	Local	Yes	Certain	Medium	Mild	Moderate	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

[59] 24-30 months

Activity/ Impact	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Soil erosion and Sediment mobilization	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
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
Operation Phase								
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[a]	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

[a] Natural hazards/extreme events are likely to occur, but not predictable as to when these will occur.

138. 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

139. 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 Project Location

(i) Protected areas, critical habitats and endangered species

140. **Impact**. The site is located within 4.5km of Phuentsholing town and surrounded by the access road and private land. There are no legally protected areas or critical habitat areas in the vicinity of the 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 project area of influence.

141. Initial screening and assessment indicate there are 2 vulnerable species of snakes (King Cobra and Burmese Python) reported to be found in the area. The clearance of vegetation and change in land use could reduce the habitat of these species. There is also the risk that such species might be killed (due to fear of being bitten) by workers.

142. **Mitigation**. The Contractors will be advised of the presence of and the potential impact on the Vulnerable Reptiles in the subproject site. Prior to commencement of the work, the Forest Range Office will be involved in marking the trees to be felled. At this time, the NHDCL will request the Department of Forest and Park Services to assess the area and to rescue and relocate the snakes to a suitable forest location away from the project site if required.

143. **Mitigation during Construction**. The Contractors will be instructed to advise all workers of the potential risk of snake bites. They will be instructed not to harm the reptiles but to inform the site in charge, who will inform the PIU or the Forest Ranger so that snake can be rescued and relocated to a safe and suitable habitat.

(ii) Physical Cultural Resources

144. **Impact.** There are no Physical Cultural Resources within 500m of the site. The closest PCR is the Rinchending Goenpa more than 1km away from the Site which is too far to be affected by project activities.

145. **Mitigation**. No mitigation required. The upfront site selection criteria used under the project 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

146. **Impact.** The project site was assessed in terms of earthquake, flooding and landslide risks. Due to its location, terrain and climatic conditions, the project site is at High risk of

earthquakes and landslides and Low for floods. 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.

147. **Mitigation for earthquakes.** The design process has taken into consideration the requirements of Bhutan Building Rules (BBR) 2017[60] 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%).

148. The proposed project 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.

149. **Mitigation for landslides.** Mitigation measures have been incorporated in the design phase**.** Under this project**,** the primary mitigation is reducing the number of floors. Compared to the other sites 1, 2 and 3, which are G+4 and G+5, the buildings at Rinchending are only G+2. Also, in addition to this, the design will incorporate retaining structures (walls) below the approach road, well designed storm water drainage, and restrictions will be imposed on dumping of excavated earth over the slopes. Last but not the least, compensatory plantation will be carried out to reduce erosion and stabilize the slope.

150. 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.

151. 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.[61]

(iv) Disruption of existing utilities and services

152. **Impact.** There are electrical lines as well as water supply lines passing through the site, which could be disrupted during the construction phase.

153. **Mitigation.** Prior to the commencement of the construction work, the NHDCL will discuss with the Bhutan Power Corporation to realign the electrical line, and with the CST and Thromde to realign the existing water supply pipes outside the boundary of the housing complex. During construction (until the lines are shifted by BPC) machine /operator drivers will be cautioned and instructed to ensure that the lines are not accidently struck by machines during loading and unloading of construction materials. In case of damage, the contractor will be fully liable to pay for the repair and compensate for the loss of service delivery as determined by the BPC.

2. Consents, Permits and Clearances and consultation

[60] 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

[61] NHDCL, 2019. Annual Report, 8th Issue.

154. All development within the city is controlled by the Municipality, which is responsible for ensuring that developmental activities are aligned with the local area plan for Phuentsholing.

155. **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 plumbing drawings certified by the 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 design team for rectification and revision of drawings.

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

3. Tree removal

157. **Impact.** There are at least 65 – 70 trees that will need to be felled prior to construction.

158. **Mitigation**. The Permit for tree felling will be sought from the Environment Division, Thromde Office prior to initiating the work. Once this is done, the trees can be cut and removed from the site as required by the Department of Forest and Park Services (DOFPS). The cost of compensatory plantation will be incorporated into the budget. For every tree cut, double the number will be planted. Also, additional trees (compensatory offset from tree removal in the Dunpa's site) will be planted for slope stabilizations works. This will be carried out in consultation with the DOFPS.

4. Compliance with ADB Loan Agreement and Safeguard Policy Statement

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 (BOQ) for each contract.[62] 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.

[62] Department of Engineering Services, MoWHS, 2020. The Bhutan Schedule of Rates - 2020 includes a Guideline for Occupational Health and Safety Costs

163. During construction, the cost of transportation of waste from the construction site to Toribari (the current waste disposal site) must be incorporated into BOQ to avoid additional claims or improper disposal of waste (unless the contractor is instructed to utilize another site by the Thromde)

5. Project Disclosure and Community Awareness

164. **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 has already been carried out. The project must disseminate information on the objectives of the proposed subproject, the preliminary design of proposed subproject components; potential environmental and social impacts (positive and negative) of the subproject, and proposed mitigation measures for the perceived negative impacts; and the Grievance Redress Mechanism and contact details of the subproject. Subproject signboards must be designed and constructed according to the design standards and specifications of the Thromde. The signboards must disclose subproject contact information for easy contact for any issues or clarification.

D. Anticipated Impacts and Mitigation Measures during Construction Phase

1. Socio-economic impacts

165. **Impact.** The subproject 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. Site preparation and construction of site office, worker camps and material storage sheds

166. **Impact.** Once the contract is awarded, the site will be handed over to the Contractor by the PIU. During site preparation, the contractor may need additional space or area for building site office, parking area, worker camps and material storage. Without any space for these facilities, the implementation of the subproject activities may not proceed smoothly and may delay project timeline.

167. **Mitigation**. While there is ample space at the site, any additional space required to park machinery, build storage sheds or for other purposes will be leased from adjacent lands, with the assistance from the PIU. 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 bunded 110% by volume. 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, parking for heavy equipment and material storage.

3. Vulnerable species

168. **Impact**. Initial screening and assessment indicate there are 2 vulnerable species of snakes (King Cobra and Burmese Python) that could be found in the area and that could be impacted by the project.

169. **Mitigation**. The Contractors will be instructed to advise all workers of the potential risk of snakes that might be found inside the subproject site during construction. They will be instructed not to harm the reptiles but to inform the Forest Ranger immediately for its safe rescue and relocation. Contractors will advise the workers on the regulations and penalties on killing and hunting of wildlife species and restrict them from doing so.

4. Recruitment and management 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. 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”[63] 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.

[63]RGOB. Regulations on Working Conditions, 2012

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 Labour Administrator, and also repeat the same within 7 days of completion of the work.

5. 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.

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;[64] 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.

6. Excavation work

179. **Impact.** Excavation work will be carried out for the footing of all the buildings. The lower parts of the site is on gentle slope but the incline increases on the upper slopes. I excavation work is carried out during the summer months, the heavy downpour will wash away the exposed parts of the site, heightening the risk of slope instability and landslide. On the other hand, excavation during dry months will create dust piles on windy days.

[64] IFC World Bank Group. 2007. Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Construction and Decommissioning.

180. **Mitigation**. The retaining walls will be built to prevent landslides. 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 and slope stabilization work. The newly excavated area will be sprinkled with water to minimize dust at least twice a day on dry windy days. Adequate drainage will be constructed to prevent sheet erosion.

7. Raw Materials Sourcing and Storage

181. **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 difference 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.

182. **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.

183. 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.

184. 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

185. **Impact.** 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).

186. **Mitigation**. Much of the water for Phuentsholing is pumped from underground 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^3, 2,000 m^3, and 500 m^3; respectively. The Contractor will be required to ensure adequate water for domestic (drinking, cooking, washing and sanitation) and construction purpose.

187. In case of shortage of water for construction, the contractor will 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

188. **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.

189. **Mitigation.** During the construction period, the required electrical supply will be utilized from the existing power line, with the approval of the BPC. For the new buildings, the construction of a substation with adequate electrical supply to cater to the housing complex (including service center, waste station, parking) will be outsourced as deposit work to the BPC, thereby ensuring reliable electrical supply to all the buildings.

10. Sewerage Requirement

190. **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.

191. **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

192. **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.

193. **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 this 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. Erosion and Landslide Risk

194. **Impact.** The monsoon months are the periods of heavy rainfall between June and September. From 2008 to 2020,[65] 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.

195. **Mitigation**. As much as possible, the excavation works will be completed before the onset of the heavy monsoons. To minimize the loss of soil and reduce landslide risks, the retaining wall (as described in Chapter 3) will be constructed. Also, site drainage will be planned to ensure that rainwater from excavated areas, worker camps and material storage areas do not cause erosion and sedimentation.

[65]There was no data for 2014-2015.

13. Ambient Air Quality

196. **Impact.** The air quality in Phuentsholing is worse in winter compared to summer months as shown in Chapter IV. The infrastructure works will further diminish 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_x, $SOx_,$, CO etc.). However, much of the impacts on air quality will occur during the construction period.

197. **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.

198. **Workers' Camp**. The Contractor will provide alternative fuel (electricity or LPG) at workers' camp and restrict use of firewood for cooking. Burning of waste will be restricted and enforced strictly.

14. Dust Generation

199. **Impact**. Dust will be generated during excavation, transportation and unloading of sand and other construction materials as well as during material storage. However, since the access to the site is quite forested, dust issues will be mostly within the site boundaries.

200. **Mitigation. T**o prevent too much dust during excavation work, the area will be enclosed/cordoned with construction fabric. Water will be sprayed over bare or newly excavated areas twice a day or more if required. Material transporters will be instructed to cover dust generating materials to prevent dust and spillage along transport routes.

