Initial Environmental Examination

Document Stage: Draft
Project No.: 54355-001
November 2021

Bhutan: Green and Resilient Affordable Housing Sector Project – Trashiyangtse

Prepared by the National Housing Development Corporation Limited of the Kingdom of Bhutan for the Asian Development Bank. This is an updated version of the draft originally posted in September 2021 available on https://www.adb.org/projects/documents/bhu-54355-001-iee-3.

CURRENCY EQUIVALENTS

(as of 20 August 2021)

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

ABBREVIATIONS

ADB	-	Asian Development Bank
AIDS	-	Acquired Immunodeficiency Syndrome
BBR	-	Bhutan Building Regulation
BHU	-	Basic Health Unit
BOQ	-	Bill of quantities
BPC	-	Bhutan Power Corporation
CA	-	Competent Authority
COVID-19	-	Corona Virus
DCR	-	Development Control Regulation
DDMC	-	Dzongkhag Disaster Management Committee
DEC	-	District Environment Committee
DOFPS	-	Department of Forest and Park Services
DYT	-	Dzongkhag Yargay Tshogdue
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
MOH	-	Ministry of Health
MOLHR	-	Ministry of Labour and Human Resources
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 Valuation Agency
PIAC	-	Project Implementation Assistance Consultant
PIU	-	Project Implementing Unit
PMU	-	Project Management Unit
PPE	-	Personal Protective Equipment
PSC	-	Project Steering Committee
REA	-	Rapid Environmental Assessment
RECOP	-	Regulation for Environmental Clearance of Projects
REMSD	-	Real Estate Management Services Division
RGOB	-	Royal Government of Bhutan
SDG	-	Sustainable Development Goal
SOP	-	Standard Operating Protocol
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 Trashi Yangtse Subproject (subproject), which is one of the 9 subprojects to be financed under the project. This subproject involves construction of 8 two-storey residential buildings comprising of 32 units, with internal access road, parking, and creation of a green space. Expectedly, 32 families will benefit from this subproject, and this translates to around 160 beneficiary citizens (i.e., approximately 5 members per family). This housing complex will be constructed within a 2.48-acre (approximately 1 hectare) residential plot located in Yangtse town. The table below summarizes in detail the components of the subproject.

Details of the Housing Complex in Trashi Yangtse

Building Type	Number of Buildings	Total Number of Units	Measurements
Category III (Type III)	8	32 (8 buildings x 2 floors per building x 2 units per floor) Features per unit: 1 Living room 2 Bedroom 1 Toilets 1 Kitchen 1 Balcony	Plinth Area (1st Floor): 171.60 m^2 (1,846.42 ft^2) Unit Area: 91.02 m^2 (979.38 ft^2) (including balcony) Building Height: 9.045m
Facilities			
Internal road and parking	To fit 23 light vehicles and 21 two-wheelers		
Other facilities	-Drinking water storage tanks (1 no. x 2,000 liters) per building -Rainwater harvesting tanks (2 x 2,500 liters) -Sub-station -Pedestrian footpath -Green area (35.14% of land)		

Categorization. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB Safeguard Policy Statement (SPS), 2009. Initial step was to categorize the subproject based on its likely

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

Description of the Environment. The proposed site of the housing subproject is located in the Yangtse town in the Trashi Yangtse Dzongkhag (District), which is considered a built-up area with existing residential, commercial and institutional establishments around. It is also bounded by major roads in the town and provides convenient and easy access during the construction and operation phase (or when the housing complex is occupied by the recipient citizens).

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

Assessment of Environmental Impacts. Potential environmental impacts were identified on the basis of review and analysis of the primary and secondary data or information and stakeholder consultations, and field visits to the site. Impacts were identified in relation to the different phases of project implementation — design and 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 that 22 IUCN Red List species of concern are identified within this default area of analysis. Further assessment has been undertaken with regard to species of concern. During field visits, the area of the subproject is confirmed to be within the town center. The 22 IUCN Red List species of concern were assessed to determine the likelihood of them being found at the subproject site. While the subproject site is already in the built-up area, the likelihood of these species being found at the site is very low. Nevertheless, the assessment included necessary discussions with the Trashi Yangtse Forest Division of 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 far higher altitudes in Bhutan.

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

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

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

Grievance Redress Mechanism. The project will adopt a grievance redress mechanism (GRM) that shall be set up to register grievances of the people regarding technical, social and environmental aspects. The process will be designed to be transparent, gender responsive, culturally appropriate and commensurate to the risks and adverse impacts of the project, as well as readily accessible to all segments of the affected people. The project GRM will not supersede any legal government grievance procedures. Affected people are to be informed about the mechanism through media and public outlets. This participatory process shall ensure that all views of the people are adequately reviewed and suitably incorporated in the design and implementation process.

Implementation Arrangement. The executing is the Ministry of Finance and the implementing agency is the National Housing Development Corporation Limited (NHDCL) of the Government of Bhutan. NHDCL will establish a project management unit (PMU) comprising officials including an Environmental Safeguard Officer who is a permanent employee of NHDCL. The PMU will be strengthened with external experts or consultants in environmental and social safeguards, including experts on finance, procurement, technical areas, and contract management. Project Implementation Units (PIUs) will be established at the local level or municipalities where the subprojects under the project are located. For this subproject, NHDCL Tashi Yangtse 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 executive summary of the IEE will be translated in the local language and made available at the offices of PMU and Contractor, including satellite office of Contractor at the subproject site. Hard copies of the IEE will be available in the PMU, and accessible to citizens as a means of disclosing the document and at the same time creating wider public awareness. On demand, the person seeking information can obtain a hard copy of the complete IEE document at the cost of photocopy from the office of the PMU.

Monitoring and Reporting. EMP compliance monitoring will be undertaken by the PMU, with support of external experts or consultants. Contractors will submit monthly reports to PMU. Consistent with reporting requirements set out in the Project Administration Manual, PMU will

[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."

prepare and submit reports to ADB on a semi-annual basis. The submission of semi-annual environmental monitoring reports to ADB will continue until ADB issues a project completion report for the project.

Conclusion. The overall finding of this IEE is that the subproject will result in significant environmental benefits because of improved living condition of selected recipient citizens of Trashi Yangtse. 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 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 subproject locations in Bhutan. Improved livability, safety, and sustainability of human settlements through access to adequate affordable housing is 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 Housing Structures

	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 Trashiyangtse housing subproject based on the detailed design produced under the project, and to specify measures to address impacts. This IEE is based on preliminary 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 measures to mitigate potential impacts; and
(v) Review and develop institutional arrangements and capacity building needs for implementation of environmental management and monitoring.

E. Structure of the Report

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

(i) Executive Summary. This chapter provides an overview and summary of the outcome of the IEE;
(ii) Chapter 1. Introduction, which includes the Background, 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 project location and area, project rationale, project alternatives, project development plan and project components, project phase, and schedule and resource utilization;
(v) Chapter 4. Description of the Environment, which includes a description of the baseline information, project 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; and
(xii) Chapter 11. Conclusion, which provides overall analysis, conclusion and recommendations of the IEE.

II. POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Safeguard Policy Statement

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

cultural resources in the project's area of influence.[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 Category B for Environment per ADB SPS.

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

20. The 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 well before the consultations giving brief project description, location, and specific contact data (including telephone numbers). In the meetings, presentations will be provided about the subproject's potential environmental and social impacts. Consultation sessions must have attendance sheets prepared and included as part of the documentation. See Table 2 below for the template.

Table 2: Template of Attendance Sheet for Consultation Meetings

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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	Trashi Yangtse 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 has the potential to impact the nearest surface water (Kholongchhu)	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.		and needs to comply with this Act. The project 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.	Trashi Yangtse 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 5 trees at the site, which requires permission from	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.			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.		
Biodiversity Act 2003	Sets forth national sovereignty over genetic resources;	No specific permit required, but any development	National Environment Commission	Subproject is not located in ecologically	Design Phase / Pre-construction Phase	PMU

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	ensures conservation and sustainable use of biochemical and genetic resources; promotes equitable sharing of benefits derived from genetic resources; promotes technology transfer and capacity building; recognizes and protects traditional knowledge, innovation, and practices of local communities associated with biodiversity; regulates the collection of genetic resources and prevents illegal access; recognizes and protects farmers' and breeders' rights; and regulates plant variety and property rights and use.	project needs to comply with the provisions of this Act.		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.		
Occupational Health and Safety						
Bhutan Constitution 2008	The following are relevant provisions on protection of workers: • Article 5 (2.d) ensures a safe and healthy environment. • Article 9 (12) endeavors to	No specific permit required, but any development project needs to comply with the relevant provisions of the constitution.	N/A	The subproject will involve workers. These provisions of the constitution on workers' occupational health and safety	Design Phase / Pre-construction Phase / Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	ensure the right to work, vocational guidance and training and just and favorable conditions of work. • Article 9 (13) endeavors to ensure the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay. • Article 9 (14) ensures the right to fair and reasonable remuneration for one's work. • Article 9 (17) takes appropriate measures to eliminate all forms of discrimination and exploitation against women including trafficking, prostitution, abuse, violence, harassment and intimidation at work in both public			will be complied by the subproject.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	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 working conditions, including occupational health and safety, labor protection and relations as well as	Foreign worker permit	Ministry of Labor and Human Resources	The subproject will involve contractors and workers. PMU will ensure that Contractor(s) comply with the relevant	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
	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.			provisions of this Act		
Regulations on Occupational Health, Safety and Welfare, March 2012 (supersedes the General Rules and Regulations on Occupational Health and Safety in Construction, Manufacturing, Mining and Service Industries 2006)	Prescribes standards and procedures on occupational health, safety and welfare for workplaces, instruments, vessels, appliances, apparatuses, tools, devices, electrical safety and other hazardous conditions. It aims to ensure safety, health and welfare for employees as well as other persons at workplaces from work-related risks to their health, safety and wellbeing	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
Regulations on Working Conditions 2012 (first edition in 2009)	Under the MOLHR, these are 15 regulations which provide for the employment conditions required to implement the provisions of the LEA 2007 effectively. The 15 Regulations cover issues such as recruitment and management of foreign workers, child labor, hours of work, grievance procedure, sexual harassment, workers' compensation, etc.	No specific permit required, but any development project needs to comply with the provisions of this regulation.	Ministry of Labor and Human Resources	The subproject will involve workers. Contractors will be required to strictly comply with the relevant provisions identified in the regulations. The PMU will monitor compliance.	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL
Regulations on Occupational Health and Safety for Construction Industry 2012 (supersedes 2009)	These regulations set the occupational health and safety standards, and procedures on construction safety. It aims to ensure safety and health for employees, as well as other persons at the construction sites, from work related risks to their health, safety, and wellbeing. It also prescribes the roles and responsibilities of the workers and	No specific permit required, but any development project needs to comply with the provisions of this regulation.	Ministry of Labor and Human Resources	The subproject will involve workers. Contractor(s) will be required to provide workers with safe and healthy working conditions during construction. Workers will be provided with safety and protection equipment, where needed. PMU will monitor	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	employers in ensuring health and safety at the site.			compliance of the Contractor(s).		
Road Safety and Transport Act 1999	Provides for safe and efficient use of road systems and to ensure an efficient and a safe public transport system. Describes the duties of the drivers related to traffic safety signs and safety procedures to prevent and minimize transport accidents.	No specific permit required, but any development project needs to comply with the provisions of this Act.	Road Safety and Transport Authority	The subproject site is adjacent to main roads. Contractor(s) will be required to comply with the relevant provisions of this Act to prevent accidents in the construction sites. PMU will monitor compliance.	Construction Phase	Contractor / Trasporter
Disaster Management Act of Bhutan 2013	Establishes and strengthens institutional capacity for disaster management in institutions, mainstreaming of disaster risks reductions in policies and plans, and integrates and coordinates disaster management activities and how to respond to emergencies.	No specific permit required, but any development project needs to comply with the provisions of this Act.	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. Trashi Yangtse District has a Disaster Management and Contingency Plan (2018) as mandated by the Disaster Management Act 2013. This plan	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
				includes hazard, vulnerability, and capacity profile for 8 Gewogs (Gewog is a group of villages). It outlines priority disaster risk reduction, awareness raising and capacity building activities and spells out the standard procedures for disaster response.		
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	Building construction approval / permit	Trashi Yangtse 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
	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, 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 subproject involves building construction. The subproject will need to strictly comply with this set of rules and will be adhered to during design phase.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	The Code ensures safety of buildings, protect public health and general welfare related to building constructions and its occupancy.					
Bhutan Green Building Guidelines, 2013	This Guidelines was issued by the Ministry of Works and Human Settlements to introduce for the basic concepts, sustainable green principles and approaches that will be practical for consideration in the design and 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			The subproject involves building construction. Although not mandatory, the subproject may use this set of guidelines as reference during design phase.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	for the present and future generations.					
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 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.			The subproject involves building construction. Although not mandatory, the subproject may use this set of guidelines as 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. A contractor will be required to have a COVID-19 Standard Operating Protocol (SOP) and plan for its project sites. See Appendix 9.