15. Noise and Disturbance to the Neighboring Community

201. **Impact.** During the construction period, the main sources of noise will be from construction activities such as use of welding machines, sawing of wood, concrete mixtures, batching plants, excavators and movement of vehicles and trucks. The impacts from construction work will be most disturbing to the neighboring community if these activities are carried on during early morning hours or late into the night. The site has a handful of residential buildings within immediate vicinities – one to the north, one to the west and one downslope.

202. 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 only until the end of the construction period.

203. **Mitigation**. Measures to minimize disturbance to the community include restricting construction work between 9PM -8AM,[66] 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.

[66]As per Development Control Regulations 2016.

16. Waste Generation and Management

204. **Impact.** The major source of the waste will be from the site offices, worker camps and construction sites. The wastes will include 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.

205. **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.

206. 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 and transported to the closest waste collection site, near Kharbandi. Hazardous waste will be stored separately and disposed with the guidance of Thromde.

207. If required by the Thromde, the 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. The budget for this will be included in the contract cost.

17. Community Health and Safety

208. **Impact.** The main risks to community 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 (only a few households live within 100m of the site) may also be at risk or if they walk into the site when work is ongoing or from materials falling from the building site.

209. **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. These measures will become more important if the access road is widened (as per Thromdes plans) and its use increases during the construction period.

18. Congestion and Traffic Management

210. **Impact.** The access road to the site is quite narrow and steep, especially after it takes off from the main Phuentsholing-Thimphu highway. The risks to human safety are the risk of accidents during material transportation especially if drivers are not careful and if construction material is stored along the access road.

211. **Mitigation**. The material transporters will be briefed to adhere to speed limit to reduce the risk of accidents. Also, the PIU will consult with the Thromde on the possibility of widening the access road along steep bends.

19. Aesthetic Impacts

212. **Impact.** The subproject will be located within 5 acres of property allocated to NHDCL, specifically for housing. If not properly designed, the buildings will not fit in with the existing surrounding.

213. **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 and almost 48% of the area will be allocated as green space. The building designs will also utilize the Bhutanese Architecture Guidelines[67] 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

214. **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 possibility that underground assets or archaeological artifacts may be discovered at the site, requiring precautionary measures and procedures to be followed.

215.

216. **Mitigation**. Contractor needs to be made aware of a chance finds procedure. In case underground assets or archaeological artifacts are encountered during excavation, construction activities including within a 30-meter radius in the area will be stopped immediately by the Contractor and the discovery will be reported by the site engineer or representative of Contractor to 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

217. **Impact.** The risk of earthquakes is high for all Phuentsholing in general and requires mitigation measures for such disasters. Also, there is always the risk of structural fires requiring emergency mitigation measures. The site is not at risk of floods as it is not close to any river (>200m). Since the site is site is relatively steep (>45 degrees on the upperslopes), and given the climatic conditions with heavy monsoon rains, the removal of vegetation and excavation work could trigger landslides.

218. **Mitigation.** Mitigation measures for earthquakes have been incorporated in the building design and choice of materials. Mitigation measures to minimize landslides include design

[67] MOWHS, 2014. The Bhutanese Architecture Guidelines.

(buildings are G+ 2) construction of retaining walls, stormwater drainage and revegetation upon completion of construction.

219. 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 outlined under Occupational health and safety, meeting points, provision of emergency transportation to the hospital for injured workers. At the site, fire extinguishers or water storage tanks with hoses must be readily available and the emergency numbers (Fire, Police and Hospital) must be posted at a visible location.

22. Completion of construction work

220. **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.

221. **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 property (government or private) will be repaired and/compensated before final leaving the site. The site will then be replanted with appropriate local species during landscaping and creation of green spaces.

222. 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.[68]

E. Anticipated Impacts and Mitigation Measures during Operation Phase

1. Impacts

223. 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 are the wear and tear on the building, breakdown of electrical and plumbing fixtures/systems, and risk of natural hazards and fire.

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

2. Mitigation Measures

225. **Maintenance and delivery of services.** The NHDCL has a Real Estate Management Services Division/Unit (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. Other maintenance requirements are regular cleaning of the complex either by the residents or hired sweepers.

[68] IFC World Bank Group. 2007. Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Construction and Decommissioning.

226. **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.

227. REMSD must immediately intimate the Thromde Disaster Management Committee and follow their instructions in case of a disaster.

228. **Water shortage.** The infrastructural design has incorporated rainwater harvesting, which will significantly reduce the demand for water during the operation phase and adequate water tanks will be installed onsite.

229. **Liquid and solid waste generation.** This is not a significant concern because the NHDCL will arrange for the residents to manage and maintain the waste station in return for free housing or keep the earning from the revenue generated.

230. The PMU will request the Thromde to extend their waste collection points up to the housing complex, so that the unusable/ non-recyclable waste can be picked up and disposed accordingly, thus ensuring that garbage is not allowed to accumulate on the premises.

231. The official site plan and building design 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.

F. Cumulative Impacts and Mitigation

232. 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 an 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.[69]

233. Phuentsholing Thromde was increased from to 19.68 km^2 but due to geographical limitations, there is little room for expansion due to the steep slopes and fragile geology. Within this limited Thromde area, there are 6,817 households with a population of 27,658.[70] Almost half of these, especially the newly extended Local areas are not connected to the sewerage network.

234. **Ongoing development plans and projects**. In other parts of Phuentsholing, there are many developmental projects such as the Amochhu Land Development and Township Project, the Phuentsholing-Chamkuna Road Project, construction of the Dry Port in Pasakkha[71] and the Pasakha Industrial Estate itself. According to the structure plan and the development plan of Phuentsholing, a number of Local Area Plans (LAPs) are being prepared and underway. These

[69] IEE 47284-002-iee-en
[70] Twelfth Five Year Plan Document 2018-2023. Phuentsholing Thromde, Volume III GNH, 2018-2023
[71] Ground-breaking ceremony for construction of Pasakha Dry Port. February 2, 2021.www.moea.gov.bt

include the Core Area, Kabreytar, Dam- dara, Ammochhu, Rinchending, Alley, Pekarshing, Pasakha (Chenbari & Gurungdara) and Pasakha Industrial Estates.

235. The implementation of the Local Area Plans means that these areas, including the subproject site will be provided with the basic urban infrastructure and services (contingent on availability of budget and priority). This includes provision or widening of municipal roads, expanding the sewerage network, sanitation, drainage and solid waste collection and disposal services.

236. At the same time, the area around Rinchending is also developing with increasing number of buildings (mostly private). The proposed 12th FYP for the area included construction of a 400m urban road, conduct geo tech studies for the developing the local area plan, and construction of 1.5km water supply line.[72]

237. In terms of private and government building constructions, the Thromde approved 60 new building constructions in 2019.[73]

238. Currently, however, there is not much large scale development ongoing in Rinchending. The subproject will add to the ongoing developmental demand for resources such as water, timber, construction material and extension of existing municipal services such as waste management; but the cumulative impact is deemed not significant

G. Environmental Benefits and Enhancement Measures

239. Phuentsholing is facing increasing demand for public services, decent housing and better living conditions.

240. population, traffic flow, solid waste, sewerages, housing shortage and other mega projects are some of the issues to name a few. With increasing population, their need for public services augments subsequently; a reason for aggravated public expenditure. The major issue city face today is that of meeting the demands of resident's urge for better living condition. The surging urge for better living condition entails Thromde to provide adequate and usable water supply, undisturbed electricity supply, proper waste collection services and many other facilities alike. Despite the fact that it is confronted with several challenges, city is on the positive side

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.

[72] Gross National Happiness Commission (2019). https://www.gnhc.gov.bt/
[73] MOWHS 2019.

243. The housing complex will include internal access with ample parking, pedestrian footpath, /green space, service block and waste station. Rainwater harvesting and water storage tanks will be provided that will ensure that residents do not have to face water shortage constraints.

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

247. This subproject involves the construction of a housing complex comprising of 18 residential buildings (G+2 floors) with 108 units on 5 acres of land. The complex will also house a service block (2 floors) and a waste station. The parking will fit 72 light vehicles and 64 2-wheelers.

1. Design and Pre-construction

248. Given that the entire site is within the municipal boundaries and within a designated Local Area Plans, the project activities are as per the approved land use for the area. The site is currently a secondary degraded forest with a few new residential buildings on the upper slopes and farmland towards the south and southwest. It is at a distance of more than 80km from the nearest protected area so will not impact on any protected area orcritical habitats.

249. Approximately 65 – 70 trees will be removed prior to construction. For every tree that is cut, double the number of trees will be replanted within the housing complex during landscaping works. This is in addition to the trees to be planted as compensatory offset for the Dungpa's site. Local trees species will be selected upon the advice of the Forest Range Office or the Gedu Forest Division.

250. To minimize any impact on the two vulnerable species of snakes that may be present) in the area, mitigation measures will involve seeking forest clearance from the Department of Forest and Park Services, following their guidance during vegetation clearance and involving the Department in rescue and relocation prior to, during and after construction. Contractors will also advise the workers against killing and hunting of wildlife species.

251. There are no Physical Cultural Resources that will be impacted by the project so no mitigation is required.

252. The receptors that lie within the zone of influence (within 200m of the proposed infrastructure development work) are the few residential buildings and farmhouses only. Measures to minimize impacts from air, dust, noise and health and safety risks to the resident communities have been incorporated during the construction phase.

253. The disaster risk with the site is the High risk of earthquakes and landslides which has been taken into consideration during building design,slope stabilization works, drainage design and through choice of construction material.

254. The project has no impacts on private land so there is no need for land acquisition. The farmer will be compensatedfor the crops and trees grown on the land.