40. Yangtse town has designated 2 zones within the municipal area divided by the Serkangchhu. Each zone is required to avoid mingling between zones and each household is required to follow the movement times as per the movement cards.

Table 4: Zones Created for COVID-19 Plan of Trashiyangtse

Zone I: Right bank of Serkangchhu	Zone II: Left Bank of Serkangchhu till Dongtir Dzong.
BWS, RBP Camp, Dzongkhag Store, KHEL Office, BPC & NHDC Housing Colony and Core Town on the right bank of Serkangchu and Doegar Bam	This Zone covers the following areas: Hotel Karmaling Area, TYLSS, Taxi Parking Area, Baechen, ZorigChusum, Hospital, BOD, NRDCL Office, RBA Transit Camp, Sawmill and DongtirDzong

Source: TrashiYangtseDzongkhag Administration

41. In addition to these measures, the district has also issued hotline numbers, and protocols for workplace, business entities (shops, restaurants) and construction sites, COVID 19 protocols for lockdown movements passes, and identified service providers during lockdown. Some of the measures constantly promoted include (i) encouraging people to stay at home and come out only when necessary, (ii) mandatory use of mask at all times, (iii) maintaining a physical distance of 1m, (iv) use of Druk Trace App or registration in a visitors logbook, (v) washing hand with soap and water for at 20 seconds, and (vi) following cough etiquette.

D. Relevant International Conventions and Treaties

42. Bhutan is a party to several multilateral environmental agreements. Of these conventions, the most relevant to the project are summarized in **Table 5**. There are no elements of the project that contravene the direction and intentions of these conventions.

Table 5: 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	The IEE process takes into consideration compliance with this agreement.

	International Environmental Agreement	Ratified	Relevance	Remarks
			conservation and sustainable use.	
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.
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 follow NEC requirements,

	International Environmental Agreement	Ratified	Relevance	Remarks
				including management of hazardous wastes.
7	Montreal Protocol on Substances that Deplete the Ozone Layer	April 2004	Protection of the Earth's ozone layer by phasing out the chemicals that deplete it	The IEE process takes into consideration compliance with this agreement, ensuring that the subproject follows NEC requirements, including prohibition on the use of ozone-depleting substances.
8	International Plant Protection Convention	June 1994	Prevent and control the introduction and spread of pests and invasive species	The IEE process takes into consideration compliance with this agreement, ensuring that the subproject avoids planting invasive and non-native species.

E. Gaps in Legal and Guiding Instruments

43. 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 6.

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

45. 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 6: Comparison of national regulations and ADB safeguard requirements

	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 Ministry of Agriculture and Forest (MOAF), acting as CA under the EAA. A permit for land clearance may be granted in private lands under strict conditions but not to alter protected area status, water catchment areas and areas containing high forest.	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	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	To ensure equivalence, the project should: (i) comply with the stricter internationally recognized standards or

	ADB SPS Principles	National requirements	Extent of Equivalence or Gaps	Gap-filling Measures
	Environmental, Health and 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)	issue. Further, the 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	provide justification 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. Compliance of Subproject with National Requirements

46. The key findings of the legislative review indicate that the following approvals and processes are required for this subproject.

47. **Project Category/Type** - Blue. The development of housing estates and colonies (#40) is listed in the Blue Category and therefore requires an IEE to be submitted to the Competent Authority, in this case the Ministry of Works and Human Settlement. However, as the MOWHS does not have an environmental officer to review the IEE, the IEE will be reviewed by the NEC.[21]

48. **Subproject Location**- The subproject is located within the Thromde, so the following approvals must be sought from the Thromde before and during project construction:

(i) Design/development consent/construction approval;
(ii) Approval for any changes in design or structure;
(iii) Approval for location selection (to ensure that buffers are maintained and there are no environmental sensitivity);
(iv) Forest clearance and removal of trees, if application to the site; and
(v) Waste disposal (excavation and construction waste).

49. **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.

50. **Compliance Requirement During Construction and Operation.** The project is located within the Thromde, so the project must comply with the following

(i) Thromde Act, 2007;
(ii) Standard Operating Procedures which cover procedures to be followed for construction approvals, annual renewal of building occupancy certificate (at a nominal fee), water supply, sewerage connection, and request for sewage vacuum tanker service, (one free service per year for those who have paid all water and sewer charges on time), new road (if any), widening or alignment of existing roads (if any) and land services, taxes and tariffs;
(iii) Disaster and emergency procedures and protocols (such as COVID 19 protocols) as and when issued by the Thromde or relevant ministry; and
(iv) The Applicable regulations and required approvals are as shown in table below.

Table 7: Summary of Relevant Permit Requirements

Act or Regulation	Government Agency/ Competent Authority	Clearance / Permit	Action required
Land Act	National Land Commission Secretariat	Land User Certificate	Request/ Process for Land User Certificate
Environmental Assessment Act 2000 National Environment Protection Act 2007	National Environment Commission	Environment Clearance	Submission of IEE

[21] NEC website. http://www.nec.gov.bt/necs/wp-content/uploads/2021/03/Project-Categorisation.pdf

Act or Regulation	Government Agency/ Competent Authority	Clearance / Permit	Action required
Regulation for the Environmental Clearance of Projects 2016			
Bhutan Building Rules 2017,2018	District Regulatory Officer, Dzongkhag Administration	Construction Permit	Submission of Building application
Forest and Nature Conservation Act, 1995 Forest and Nature Conservation Regulations 2000	Forest Range Office, TrashiYangtse	Tree felling permit	Submit application for tree felling
Labour and Employment Act 2007	Ministry of Labour and Human Resources	Foreign worker permit	Process for import of foreign workers
Waste Prevention and Management Act of Bhutan 2009 Waste Prevention and Management Regulation 2012, 2016	District Environment Officer	Waste disposal permit	Process for approval to dispose waste

G. Applicable Environmental Standards

51. **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.

52. 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.

53. 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 **8**, Table 9, Table 10 and Table 11 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 12, Table 13, and Table 14.

Table 8: 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	-
	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 9: 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 10: Effluent Standards

Parameters	Unit	NEC Standards, mg/l [a]
Biochemical Oxygen Demand	mg/l	30.0

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

Source: Environmental Standards, NEC 2020

[a] Standards for Sewage Treatment Plant Effluent

54. Table 10 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 11: 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 12: 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
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 13: 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 14: Vehicular noise level limits

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

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

III. DESCRIPTION OF THE SUBPROJECT

A. Subproject Location and Area

55. The project site is located in TrashiYangtse Dzongkhag (District), within Yangtse town (27°36'39.6" N 91°29'49.6"E) at an altitude of 1844 masl. The site is adjacent to the existing NHDCL colony on vacant government land. Trashi Yangtse Dzongkhag is located in the north eastern part of Bhutan, between Mongar and Trashigang (south), Lhuentse (west). It borders India in the east and the People's Republic of sh in the north.

56. The site is adjacent to the existing NHDCL complex and bordered by the road going uphill towards the Dzong and Baylling as well as the road/street that goes towards the municipal office. These are paved municipal roads.

57. The NHDCL has been granted the user rights certificate for the land. The proposed site is 2.48 acres (approximately 1 hectare), and land user certificate (LUC) has been processed from the National Land Commission. See Appendix 3 for the copy of LUC with the corresponding cadastral map. The land was allotted to the NHDCL years ago to construct residential housing, but since the project had not been initiated for a while, the residents of the current national housing complex adjacent the proposed project site are cultivating potatoes on one third of the land.

58. Towards the north is forest land below the Dzong. The Kholongchhu Hydropower project lies towards the northeast, and there are houses and shops on all other sides. There are no buildings or huts on the site.

Figure 1: Maps showing TrashiYangtse Dzongkhag

Map source. National Land Commission [22] and Trashi Yangtse Dzongkhag [23]

[22] From Gross National Happiness Commission. 2018 Population and Development Situation Analysis, Bhutan
[23] Trashi Yangtse Dzongkhag Administration http://www.trashiyangtse.gov.bt/dzongkhag-map)

Figure 2: Subproject location within Trashi Yangtse District

Source: Google earth and NHDCL design team

Figure 3: Aerial and Ground Level Photos of Subproject Site and its Boundaries

B. Subproject Rationale

59. Despite being a District Headquarter as well as the primary town for TrashiYangtse, the district has not seen much development and economic activity as compared to other districts and towns. Much of the district falls under the Bumdeling Wildlife Sanctuary and has 76% forest cover.[24]

60. According to the National Human Settlement Strategy report, TrashiYangtse's overall ranking is 15/20, making it one of the lesser developed districts. In addition to this, the Dzongkhag also has noted outmigration towards the more developed districts in the West. The district has a built-up area of 0.05% which includes the existing 2 towns (Yangtse and Doksum) and other gewog centers. Agriculture and livestock farming is the main source of livelihood for majority of the population.[25]

61. Due to the limited development in the district, there is still an acute shortage of housing for the low-income workers especially in Yangtse town where most of the government offices, private businesses and projects are centered. This is despite the outmigration pattern and gungtongs (unoccupied houses but private-owned) in the district. The establishment of the Kholongchhu Hydropower project further exerted additional pressure on existing housing. Moreover, the existing housing facilities provided by NHDCL a decade ago to cater to civil service employees is still not adequate and there is a growing demand for affordable housing.

62. Under the 12 Five Year Plan (FYP), the Government has a designated National Key Result Area (NKRA) that aims to improve liveability, 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 sub-project.

C. Subproject Alternatives

63. The NHDCL selected the site due to its suitability in terms of its availability. The land is currently undeveloped and there are no residents that need to be relocated or compensated. The land was allocated to NHDCL by the District Administration to resolve the housing shortage in Trashi Yangtse, so there it was not necessary to acquire land. The site is also very convenient for potential future residents (government and corporate employees) as it is in the town center and within 2km of all offices, the hospital and schools, reducing travel time and cost. The gentle slope also minimizes the amount and cost of site development works such as earth cutting and slope stabilizations works or secondary services/facilities such as approach road.

64. Overall, the site selection has considered several factors that will ensure avoidance of or minimal environmental impacts, and will safeguard the welfare and well-being of the future occupants, such as, but not limited to, the following:

(i) Complies with all requirements of relevant national, state and local laws, rules and regulations;
(ii) Complies with all requirements of ADB SPS, 2009;
(iii) Does not involve components, processes and technologies that pose significant threat to public health and the environment, such as incinerators, etc.;

[24] TrashiYangtseDzongkhag, 2020. Dzongkhag at A Glance. Retrieved from http://www.trashiyangtse.gov.bt/
[25] Gross National Happiness Commission (2013).Eleventh Five Year Plan Document

(iv) Does not involve works within or near environmentally sensitive locations (must be at minimum distance of 500m), including sites with national or international designation for nature conservation, cultural heritage, or any other purposes;[26]

(v) Does not result in destruction of or encroachment onto physical cultural resources such as archaeological monuments; heritage sites; and movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance;

(vi) Does not lead to degradation of cultural properties, and loss of cultural heritage values and tourism revenues;

(vii) Not located in flood zones and/or adjacent to natural water courses (must not be within 30 meters from the edge of major streams, and/or within 15 meters from the edge of small streams);

(viii) Does not lead to alteration of surface water hydrology of streams/waterways through diversion of flow or reclamation;

(ix) Not located in areas that can cause adverse impact on human health, such as but not limited to the following:

- Municipal solid waste dumps (must be at least 1 km away),
- Sewage Treatment Plants (STPs) (must be at least 500 m away),
- Industrial area with polluting industries (must be at least 500 m away or at a distance wherein pollutants will not affect the ambient air quality at the site, whichever is more strict), and
- High-tension cables (distance must be in compliance with the guidelines of the Bhutan Power Corporation and Bhutan Electricity Authority to avoid long term exposure to high electromagnetic fields (EMF)). The distance from high tension cable should ensure that the EMF is reduced to safe exposure level;[27]

(x) Area that has sufficient space for all allied infrastructures. If there is no centralized septage management in the town, the area shall have sufficient space for septic tanks/chambers designed to accommodate target number of occupants;

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

(xii) Avoids removal of trees where possible. When mature trees must be removed, new trees must be planted following the compensatory replacement required by the government;

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

(xiv) Area where access to basic services can be practically built or established. These basic services include water supply, sewerage system, electricity, telecommunication, sanitation/solid waste management, etc.;

(xv) If area is outside the periphery of the urban center, the area should be accessible via public transport and/or has road infrastructures leading to civic centers, markets, institutions such as hospitals, schools, etc.;

[26] If corresponding development control regulations similar to Thimphu's DCR-2016 is promulgated by Trashiyangtse in the future, the subproject shall comply with these local regulations particularly on sanctions pertaining to allowed locations for housing developments.