255. The site is easily accessible from the Phuentsholing-Thimphu highway so there is no need to construct an approach road. Also, drinking water supply schemes and electricity is already available and this will be utilized during construction. For the residential complex, the construction of a substation and provision of electrical supply will be outsourced as deposit work to the Bhutan Power Corporation.

2. Construction phase

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

257. Construction impacts will be limited to the immediate area and its surrounding and therefore the zone of impact (mostly for noise and air and dust pollution) is less than 200m. Both demolition and excavation work will be confined to the existing structure and building footprint and will not last more than a few months.

258. If possible, 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.

259. 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.

260. 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.

261. 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.).

262. 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

263. 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

264. 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

265. 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.

266. The waste station will help to encourage behavior change, promote reuse, recycling and reduce the quantity of waste being disposed.

267. 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. Regular Environmental and Social 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

268. 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 Rinchending is one of the three sites.

B. Alternatives relating to Design and Technology

269. The subproject has departed from the convention housing design by incorporating universal designs features, disaster resilience, fire safety and rainwater harvesting considerations. It is a vast improvement from previous residential housing buildings that NHDCL has designed and built before.

C. Environmental Implications of Alternatives

270. 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

271. 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 29: Comparison of "With Project" and "No Project" Options

Description	No Project	With Project
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
Physical impacts	None	The planned housing complex will be designed based on what is allowable within the local area plan. 18 buildings will be constructed at the site, with internal access road and parking, as service block and a waste station.
Potential impacts due to seismic risks, environmental friendly and climate resilience	The site is undeveloped, secondary forest with the parts of the lower slope cropped.	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.
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)

272. **"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 Phuentsholingwill 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.

273. **"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 living 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

274. 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

275. Key stakeholders were identified and consulted during the project planning process. Copies of minutes of consultation meetings are in Appendix 5. The key stakeholders consulted are as follows.

(i) Executive Secretary, Phuentsholing Thromde and Solid waste section head, Thromde office- 12 March, 2021
(ii) Future potential residents- residents of the Kidu Colony including representatives and women's groups; 10 March, 2021
(iii) Waste collectors/technicians working with the Thromde- 12 March, 2021

276. **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

277. NHDCL has informed and sought clarification from the Forest Range Office on the proposed activities to confirm that the IBAT species list.

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

Table 30: Public Consultations for the Phuentsholing Subprojects

Date	Target audience	Number of Participants
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 subprojects

279. 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.

280. 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.

281. 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.

282. 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

283. 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.

284. 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.

285. 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

286. 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)

287. 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.

288. Some of the preferences for the new housing colonies are a) sliding windows reinforced with grills especially on the ground floor; grills in the open space along the stairway for security reasons; 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.

289. 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

290. 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 with the residents near the subproject site as identified during the reconnaissance visits (see Table 18). 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

291. 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.

292. 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

293. 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.

294. 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 7. 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.

295. **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.

296. **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.

297. **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.

298. **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.

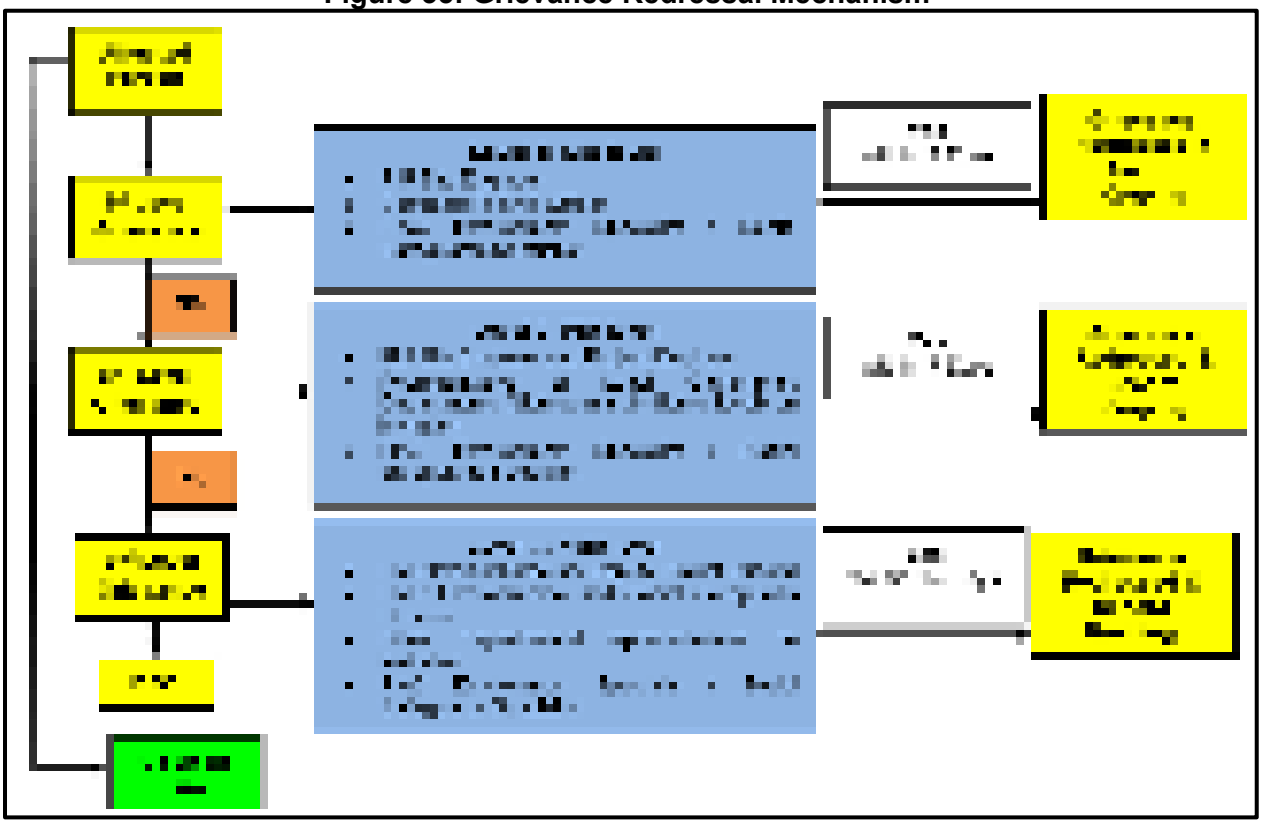
(iii) **3rd Level Grievance (PMU):** All the grievances that are not addressed at 2nd level by PIU will be brought to the third level. The third level will meet once a month and determine the merit of each grievance/s brought to the committee. The third level grievance redress committee will resolve 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 matted may be taken to the Project Steering Committee (PSC) for solution.

299. 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.

300. 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.

301. The process of the project GRM is given in Figure 35.

Figure 35: 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

302. 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.

303. **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.

304. **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.

305. **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 8.

306. **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.

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

308. **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

309. **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[74] 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

[74] Department of Disaster Management (Ministry of Home and Cultural Affairs); Department of Engineering Services; Department of Geology and Mines; etc.

PMU and PIUs, as and when required; and (v) ensure that conditions of the Loan Agreement with ADB are met.

310. 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.

311. 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 36: Overall Project Implementation Arrangement

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

Figure 37: 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.

313. **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 SEMPs 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.

314. **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.

315. **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 SEMPs;
(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.

316. **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.

317. 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.

318. 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.

319. 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 31: Environmental Safeguards Roles and Responsibilities

Project Management Unit	Environment Specialist Consultant	ADB
Pre-construction stage		
Environmental officer of the PMU, with assistance from the environment specialist	Environment Specialist Consultant will assist PMU and conduct IEE	ADB to review the REA checklists and

Project Management Unit	Environment Specialist Consultant	ADB
consultant, to conduct Rapid Environmental Assessment (REA) for each site of proposed subprojects using checklist available from ADB. Based on the REA, categorize the project based on ADB SPS. Submit all categorization forms to ADB.	(or update existing IEE) for all subprojects, which will include an EMP. The environmental expert and other consultants will work 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.	reconfirm the categorization.
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.	
Construction Stage		
PMU to review the monthly monitoring reports from the environment specialist	Contractor to conduct environmental monitoring and	ADB to review the reports and provide

Project Management Unit	Environment Specialist Consultant	ADB
consultant to ensure that all mitigation measures are implemented. PMU to consolidate the monthly reports and submit semi-annual reports to ADB for review. Corrective actions to be undertaken if needed.	implement SEMPs/EMPs. The Environment Specialist Consultant will assist the PMU environmental officer in (i) review and approval of 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.	necessary advice/guidance needed to the PMU.
Operation Stage		
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. ADB to prepare Project Completion Report
PMU to continue submission of semi-annual environmental monitoring report to ADB until ADB issues a 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

320. 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.

321. 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 32: Environmental Management Plan

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
Design / Pre- construction phase					
Subproject Location	Impact on protected area, critical habitats and endangered species	• The PIU will seek advice/request the Department of Forest and Park Services (DOFPS) to assess the area and to rescue and relocate the snake species if these are discovered during the survey; • Process for forestry clearance and ensure only marked trees are felled and removed as instructed/ required by the DOFPS. • Instruct contractors (and in turn workers) on restrictions on hunting, and to inform the PIU upon in case of any encounters with wildlife, so that these can be rescued and relocated	NA	PIU	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.			
	Risk of natural hazards such as earthquakes and climate change considerations	• 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. • Choice of construction materials must be based on climatic conditions and suitable for heavy monsoon rains.	Included in Subproject design cost	PIU	PMU
	Risk of landslides	• The height of the buildings is only G+2. • Retaining structures (walls) below the approach road, and in between the buildings have been incorporated into the design. • Include a well-designed storm water drainage system to minimize runoff on cleared slopes,			

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Restrict dumping of excavated earth over the slopes. • Budget for compensatory plantation.			
Consents, permits and clearances	Failure to comply with national regulation and procedures can delay project progress	• Seek approval for building design and construction approval from the Development Control Division, Phuentsholing Thromde. • Seek approval for environmental clearance from NEC.	PMU Operating cost	PIU	PMU
Removal of trees	At least 60 – 70 trees need to be cut	• Seek approval removal of trees from the DOFPS. • Replant the area with at least double the number of trees cut during landscaping as compensatory measure.	PMU Operating cost (permit) Contractor's cost (removal and replanting)	PIU (permit) Contractor (tree removal and replanting)	PMU
Disruption of utilities and services	Damage to water supply and electrical lines	• Discuss (and outsource) with the Bhutan Power Corporation to shift the electrical line outside the site boundary. • Discuss with the CST and Thromde to realign the existing water supply pipes outside the boundary of the housing complex. • Caution and Instruct machine /operator drivers to ensure that the lines are not accidently struck by machines during loading and unloading of construction materials. • In case of damage, pay for the repair and compensate for the loss of service delivery as determined by the BPC.	Included in Project design cost	PIU	PMU
Aesthetics	Change in aesthetics at the site due to new	• Consider requisite development controls (such as building height, ground coverage and minimum setbacks from roads and	PMU Operating cost	PIU	PMU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
	infrastructures that could obstruct views.	adjacent plots), as per the allowable local area plan. • Comply with the Bhutanese Architecture Guidelines[75] as a reference to ensure that the buildings blend in with the surrounding while maintaining certain elements of traditional Bhutanese architectural designs. • Undertake landscaping and revegetation will further improve site conditions once activities are completed.			
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	• 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 • Conduct pre-bid meeting to inform contractors of the need to strictly incorporate OHS and EMP into the contract cost • 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.	PMU Operating cost	PIU / PMU	PMU
Project disclosure and Community awareness	Lack of awareness by the Public and Community on project activities or GRM	• Disclose project information/brief on NHDCL website, along with GRM mechanism and contact numbers, and one available at the site office	PMU Operating cost	PIU / PMU	PMU

[75] MOWHS, 2014. The Bhutanese Architecture Guidelines

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Design and install project signboards as per design standards and specifications of the Thromde and include relevant contact numbers for GRM			
Construction phase					
Award of Construction work	Positive multiplier effect for goods and services	• The project will generate employment and business opportunities for local suppliers of construction materials as well as material transporters and machine operators.	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	• If required, land will be leased from government or private landowners to set up worker camps, material storage and to park machinery. • 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% by volume.	Contractor's cost	Contractor	PIU
Recruitment and management of workers	Non-compliance with National recruitment regulations and risk of employing underage children.	• Strictly follow the "Handbook on Recruitment and Employment of Foreign Workers in Bhutan"[76] with respect to screening recruitment, worker permits, road passes, management, and repatriation • Process for worker permits and entry as per prevailing health restrictions and screening requirements. • Follow restriction on employment of children below 18 years. • Employ trained and skilled national workers wherever possible. • If Contractor has more than 12 workers, it must submit a Notification of Construction	Contractor's cost	Contractor	PIU

[76]RGOB. Regulations on Working Conditions, 2012

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		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.			
	Risk of conflict and disturbance with neighboring community	• Brief all workers on required social behavior and impose sanctions for inappropriate conduct. • Record number of complaints received from neighboring residents	Contractor's cost	Contractor	PIU
	Requirement for housing and resources (drinking water and electricity and sanitation facilities	• Provide workers with temporary accommodation, drinking water and sanitation facilities, with separate toilets for males and females. • Maintain cleanliness of the residential areas. • Ensure adequate water is available for sanitation and require workers to maintain toilets. • 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".	Contractor's cost	Contractor	PIU
Occupational health and safety	Health and safety risks for construction workers	• Prepare site-specific health and safety management plan including COVID 19 H&S measures. • 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. • Abide by the international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		Guidelines on Construction and Decommissioning Activities;[77] • Screen workers at their point of origin for both virulent and contagious diseases, including COVID-19. • Follow COVID 19 protocols as per the prevailing requirements of the Ministry of Health and the COVID Taskforce. • 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. • Install adequate support structures for temporary structures. • Prepare emergency management procedures. • Determine types of trainings/ orientations/ briefings required for each group of workers and who will give the required briefings. • Institute protocols to deal with accidents and emergencies including compensation for treatment and recovery, loss of ability to work, and loss of life • Provide medical assistance for cases of workplace related injury. • Provide adequate payment and facilities (lighting) for overtime work. • Post/Display emergency contact numbers of the staff as well as Police/Hospital/Fire at a visible location. • Provide workers with Personal Protective Equipment (PPE) such as safety helmets,			

[77] 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
		gloves, glasses, and boots (as required) and enforce their use at the workplace. • Brief workers on work risks during toolbox talks. • Restrict drinking or consumption of intoxicants at the work site. • Post warning signs at risky/hazardous areas in the Dzongkha and English languages. • Maintain accident register with incidents and actions taken. • Maintain First aid box at site for minor injuries. • 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) • Provide a safe means of access and egress to and from every workplace • If gas cylinders are used, then store these in an upright position, protected against heat and cover the control valves with protective caps screwed to proper positions.			
Excavation work	Mismanaged spoils from loose excavated soils.	• Reuse excavated soil for filling in the building foundations and for levelling the parking and recreational areas • Remove excess excavated soil within 2 weeks of excavation and dispose at designated site. • Seek approval/permit for disposal of soil/spoil from Thromde office, and remove unwanted soil from the site within 2 weeks of excavation dispose at pre-approved disposal site.	Contractor's cost	Contractor	PIU
	Dust generation on windy days	• Enclose excavated areas to contain dust.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Spray water over loose soil piles especially on windy days.			
Raw materials sourcing and storage	Haphazard and inefficient material purchase and sourcing	• Prepare and plan material requirement and delivery as required during each phase of construction depending on what is available locally • Outsource manufacture of doors and windows	Contractor's cost	Contractor	PIU
	Lack of storage space and Loss of materials	• Schedule material procurement to prevent both shortage and storage issues. • Construct material storage shed, maintain inventory, and keep valuable items locked. • Appoint security guard if necessary • Stack material in a safe and orderly manner	Contractor's cost	Contractor	PIU
Water Requirements	Water supply shortage due to additional demand for drinking, cooking, washing as well as construction and its associated activities (sprinkling/spraying and cleaning).	• Ensure adequate water for domestic (drinking, cooking, washing and sanitation) and construction purpose. • Install adequate water tanks or mobilize water tankers during periods of shortage. • To conserve water, all water supply pipes will be checked, repaired and maintained regularly to prevent leakages or blockages.	Contractor's cost	Contractor	PIU
Electrical requirements	Delay in project implementation at the site due to lack of electrical power supply.	• Request from Bhutan Power Corporation for service on the handling of electricity connection before, during and after the construction works.	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.	• 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. • If available, Contractor may opt to rent out portable toilets which can be desludged regularly by the service provider.	Contractor's cost	Contractor	PIU
Mobilization and operation of	Risk of accidents and injuries to workers	• Train machine operators	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
construction equipment		• Ensure machine operators to use the horn when backing, be assigned a signal person to guide him when reversing • 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.			
	Congestion and blockages/obstructions due to narrow access road	• Request Thromde to widen the existing access road if possible • Place warning signs at the entry of the site, so materials transporters can readily find the site; • Brief drivers on restriction of spillage or storing of construction material along access road, on top of drains and footpaths blocking access.	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.	• Complete all excavation works before the onset of the monsoon season to reduce the runoff. • 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.	Contractor's cost	Contractor	PIU
Ambient Air Quality	The use of fuelwood for heating in winter will result in air pollution from fires. 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	• 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). • Restrict open burning of wastes. • Ensure that construction equipment and vehicles are maintained in good condition and have passed the RSTA emission test. • Provide tarpaulin covers to vehicles transporting soil, sand and other construction materials and waste.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
	Dust from excavation, and other construction activities.	• Provide cover to stockpiles of soil, sand and other construction materials, especially during windy days. • 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. • Remove excess excavated soil from the site within 2 weeks of excavation and dispose at the designated disposal site.			
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.	• Restrict construction work between 9PM - 8AM. • Brief workers on their obligations regarding proper management of work and behavior with sanctions for inappropriate behavior or repeated complaints from the residents. • Implement a preventive maintenance schedule for all heavy construction equipment and machinery to minimize noise and vibration. • Do not allow woodworks such as the use of sawing machines at the site. Doors and windows must be fabricated offsite or outsourced.	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 other nuisance to nearby communities.	• Provide appropriate bins for waste storage and safe collection, segregate hazardous wastes within the site. • Maintain cleanliness of the site premises or surroundings. • Ensure that workers are briefed on proper waste management and good housekeeping at worker camps. • Allocate waste storage areas where wastes can be stored and then collected by the municipal trucks.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Ensure to remove solid wastes and bring to designated disposal sites.			
Community health and safety	Safety risk to public safety during transport of materials. Safety risk to pedestrians.	• Provide cordon or barricades around the construction site to restrict public from the site and controlling access to the site. • Install signboards to notify passers-by of ongoing work, install warning signs near access road and entry points. • Restrict unloading or storing of construction material along access road, on top of drains and footpaths. • Designate personnel to warn passers-by and guide trucks during material delivery. • Schedule materials delivery times to avoid peak traffic hours. • Impose speed limits for trucks near the construction site.	Contractor's cost	Contractor	PIU
	Air pollution due to emissions and dust	• 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). • Restrict open burning of wastes. • Ensure that construction equipment and vehicles are maintained in good condition and have passed the RSTA emission test. • Provide tarpaulin covers to vehicles transporting soil, sand and other construction materials and waste. • Provide cover to stockpiles of soil, sand and other construction materials, especially during windy days. • 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.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Remove excess excavated soil from the site within 2 weeks of excavation and dispose at the designated disposal site.			
	Congestion and blockages/obstructions	• Restrict material drop off by trucks during peak traffic hours (8-9.30Am and 4-6PM) • Brief drivers on restriction of spillage or storing of construction material along access road, on top of drains and footpaths blocking access.	Contractor's cost	Contractor	PIU
Chance finds	Potential chance finds	Follow chance finds procedure: • In case of suspected chance finds, the Contractor shall immediately stop all works • Contractor to report immediately within the same day to the PMU or PIU regarding the suspected chance finds. • PMU or PIU to advise Contractor to strictly follow the full stoppage of works. • PMU to report the potential chance finds to the Department of Culture, Ministry of Home and Cultural Affairs, and the latter to investigate. • No works shall resume until clearance is provided by the Department of Culture, Ministry of Home and Cultural Affairs.	Contractor's cost	Contractor	PIU
Emergencies such as earthquakes, Fire hazards	Risk of injury and losing lives due to natural hazards and fire	• Develop an emergency action plan to handle emergencies such as earthquakes, fires, breakdown in machinery, collapse of structures, electrical mishaps. These are as follow: • Identify procedures to follow during emergencies. • Display and maintain suitable warning signs at conspicuous places in Dzongkha and English. • Identify a meeting point for all workers in case of earthquakes.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Brief workers on protocols to follow during earthquakes. • Provide transportation to the nearest hospital in case of accidents and emergencies. • Install fire extinguishers or ensure adequate storage of water supply, water hoses and pipes • Train staff to operate the fire extinguishing equipment. • Conduct quarterly checks on fire extinguishers. **Collapse of structures**. • Stabilize all temporary structures to prevent them from collapse. • Electrical mishaps. • Hire only certified electricians. • Provide all temporary electrical installations with earth- leakage circuit breakers. • Require workers to check safety of electrical wiring before commencement of work • Operation of machines • Restrict operation of machines to trained and competent operators, or under the supervision of one			
Post construction –camp closure	• Positive impact resulting to restoration of pleasant aesthetics at site.	Implement camp and site closure plan that includes the following • Dismantle all worker camps, fill in sanitation areas/temporary toilets with soil • Remove all machines, equipment and debris from construction site and worker camps • Restore any damage to government or private properties • Hand over site back to PMU	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Carry out repair and maintenance during liability period as per contract • Ensure that foreign workers exit the country (expatriation) on completion of work • Plan and undertake revegetation and landscape development			
Post-construction – greening and landscaping	• Positive impact resulting to enhancement of surrounding environment.	• Improve aesthetic view by landscaping • Development of green belt around the housing complex	Contractor's cost	Contractor	PIU
Operation phase					
Building occupancy and utilization	Wear and tear of buildings	• Follow NHDCL maintenance processes to address complaints by tenants • Undertake regular inspections to assess the risks, hazards or defects with the buildings and rectify these	Housing Management Cost	Housing Management	PIU / PMU
	Fire safety	• Train the focal resident person on use of fire extinguishers and its maintenance • Regularly check and maintain the fire extinguisher • Post emergency numbers of Fire, Police near the fire extinguisher or at a visible location.	Housing Management Cost	PIU	PIU / PMU
	Accidents and emergencies and natural disaster	• Follow instructions from the Thromde Disaster Management Committee (DMC) on procedures to follow in case of emergencies. • Post emergency numbers for Police, Ambulance and Fire should be prominently posted at a visible spot. • Maintain emergency lighting system in the premises. • Conduct of periodic fire drills. • Posting of emergency exit plans, designating evacuation areas,	Housing Management Cost	PIU	PIU / PMU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		dissemination of other emergency plan information. • Other training to raise awareness on how to properly behave and respond in times of fires or natural disasters.			
	Buildup of sewage that could impact surface water and groundwater	• Coordinate with Thromde for desludging and vacuum cleaning of septic tank annually	Housing Management Cost	PIU	PIU / PMU
	Solid waste generation that could impact the environment	• Follow Thromde waste management guidelines and garbage collection and disposal times and ensure that garbage is not allowed to accumulate on the premises.	Housing Management Cost	PIU	PIU / PMU