[27] US EPA: Questions and Answers About Electric and Magnetic Fields (EMFs).

(xvi) Does not adversely affect the existing community resources/ facilities, such as roads, sanitation services, water supply, solid waste management, power supply, parking spaces, etc.; and

(xvii) Ensures that the subproject design will not lead to depletion of water supply and degradation of groundwater and surface water in the area. The following should be considered:

- Conservation measures integrated into the design;
- Water supply is sufficient during the operation phase. Liaising with water supply provider should be part of the consultation and assessment; and
- Not to overburden the sewerage system and other infrastructures in the area.

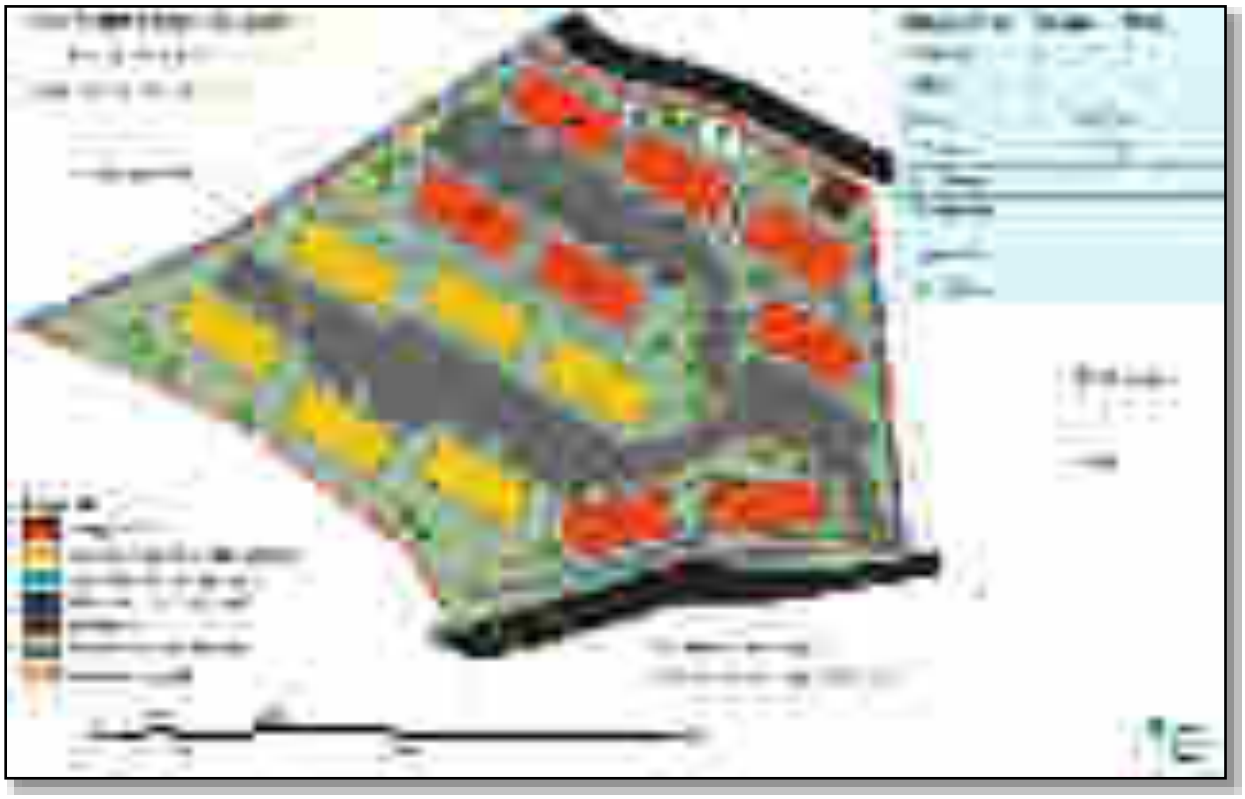
D. Subproject Components and Design

65. The subproject is one of nine subprojects designed by the NHDCL that will provide affordable housing in six dzongkhags (districts), bringing the above benefits (and others) to about 1,026 – 1,062 urban households - mostly low-income civil servants, corporate employees and wage workers. For Trashi Yangtse, the sub-project involves construction of eight residential buildings comprising of 32 units on 2.48 acres of residential land. In keeping with the district requirements, each building will be 2-storey. Table 15 shows the size of the various components of the subproject.

Table 15: Details of the Housing Complex

Building Type	Number of Buildings	Total Number of Units	Measurements
Category III (Type III)	8	32 (8 buildings x 2 floors per building x 2 units per floor) Features per unit: 1 Living room 2 Bedroom 1 Toilets 1 Kitchen 1 Balcony	Plinth Area (1st Floor): 171.60 m^2 (1,846.42 ft^2) Unit Area: 91.02 m^2 (979.38 ft^2) (including balcony) Building Height: 9.045m
Facilities			
Internal road and parking	To fit 23 light vehicles and 21 two-wheelers		
Other facilities	-Drinking water storage tanks (1 no. x 2,000 liters) per building -Rainwater harvesting tanks (2 x 2,500 liters) -Sub-station -Pedestrian footpath -Green area (35.14% of land)		

Figure 4: Site Layout



1. Building Design[28]

66. The buildings are designed keeping in mind the location within the center of the district and town center. The building designs will follow the Bhutanese Architecture Guidelines[29] as a reference to ensure that the buildings blend in with the surrounding landscape while maintaining certain elements of traditional Bhutanese architectural designs. It also abides by Action area plan (AAP) for Trashiyangtse Thromde, which only allows the construction of only two storeys (G+1 buildings).