C. Environmental Performance

322. 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

323. 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.

324. 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.

325. 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.

326. 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 9. This monitoring sheet is indicative which can be further enhanced depending on the actual situations at subproject construction site.

327. 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 10. This checklist is

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

328. 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 (PCR). The template for the SEMR is attached as Appendix 11.

329. 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 33: Environmental Monitoring Plan

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
Pre-Construction					
1	Land use approval	• Land Use certificate received from National Land Commission	PMU	PMU	PMU
2	Subproject design and approvals	• Infrastructure design and construction approval, • Demolition approval	One time	NHDCL	PMU
3	Roles and responsibilities and awareness of project site supervision team	• Office order • TOR for Site supervision team • Training materials • Participant list	One time	NHDCL	PMU
4	Awareness and training of Contractor	• Pre-bid meeting to inform contractors • No. of trainings and dates • Contractor's attendance sheet	One time	NHDCL	PMU
5	Incorporating of EMP into bid documents	• EMP included in bid document	One time	NHDCL	PMU
6	Incorporating of OHS requirements into contract	• OHS component included in Contract	One time	NHDCL	PMU
7	Project disclosure and information	• Project information/brief on NHDCL website, • Project contact number on signboards • Minutes of Meeting/Consultation with	One time	NHDCL	PMU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
		Affected people and community			
Construction phase					
8	Consents and Permits	• Tree removal • Waste disposal	One time	Contractor	PIU
9	Recruitment of workers	• No. of workers (nationals/foreign- by gender) • No. of skilled and unskilled workers • No. of workers below age 18	During recruitment	Contractor	PIU
10	Workers' welfare (health and safety)	• No. of worker camps • Availability of safe drinking water, electricity and sanitation facilities (with separate toilets for males and females) • PPE distribution list/records • Ocular inspection of the cleanliness of worker camps • safety structure installed • Overtime facilities provided • Emergency Contact numbers displayed • Assembly points identified • Emergency protocols • First aid kid • Warning signs at risky/hazardous areas • Records in accident register with incidents and actions taken. • No of fire extinguishers installed at site • Type and no. of trainings (training record)	Monthly	Contractor	PIU
11	If to be needed, temporary land requirement for worker camps and storage	• Land lease agreement between Contractor and landowner/government	One time	Contractor	PIU
12	Air pollution	• Ambient air quality measurement • Use of electrical appliances • Ocular observation of vehicles and site conditions • Use of reconditioned machines and vehicles. • Maintenance of machines	Semi-annually (ambient air quality measurement) Monthly or as necessary (ocular)	Contractor	PIU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
13	Dust pollution/ minimization	• Ambient air quality measurement • Ocular observation of dust and dust suppression measures undertaken as per EMP	Semi-annually (ambient air quality measurement) Monthly or as necessary (ocular)	Contractor	PIU
14	Water supply and conservation	• No. of water storage tanks. • Measures taken during periods of shortage. • No. of water supply repair and maintenance works	Monthly or as necessary	Contractor	PIU
15	Waste management of worker camps, construction sites	• No. and types of waste bins installed • No. of truckloads of construction waste disposed • Types of solid waste segregated and reused • Ocular inspection of camps and construction site • Segregation, storage of hazardous waste	Monthly or as necessary	Contractor	PIU
16	Generation of excavated soil	• % soil reused for construction • % soil disposed • Ocular observation of soil pileup at site	One time	Contractor	PIU
17	Site drainage	• Site drainage • Connection to storm water drainage • Repair and maintenance of drains • Ocular observation of site drainage	Monthly or as necessary	Contractor	PIU
18a	Noise pollution and disturbance to the BNC	• Ambient noise level measurement • Incorporation of the noise reduction measures into the Contract document	Semi-annually (ambient noise level measurement) Monthly or as necessary (monitoring of complaints)	Contractor	PIU
		• Complaints by the Range Office		Contractor	PIU
18b	Disturbance to the local community	• Ambient noise level measurement • No. of complaints received from neighboring community		Contractor	PIU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
19	Congestion and blockages/obstructions	• No. of complaints on congestion caused by Construction traffic • Ocular observation of road conditions (spillage of construction material along access road, blockage of drains and footpaths)	Monthly	Contractor	PIU
20	Material storage	• No. of material storage sheds • Ocular observation on material storage at site • Material inventory	Monthly	Contractor	PIU
21	Community health and safety	• Consultation with community (minutes of meeting, participant list) • No. of safety signs • Installation of barricades • Obstruction of access routes/paths • No. of accidents occurred • No. of complaints received	Monthly	Contractor	PIU
22	Camp closure	• Ocular observation of site conditions and compliance to EMP	One time	Contractor	PIU
Operation phase					
23	Operation phase (e.g. building management)	• Maintenance records	Every quarter	NHDCL estate management	PMU
24	Fire hazard	• No. of fire extinguishers, and maintenance record	Once a year	NHDCL estate management	PMU
25	Sewage and sanitation	• Maintenance record	Once a year	NHDCL estate management	PMU
26	Waste management	• Maintenance record	Monthly	NHDCL estate management	PMU

330. 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 PCR 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.

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

A. Capacity Building

332. 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.

333. 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.

334. 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 34: Training Modules for Environmental Management

Module	Frequency of Sessions	Target participants	Conducting Personnel
1. Introduction and Sensitization to Environmental Issues (One-day workshop): • ADB Safeguards Policy Statement; • Government of Bhutan applicable safeguard laws, regulations and	Once during Pre-construction	NHDCL engineers / management team, officials responsible for implementing the Project, PMU staff, PIU staff, contractor/s.	Environmental Specialist Consultant

Module	Frequency of Sessions	Target participants	Conducting Personnel
policies including but not limited to core labor standards, OHS, etc.; • Sensitization on environmental concerns, environmental impacts of urban infrastructure improvement projects.			
2. Project training on hazards, health, safety and environmental issues pertaining to the project (two-day workshop and site visits): • EMP mitigation and monitoring measures; • Roles and responsibilities; • Public relations, • Consultations; • Grievance redress; • Monitoring and corrective action planning; • Reporting and disclosure; • Construction site standard operating procedures (SOP); • Chance finds (archaeological) protocol; • Health and safety plan; • Traffic management plan; • Waste management plan; • Site clean-up and restoration.	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
3. EMP implementation (Two-day session and site visit): • Implementation of EMP • Identification of environment impacts • Monitoring and reporting for EMP • Public interactions and consultations • Coordination for consents with various departments • Monitoring formats filling and review of impacts.	Once during construction stage	NHDCL Engineers, Officials responsible for implementing the Project, PMU staff, PIU staff, contractor/s.	Environmental Specialist Consultant

B. Cost of EMP Implementation and Monitoring

335. Implementation of the EMP and monitoring of environmental conditions at the site will entail costs that will be borne by the Contractor. Such costs shall be included in the bidding and contract documents to ensure that all environmental measures are implemented and monitored without any budget constraints or impediments. These costs have been estimated as far reasonably as possible, and therefore indicative, in . Costs associated with activities that are borne by the PMU, PIC or any other stakeholders other than the Contractor are not included in the estimates. Moreover, costs integral to the Contractor's BOQ costs (during construction phase), and operational cost of maintaining the housing complex (during the operation phase) are not included as well.

Table 35: Indicative Cost of EMP Implementation and Monitoring

	Activities or Items	Unit of Measure	No. of Units	Unit Cost ($)	Total ($)
A	**EMP Implementation**				
A.1	Providing hard barricade during trench excavation in the construction site.(Type of hard barricading with type of materials, specifications to be mentioned).	set	10	100.00	1,000.00
A.2	Providing safety signage boards, caution tapes and green nets during construction works in site.(With information to submit posters sample with size and type of material on which it will be displayed).	LS			500.00
A.3	Providing water sprinkling three times a day during construction works at site.(Daily reports with photographs to be submitted).	LS			100.00
A.4	Regular health check-ups in two equal time interval (type of tests and check ups that should be done to be mentioned to Contractor and records to be submitted to client).	person	50 X 2	25.00	2,500.00
A.5	Trainings and awareness programs to Contractor's labors at least in the project period.(Induction training, types of job specific training should be mentioned clearly and training plan should be submitted by Contractor).	no.	3	200.00	600.00
A.6	Provide personal protective equipments, first aid kits, fire extinguishers. (PPE extra stock of minimum 10% of total workers should be available with stock and issue register should be available for inspection. Mention the types of PPEs with specifications that should be provided to workers and staffs like safety helmet, goggles, nose mask, hand gloves, safety shoes, ear plug, face guard, etc.).	LS			5,000.00
A.7	Placement of a dedicated **Safety Officer** throughout contract period for maintaining safety and protection against accidents including traffic control and EMP safeguard compliances with one standby emergency vehicle. (CV/Resume of safety engineer/officers should be submitted for approval and should be as per the required qualifications).	months	18	2,000.00	36,000.00
B	**EMP** **MONITORING** **(Air quality monitoring, set intervals for monitoring. Reports should be submitted along with the signature of witness from consultant).**				
B.1	Monitoring of **Air Quality at downwind** location.	Samples	4 (1 location x 4)	250.00	1,000.00
B.2	Monitoring of **Noise Level at site**	Site	4 (1 location x 4)	20.00	80.00

	Activities or Items	Unit of Measure	No. of Units	Unit Cost ($)	Total ($)
C.	**Enhancement Measures**				
C.1	Landscaping after the construction period	Sqm	Cost included in Contractor's BOQ cost.		
D.	**COVID-19 HEALTH AND SAFETY PLAN**				
D.1	Thermal scanners. All persons at the worksite should have their temperature screened with Infrared Thermometer (handheld non-contact). [Dr. Trust(USA) Non-Contact Forehead Temporal Artery Infrared Thermometer]	scanner	2	60.00	120.00
D.2	Contactless attendance system. (This is biometric attendance system unit. Prices for contactless system are not available)	unit	1	110.00	110.00
D.3	Liquid Soap & Hand washing arrangement at site	L.S.			100.00
D.4	Contactless, sensor-based/ pedal operated sanitizer [Metal foot sanitizer dispenser]	unit	3	30.00	90.00
D.5	Additional rest areas at sites and dining spaces in camp site	L.S.	Cost included in Contractor's BOQ cost.		
D.6	Ensure availability (even tie-up) of Ambulance equipped with all necessary items like nose masks, first aid kits, aprons, disinfect solutions etc.	No additional cost required but should be monitored.			
D.7	First aid kits with hand sanitizers and hand wash liquids shall be mandatory available in all the vehicle without any lapses.	L.S.			200.00
D.8	Regular notification by local government, district authority should be adhered to, and all the staff should be compulsorily made aware of such notification.	No additional cost required but should be monitored.			
D.9	Job protection of workers during crisis period of COVID 19 pandemic needs to be ensured.	No additional cost required but should be monitored.			
F.	Contingency (10%)				**4,830.00**
	Total				**53,130.00**

XI. RECOMMENDATION AND CONCLUSION

336. 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.

337. The infrastructure development works involve the construction of 18 3-storey residential buildings comprising of 108 units, complete with internal access road and parking on 5 acres of land. The housing complex will also have a service center and waste station.

338. There is no need for land acquisition and compensation and resettlement measures have been prepared under the social diligence studies. Prior to construction, the existing utilities (water supply and electrical lines) will be relocated and the retaining walls built.

339. There are no impacts on ecological habitats but there are two vulnerable species of snakes that are present in the area and may be impacted by the project activities. Adequate mitigation measures to ensure minimal impacts on these species if found have been incorporated into the EMP.

340. 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.

341. 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.

342. 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.

343. 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. 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.

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 4.5km from the city core. The density of Phuentsholing is 48 persons per sq.km.[78] The limited Thromde area has a population 27,658[79]
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 (Phibsoo wildlife sanctuary) is more than 80km away.
Wetland		✓	There is no wetland in and around the area.
Mangrove		✓	There are no coastal areas in Bhutan.

[78] ADB, Phuentsholing Township Development Project
[79] NSB, Statistical Yearbook of Bhutan, 2020.

Screening Questions	Yes	No	Remarks
Estuarine		✓	There are no coastal areas in Bhutan.
Buffer zone of protected area		✓	The closest protected area (Phibsoo wildlife sanctuary) is more than 80km away.
Special area for protecting biodiversity		✓	There is no special area for protecting biodiversity in and around the area.
Bay		✓	There are no coastal areas in Bhutan.
B. Potential Environmental Impacts Will the Project cause…			
impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.	✓		The subproject involves construction of 18 residential buildings comprising of 108 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)?		✓	The subproject site is far from these types of ecosystems.
dislocation or involuntary resettlement of people?		✓	
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?		✓	The area is currently being used for housing.
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. There is no receiving body of water nearby the site.

Screening Questions	Yes	No	Remarks
air pollution due to urban emissions?	✓		This is anticipated during construction phase. The sources of air pollution will be from trucks transporting materials to the site and machinery use, but these are required to undergo emission tests annually in compliance with the Road Safety Transport Authority. The environmental management plan (EMP) of the project will provide measures to mitigate this impact.
risks and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation?	✓		This is anticipated during construction phase. Occupational health and safety hazards from construction works will be mitigated through the OHS measures, many of which are mandatory by regulation. The environmental management plan (EMP) of the project will provide measures to mitigate this impact.
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.
noise and dust from construction activities?	✓		Anticipated but will be temporary during construction phase and limited to the project site. As there are not many neighbors in the immediate vicinity and the area is surrounded by trees, this impact will not be significant
traffic disturbances due to construction material transport and wastes?	✓		The access road is only used by the local community and residents so the volume of traffic is very low at the moment.
temporary silt runoff due to construction?	✓		This is anticipated if excavation works are undertaken during the rainy season. The EMP of the project will provide measures to avoid or minimize runoff, such as for example, avoiding or minimizing heavy excavation works during monsoon season, providing silt traps or canals around the site, etc.
hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	Not anticipated for a housing development project. The construction activities will be carried out within the site boundaries only.

Screening Questions	Yes	No	Remarks
water depletion and/or degradation?		✓	During construction phase, there will be an increase in demand for water use for construction activities as well as for domestic purposes, but this will be temporary. Once the project is in operation (or when the housing units are already occupied and used), there should be no issue with water supply depletion as the same existing Phuentsholing residents will occupy the facility. Besides, the design includes rainwater harvesting that will reduce water dependence from the city's piped water services.
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?	✓		Although there is no surface water in the area, the groundwater may be impacted. This is anticipated during the construction and operation phases of the project. The EMP of the project will provide measures to avoid or minimize this impact, such as following the mandatory waste disposal through Phuentsholing's garbage collection services.
pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	This is not anticipated. The subproject site is not near receiving bodies of water used for livelihood activities or drinking water supply.
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?	✓		Fuel, paints and other chemicals normally used for housing development will be used during construction phase, but not explosives. The EMP of the project will provide measures to avoid potential impact of fuel or chemical spills during construction phase.