67. The buildings are also designed in compliance with Bhutan Building Regulations 2018and the Bhutan Building Code, 2018). These regulations and codes prescribe the building dimensions, circulation space requirements, design standards, detailing of structures, light and ventilation requirements, water supply and sanitary control, electrical requirements and standards, fire safety, access, parking and provisions for disabled persons. The designs also comply with the Bhutan Green Building Guidelines, 2013, Bhutan Building Color Code, 2014 and Design Guidelines for Differently Abled Friendly Construction, 2011.

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

(i) IS 13920_2016 (Ductile Design of Reinforced Concrete Structures);

[28] 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.

[29] MOWHS, 2014. The Bhutanese Architecture Guidelines

(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).

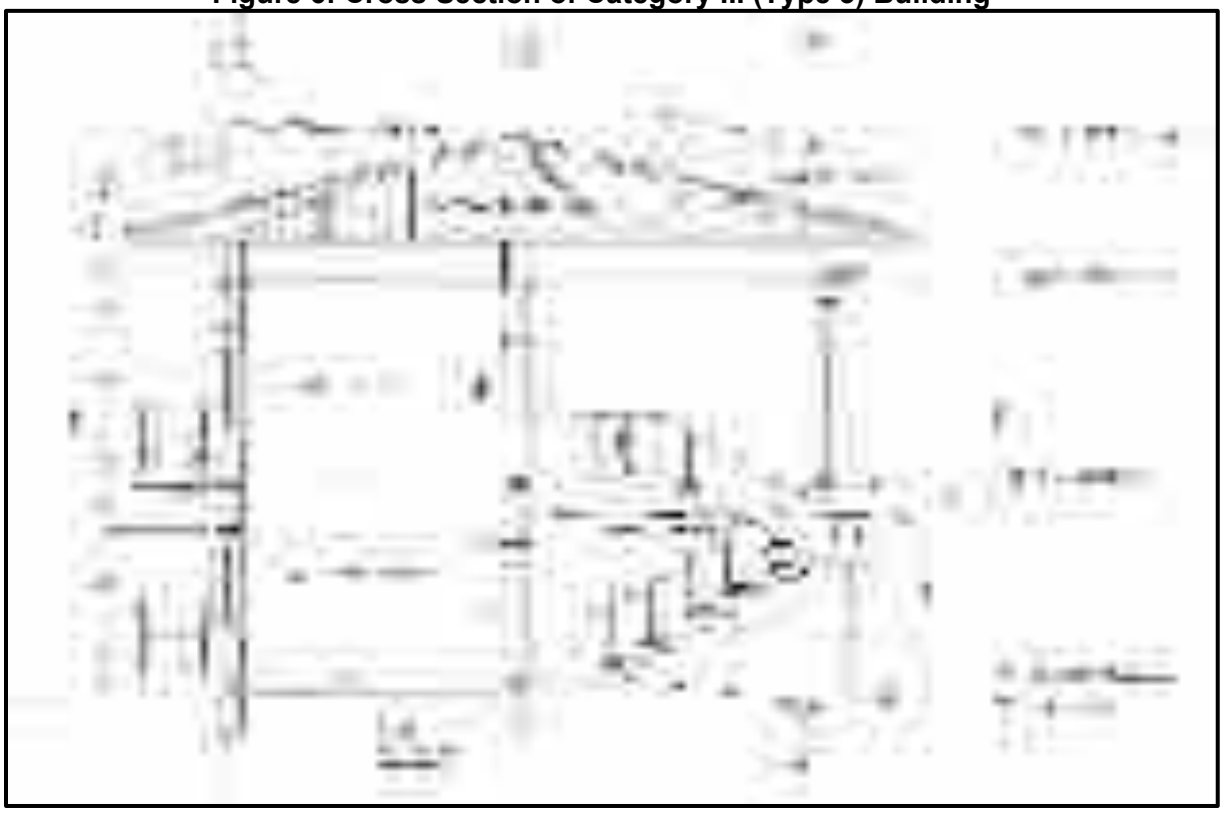
69. **Category III (Type 3) Building**. There will be eight buildings of this type only under the subproject. This type of building will have 2 apartments for each floor. Each apartment will comprise 1 Living room, 2 Bedrooms, 1 Toilet, 1 Kitchen and 1 Balcony. The Plinth Area(1Floor) is 171.60 m^2 (1,846.42 sq. ft.) and the unit area is91.02 m^2 (979.38 sq. ft.) (Including balcony).

70. The footprint of the eight buildings will occupy 22.19% of the total land area with 35.14% maintained for green area. As the site is located adjacent to the existing housing colony, there is no need to construct a new approach road. Internal access road and parking to fit 23 light vehicles and 21 two wheelers will be constructed.

71. There is no need to construct access road from main roads, or for sourcing water and electricity. The site is adjacent a thromde road, and is in an area where piped water and electricity are already available. See Figure 3 for a visual of the site.

Figure 5: Front elevation of the Category III (Type 3) building[30]

Figure 6: Cross Section of Category III (Type 3) Building[31]



[30] See footnote 36.
[31] See footnote 36.

Figure 7: Floor Plan of Category III (Type 3) Building[32]

[32] See footnote 36.

72. **Site preparation works**. This will include site clearance, tree cutting and handing over of the site to the Contractor.

73. **Design Capacity**. For this housing development, the design assumes five persons to reside in each unit, which translates to about 160 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.

74. **Water supply details**. Currently, water in the area of the subproject site is already provided by the municipal water supply system. The existing housing complex adjacent the site is connected to this water supply system, and the subproject will likewise connect to this same source. 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 which translates to about 160 total residents in this housing complex. Each building will be provided with one 2,000-liter water storage tank. Thus, the total storage capacity in the residential buildings is 16,000 liters. On average, each person will consume about 100 liters of water per day.

Table 16: Daily Water Requirement Calculation

Building	Total Number of Units	Number of Persons	Water Consumption
Category III (Type 3)	32 units	32 units x 5 persons/unit = 160 persons	160 persons x 100 liters/person = 16,000 liters

75. **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 8: Rainwater Harvesting Tank Details

76. **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.