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?	✓		Anticipated during construction phase. The EMP of the project will provide measures to avoid potential impacts to communities, such as for example, work areas to be clearly demarcated with signages and provided with safety barriers, and access by public will be restricted. Only workers and project concerned members will be allowed to visit the operational site.

A Checklist for Preliminary Climate Risk Screening

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

Screening Questions		Score	Remarks[80]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	2	The site[81] is located on a gentle slope of hill and exposed to landslide. The location is covered with vegetation but site development and construction work may lead to imbalance of the slope.
	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.)?	1	Slope management measures should be in place for the proposed site.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g., prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g., construction material)?	0	No such effect envisaged.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	No such effect envisaged.
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g., annual power production) of project output(s) (e.g., hydro-power generation facilities) throughout their design life time?	0	No such effect envisaged.
	Cumulative score	**3**	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

[80] 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.

[81] https://www.google.com/maps/place/26%C2%B050'40.9%22N+89%C2%B023'32.5%22E/@26.8450576,89.3974394,143a,35y,258.08h,71.75t/data=!3m1!1e3!4m9!1m3!11m2!2sLV4IZUe43MeUSvdEtHryOks8K9hqbw!3e3!3m4!1s0x0:0x0!8m2!3d26.8446927!4d89.392367

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: The site is exposed to landslide. Site development and construction works may lead to imbalance of ground bonding. Slope management measures should be in place for site development and building construction on the proposed location.

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)*
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)?				
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 a residential zone. The site is currently undeveloped. However, the area is within the designated Urban Village Low Density UV-2 (LD) Area, so 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?	Yes	Land cover and aesthetics; due to removal of existing vegetations.	Not significant because the clearance of vegetation and buildings will not cause large change in environmental conditions. There are 65-70 trees to be cut except for shrubs
1.3	Creation of new land uses?	No		The site is currently designated Urban Village Low Density UV-2 (LD) 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

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)*
				mitigated through standard measures.
1.6	Demolition works?	No		There are no structures on the site
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 Thromde 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 .	Not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures. 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.
1.16	Facilities for treatment or disposal of solid wastes or liquid effluents?	Yes	Aesthetics and odor due to potential release of untreated effluents in canals and indiscriminate	Not significant because the impact can be mitigated through efficient functioning of the facilities as per design.

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)*
			disposal of solid wastes	While there is currently no municipal sewerage system yet in the town, toilets will be constructed and connected to septic tanks with soak pits as per design. There is also an option that these septic tanks will be emptied using municipal vacuum tankers until it is connected to a centralized municipal sewerage system in the future.
1.17	Facilities for long term housing of operational workers?	NR	Not required	
1.18	New road, rail or sea traffic during construction or operation?	No	Not Applicable	
1.19	New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	Not Applicable	
1.20	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	NR	Not required	
1.21	New or diverted transmission lines or pipelines?	No	Not Applicable	
1.22	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	NR	Not Applicable	
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?	NR		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?	No		The site is not located near any river

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?	No		Yes, construction materials will be transported from within Chukha and neighboring districts depending on availability
1.27	Long term dismantling or decommissioning or restoration works?	No		
1.28	Ongoing activity during decommissioning which could have an impact on the environment?	No		
1.29	Influx of people to an area in either temporarily or permanently?	No		Both foreign and national workers will be recruited by the contractor for the construction work temporarily (until the duration of the construction period)
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		
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?				
2.1	Land especially undeveloped or agricultural land?	Yes		The subproject will be carried out on 5 acres of undeveloped land
2.2	Water?	Yes		Water will be used from existing water supply
2.3	Minerals?	No		Sand, stones, marble will be required for construction. These will be purchased from registered suppliers
2.4	Aggregates?	Yes		Will be required for construction purposes. These will be purchased from registered suppliers
2.5	Forests and timber?	Yes		Timber will be required for making doors and windows and other woodwork. These will be purchased from registered suppliers

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)*
2.6	Energy including electricity and fuels?	Yes		Electricity will be installed by the Bhutan Power Corporation
2.7	Any other resources?	No		
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?				
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		Solvents, primers, adhesives, paint will be utilized
3.2	Will the project result in changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)?	Yes		There is a risk only if water is allowed to accumulate and not drained off or if site conditions are not maintained. Drainage will be constructed and site maintenance enforced
3.3	Will the project affect the welfare of people e.g. by changing living conditions?	Yes		The project will provide affordable housing for residents of the Kidu Colony and wage workers in Phuentsholing. It will positively enhance their living conditions as they are living in temporary shelters at the moment
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		
4. Will the Project produce solid wastes during construction or operation or decommissioning?				
4.1	Spoil, overburden or mine wastes?	No.		Top soil will be stored aside for landscaping works 60% of the excavated soil will be reused for filling works and the remaining will be used for filling works in the Amochhu area
4.2	Municipal waste (household and or commercial wastes)?	Yes		General household and office waste- these will be segregated into organic, non-organic, recyclable and hazardous waste and disposed accordingly

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)*
				A waste service station is designed to better segregate, recycle and minimize waste being disposed at the land fill site
4.3	Hazardous or toxic wastes (including radioactive wastes)?	Yes		Pre-approved solvents, primers, adhesives, paint will be utilized
4.4	Other industrial process wastes?	No		
4.5	Surplus product?	No		
4.6	Sewage sludge or other sludge from effluent treatment?	No		
4.7	Construction or demolition wastes?	Yes		Adequate arrangements with the approval by the Thromde will be made to segregate and dispose construction waste.
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		
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?				
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources (vehicles and/or heavy equipment)?	Yes		Air emissions from Vehicles dropping off of materials at construction sites are anticipated but this will be mostly during the construction period.
5.2	Emissions from production processes?	No		
5.3	Emissions from materials handling including storage or transport?	Yes		Dust will be blown from open piles of sand from both within and outside the site
5.4	Emissions from construction activities including plant and equipment?	Yes		Air emissions from machines being used at site
5.5	Dust or odors from handling of materials including construction materials, sewage and waste?	Yes		Dust will be generated during material transportation, loading and unloading and sewage will be generated in the worker

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)*
				camps. OHS requirements and maintenance of workers camps will be followed
5.6	Emissions from incineration of waste?	No		
5.7	Emissions from burning of waste in open air (e.g. slash material, construction debris)?	No		This is not permitted and will be restricted at site.
5.8	Emissions from any other sources?	No		
6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?				
6.1	From operation of equipment e.g. engines, ventilation plant, crushers?	Yes		The construction is expected to generate noise due to use of excavators, construction machinery
6.2	From industrial or similar processes?	No		
6.3	From construction or demolition?	Yes		Same as point 6.1
6.4	From blasting or piling?	No		
6.5	From construction or operational traffic?	Yes		The construction is expected to generate noise due to increase in vehicular movement for material drop off
6.6	From lighting or cooling systems?	No		
6.7	From sources of electromagnetic radiation (consider effects on nearby sensitive equipment as well as people)?	No		
6.8	From any other sources?	No		
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?				
7.1	From handling, storage, use or spillage of hazardous or toxic materials?	Yes		Solvents, primers, adhesives, paint will be utilized and harmful if not properly utilized and stored. But these will only be brought to the site when required and removed once work is completed
7.2	From discharge of sewage or other	Yes		During construction stage temporary toilets will be constructed, that will be

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)*
	effluents (whether treated or untreated) to water or the land?			demolished on completion of work. Toilets will be emptied using municipal vacuum services
7.3	By deposition of pollutants emitted to air, onto the land or into water?	No		
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		
8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?				
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous or toxic substances?	Yes		Hazardous materials will be stored separately and disposed as per municipal instructions
8.2	From events beyond the limits of normal environmental protection e.g. failure of pollution controls systems?	No		
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		The sites lie in High Seismic zone and about 1-1.5km from the landslide area inRinchending. The Buildings are designed for seismic performance (IS 1893:2016, Zone V, Z=0.36, I=1.37, R=5, Damping=5%). The height of the buildings is only 3 floors and retaining wall are planned behind the buildings and below the main access road
9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?				
9.1	Changes in population size, age, structure, social groups etc?	No		No because the residents will be mostly from the existing Kidu Colony or government and corporate employees working within 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)*
9.2	By resettlement of people or demolition of homes or communities or community facilities e.g. schools, hospitals, social facilities?	No		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?	No		Government regulations require that all camps have to cleared out on completion of work so no new communities will be created
9.4	By placing increased demands on local facilities or services e.g. housing, education, health?	Yes		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		The project will generate employment for both skilled and non skilled workers
9.6	Any other causes?			
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?				
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

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)*
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 or waste water treatment, etc) housing development extractive industries supply industries other?	Yes		Yes, but any development requires the approval of the municipality.
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 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
Are there features of the local environment on or around the Project location which could be affected by the Project? • 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? • Other areas which are important or sensitive for reasons of their ecology e.g. o Wetlands, o Watercourses or other water bodies,	There are no protected areas or critical habitats within 50km of the project site The closestriver is the Omchhu, at a distance of 5km The area is a within the Urban Village Low Density UV-2 (LD), where the existing land use is residential housing. There are no critical habitats that could be affected by the project. 2 vulnerable snake species are