77. **Septic tank and soak pits**. The septic tank will receive both WC waste and sullage from the buildings. Based on the estimated number of 160 persons, the overall dimensions of septic tank including wall is 6.00m x 2.25m. A total of 2 septic tanks and soak pits is provided for the proposed colony. The tanks will have one soak pit each (2.5 m diameter) and the septic tank will have two sections; settling chamber 1 (3.5m x 1.75m) and settling chamber 2 (1.75mx1.75m). Seepage from the soak pit into the ground.

Table 17: Calculation for Septic Tank Sizes

Design Data / Parameter	Value	Unit	Remarks
Number of residential units	16	Nos	
Average household size per residential unit	5 / 3	Nos	5 for 2-bedroom; 3 for 1-bedroom
Average water consumption/person/day	120	liter	(100-200 liters/person/day)
Ambient temperature in winter	20	°C	

Design Data / Parameter	Value	Unit	Remarks
Retention period for the wastewater in the septic tank	24	Hours	(normally 24 hours)
Period between desludging (cleaning interval)	2	years	(2-5 years)
Depth of tank	1.8	m	(Min. 1.2 m; preferably 1.5 m)
Gap between water level and underside of cover slab	0.3	m	(min. of 300 mm)
Is septic tank required to receive both WC waste and sullage?	1		(Enter 1 if yes, otherwise enter 2)
Length to breadth ratio of the tank	3		(3/1; 4/1; Preferred ratio is 3/1)
Calculations:			
Sewage flow (90% of the water consumption)/person/day)	108	liter	
Volume of sewage entering the tank per day	8,640	liter	
Sizing factor	1.15		
Sludge and scum accumulation rate/person/year	40	liter	
Volume of sludge and scum	7,360	liter	
Required tank volume	16,000	liter	(1 cubic meter minimum)
Plan area of the septic tank	8.89	m^2	
Computed minimum dimensions of septic tank			
Width of tank	1.75	m	(0.6 m minimum width)
Length of the tank	5.25	m	
Length of first compartment	3.50	m	
Length of second compartment	1.75	m	
Depth of tank from floor to soffit of cover slab, h	2.1	m	< 5.25 m

Figure 9: Schematic Diagram of Septic Tank and Soak Pit (3-D)

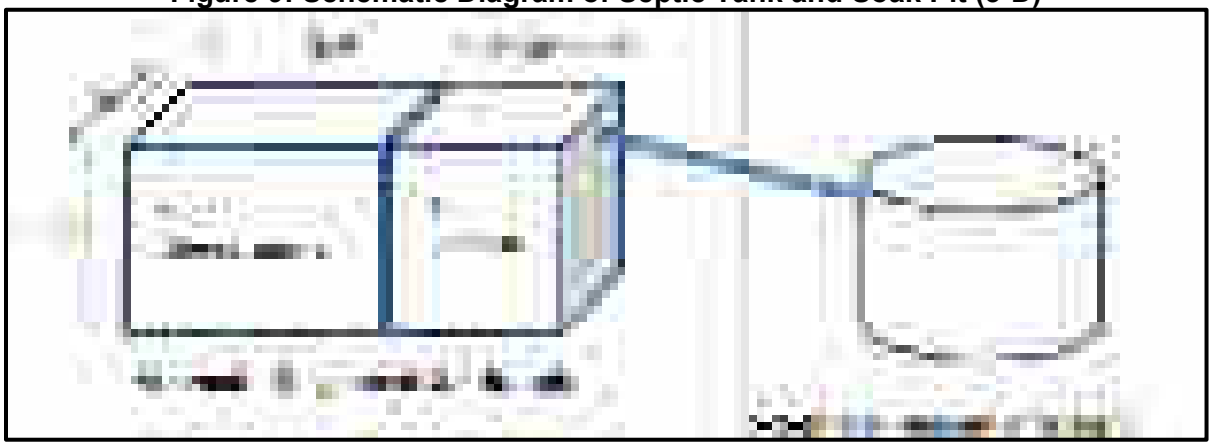


Figure 10: Schematic Diagram of Septic Tank and Soak Pit (Top View / Cross Section)