Question	Remarks
○ the coastal zone, ○ mountains, ○ forests or woodlands • 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? • Inland, coastal, marine or underground waters? • Areas or features of high landscape or scenic value? • Routes or facilities used by the public for access to recreation or other facilities? • Transport routes which are susceptible to congestion or which cause environmental problems? • Areas or features of historic or cultural importance?	reported to found in the general area for which mitigation measures to assess the presence and relocate these is proposed.
Is the Project in a location where it is likely to be highly visible to many people?	Yes, the project will only be visible to all traveling along the Highway as it is adjacent to it.
Is the Project located in a previously undeveloped area where there will be loss of greenfield land?	No, the site has been specifically allocated for housing
Are there existing land uses on or around the Project location which could be affected by the Project? For example: • homes, gardens, other private property, • industry, • commerce, • recreation, • public open space, • community facilities, • agriculture, • forestry, • tourism, • mining or quarrying	No.
Are there any plans for future land uses on or around the location which could be affected by the Project?	No
Are there any areas on or around the location which are densely populated or built-up, which could be affected by the Project?	The area falls under the Local Area Development Plan as part of the Thromde- so more development (buildings, roads, sewerage, watersupply, utility network) is anticipated.
Are there any areas on or around the location which are occupied by sensitive land uses which could be affected by the Project? • hospitals, • schools, • places of worship, • community facilities	No. The closes religious and historic site, school and hospitalis more than1km from the site.
Are there any areas on or around the location which contain important, high quality or scarce resources which could be affected by the	No

Question	Remarks
Project? For example: • groundwater resources, • surface waters, • forestry, • agriculture, • fisheries, • tourism, • minerals.	
Are there any areas on or around the location of the Project which are already subject to pollution or environmental damage? For example: • where existing legal environmental standards are exceeded, which could be affected by the Project	No
Is the Project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions? For example: • temperature inversions, fogs, severe winds, which could cause the Project to present environmental problems?	Yes, the project in general fall in High earthquake hazard zone and it is also within 1-2km of a landslide prone area
Is the Project likely to affect the physical condition of any environmental media? • The atmospheric environment including microclimate and local and larger scale climatic conditions? • Water – e.g. quantities, flows or levels of rivers, lakes, groundwater. Estuaries, coastal waters or the sea? • Soils – e.g. quantities, depths, humidity, stability or erodibility of soils? • Geological and ground conditions?	No
Are releases from the Project likely to have effects on the <u>quality</u> of any environmental media? • local air quality • global air quality including climate change and ozone depletion • water quality – rivers, lakes, groundwater. estuaries, coastal waters or the sea • nutrient status and eutrophication of waters • acidification of soils or waters • soils • noise • temperature, light or electromagnetic radiation including electrical interference • productivity of natural or agricultural systems	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
Is the Project likely to affect the availability or scarcity of any resources either locally or globally? • fossil fuels • water • minerals and aggregates • timber	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

Question	Remarks
• other non-renewable resources • infrastructure capacity in the locality - water, sewerage, power generation and transmission, telecommunications • waste disposal roads, rail	
Is the Project likely to affect human or community health or welfare? • The quality or toxicity of air, water, foodstuffs and other products consumed by humans? • Morbidity or mortality of individuals, communities or populations by exposure to pollution? • Occurrence or distribution of disease vectors including insects? • Vulnerability of individuals, communities or populations to disease? • Individuals' sense of personal security? • Community cohesion and identity? • Cultural identity and associations? • Minority rights? • Housing conditions? • Employment and quality of employment? • Economic conditions? • Social institutions?	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: Sample COVID 19 Health and Safety Guidance for Contractors

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,[82] the ILO Workplace Response to the Coronavirus Disease outbreak,[83] 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

[82] 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
[83] 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.

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. 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^{o}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: Result of IBAT Screening (page 1)

Result of IBAT Screening (page 2)

Result of IBAT Screening

Appendix 5: Copies of Minutes of Consultation Meetings

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 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 affordhigh 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.

MINUTES OF FOCUS GROUP DISCUSSIONS AT PHUNTSHOLING
(PTDP / BAHP)
Employed and Unemployed (Kidu Colony)

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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.

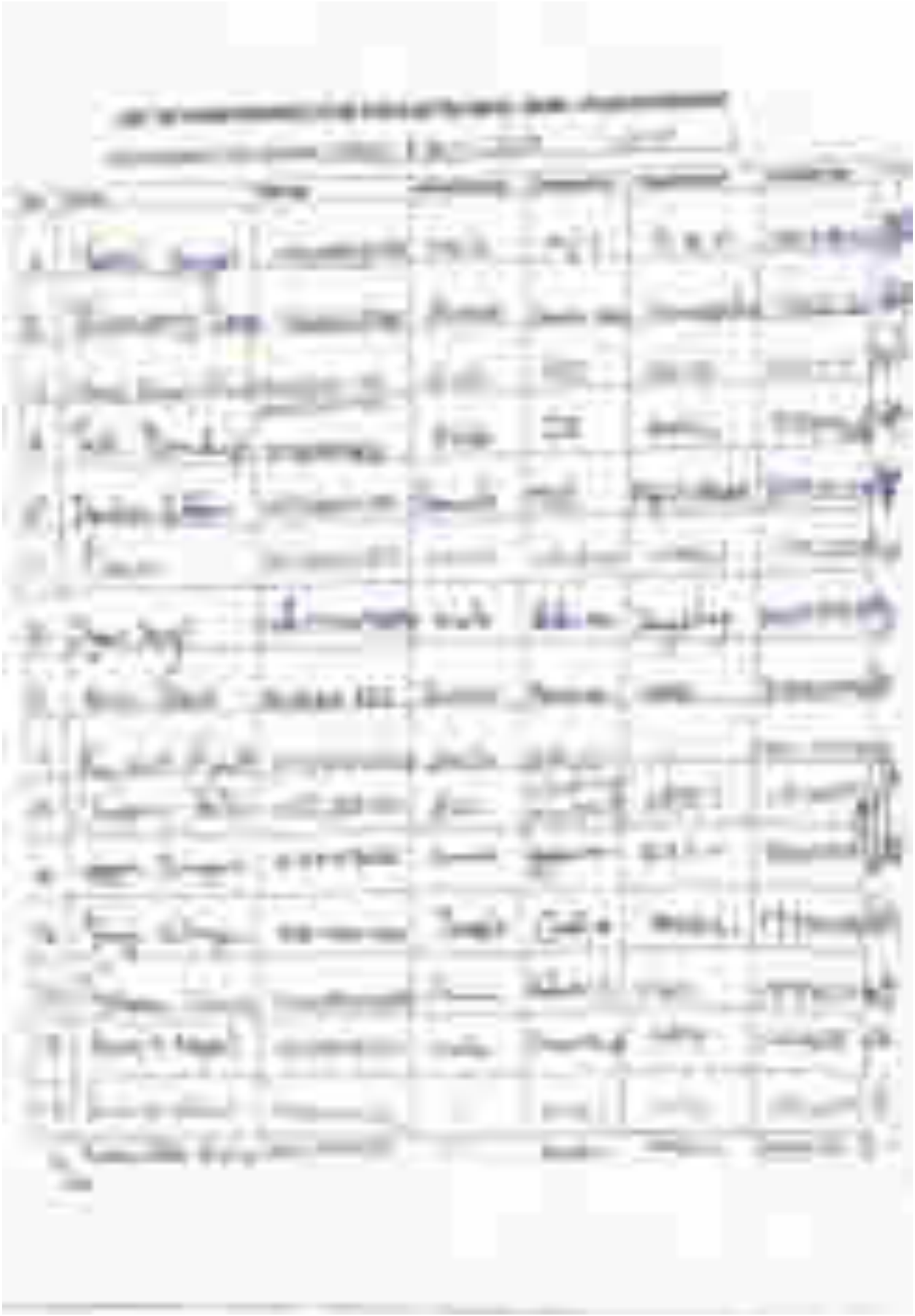
On the idea of ownership schemes for housing units, the participants are of the opinion that though in principle the idea is very good; but in practice, it will be difficult to implement because civil servants are usually posted to a location for 3-5 years and after that as per rules they must be transferred 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 deputes 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 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.[84] 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[85].

C. Common Symptoms of Corona Virus Disease[86]

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.

[84] Gross National Happiness Commission. 2019. Twelfth Five-Year plan. 2018-2023. Thimphu.
[85] World Health Organization. https://www.who.int/health-topics/coronavirus#tab=tab_1
[86] World Health Organization. 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: 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
1. Compliance with Local Permit Requirements	**(Secured / Application Submitted / Not Applicable)**	
Location/zoning permits		
Permit to construct		
Building permit		
Transport / hauling permits		
2. Compliance with IEE Requirements	**(Approved / Under Preparation / Submitted to PIU for Approval)**	
Site-specific EMP (SEMP)		
Corrective Action Plan, if any		
3. Compliance with SEMP		
Construction Site	**(Satisfactory / Needs Improvement / Not Implemented)**	
- 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		

Monitoring Item	Status	Remarks
Construction Workers' Camp Site	**(Available / Needs Improvement / Not Available)**	
- 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		
4. Implementation of GRM	**(Yes / No or None / Under Resolution)**	
Complaints		
Complaints resolution		
5. Environmental Quality Measurement	**(Passed / Failed / Not Applicable)**	
Ambient air quality sampling		
Noise level measurement		
Receiving water quality sampling		

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 8: 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?				
	c. Is there a regular collection for solid wastes from work sites?				

Monitoring/Inspection Questions		Findings			Comments / Clarifications
6.	Wastewater Management	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.	Dust Control	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.	Noise Control	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.	Traffic Management	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?				
	d) Are the excavation sites provided with sufficient lighting at night?				

Monitoring/Inspection Questions		Findings			Comments / Clarifications
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 9: 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)[87]	If On-going Construction	
				%Physical Progress	Expected Completion Date

[87] If on-going construction, include %physical progress and expected date of completion

II. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS[88]

Package No.	Subproject Name	Statutory Environmental Requirements[89]	Status of Compliance[90]	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish[91]

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)		

[88] 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.

[89] Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

[90] Specify if obtained, submitted and awaiting approval, application not yet submitted

[91] *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)[92]

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
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

[92] 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/m3	SO2 µg/m3	NO2 µg/m3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

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_{eq} (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LA_{eq} (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 **Name**
Position **Position**