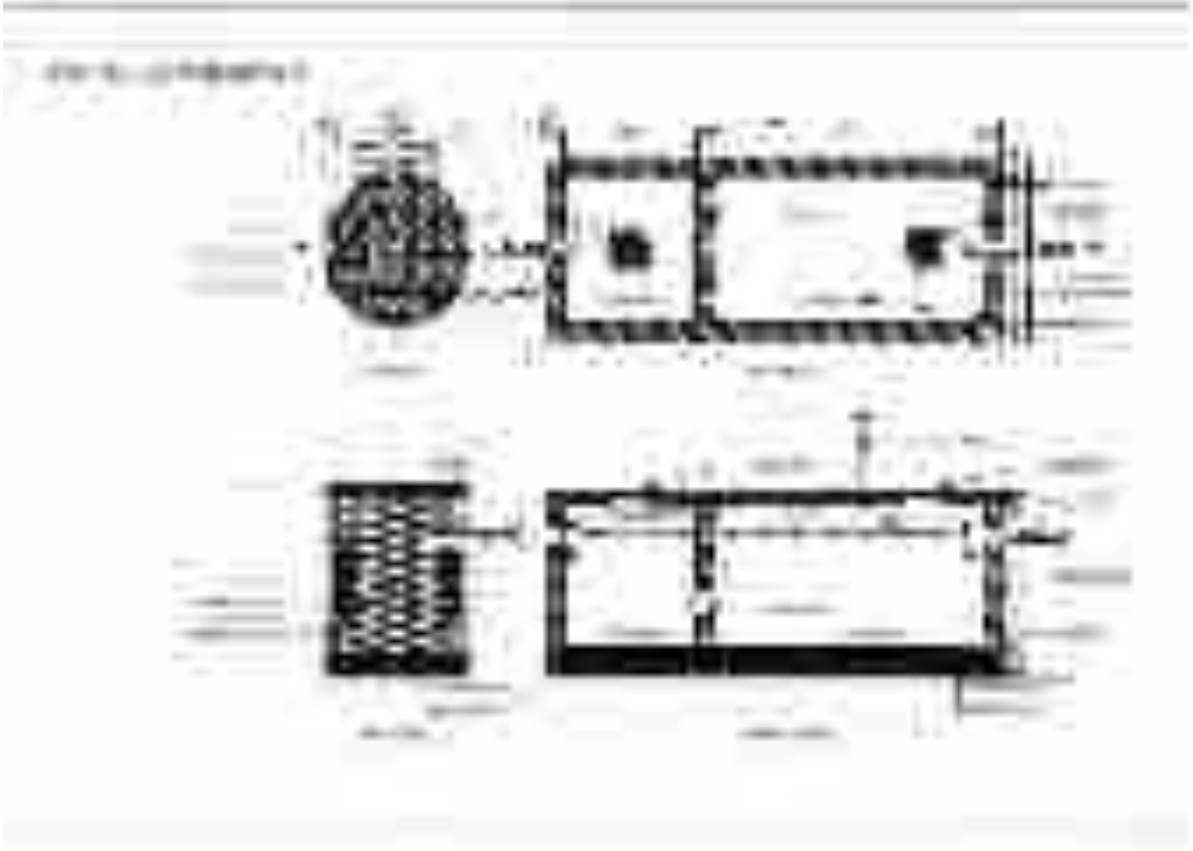
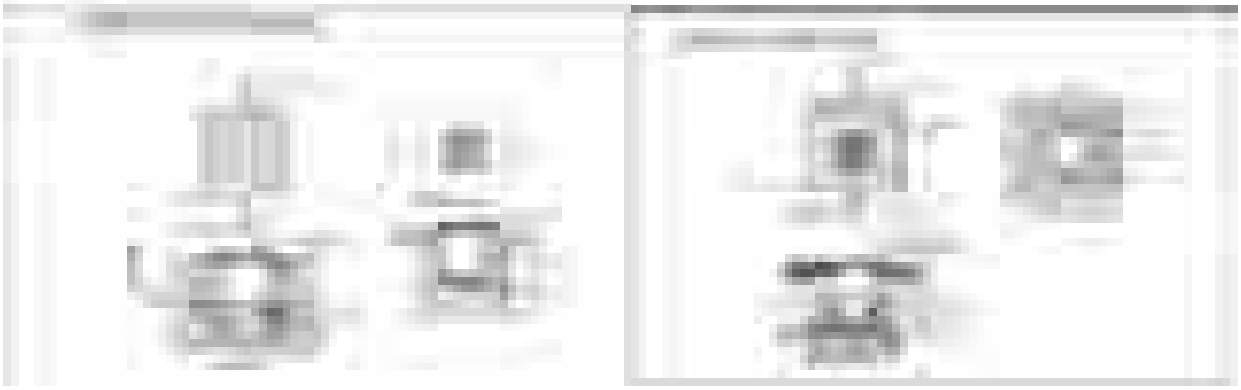


Figure 11: Schematic Diagram of Interception Pit and Manhole Chamber



78. **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 uni. The building drains will be connected to the existing natural drain running along the periphery/boundary of the site into the Kholongchu river.

Figure 12: Storm water drainage

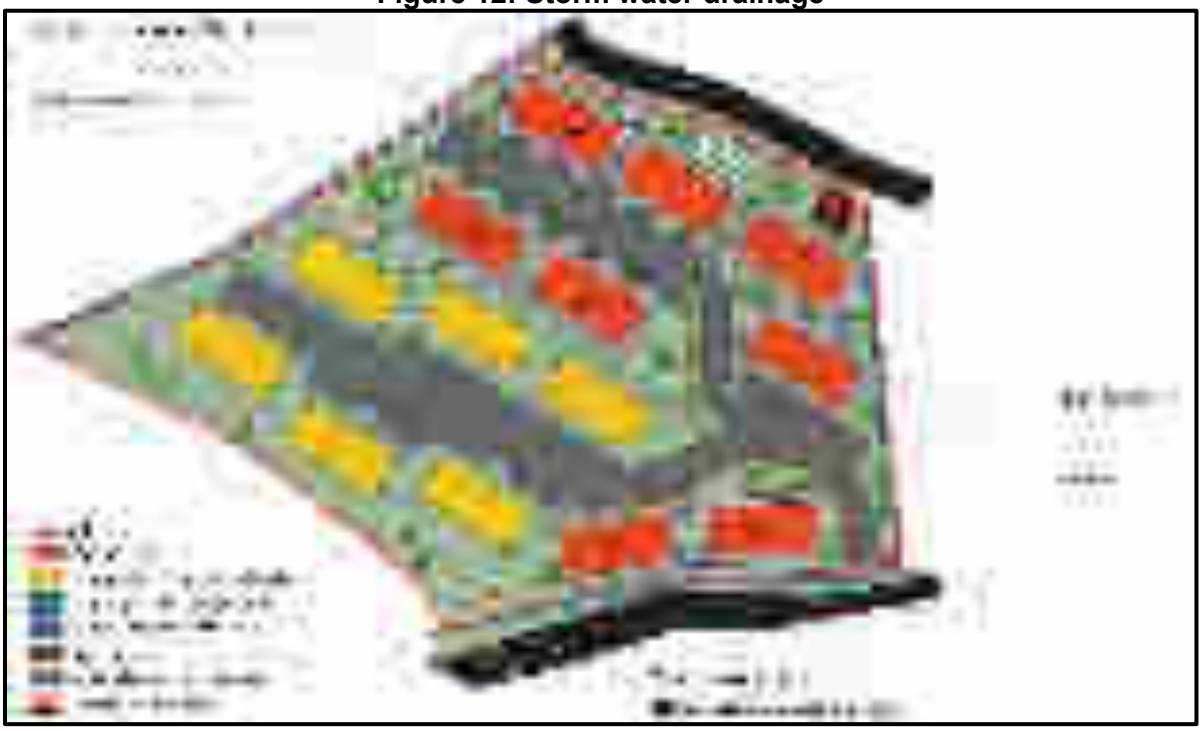


Figure 13: Storm Water Drainage Towards the Northern Boundary of the Site

Figure 14: Storm water drainage towards the lower slopes of the site

79. **Site accessibility, entry, exit and internal roads**. The main entry to the existing housing colony and the proposed housing colony site is proposed from the lower right bottom corner of the Site. There will be only one entry and exit for the site. At the entry and along the road, the parking is designed to accommodate 23 light vehicles and 21, 2 wheelers. **Figure 15** shows the road and parking details. From the main parking, internal roads to connect each building will also be accessible through the pedestrian footpath from the Parking. The housing complex will have a boundary wall with chain link fencing.

Figure 15: Site Access, Internal Road and Pedestrian Footpaths

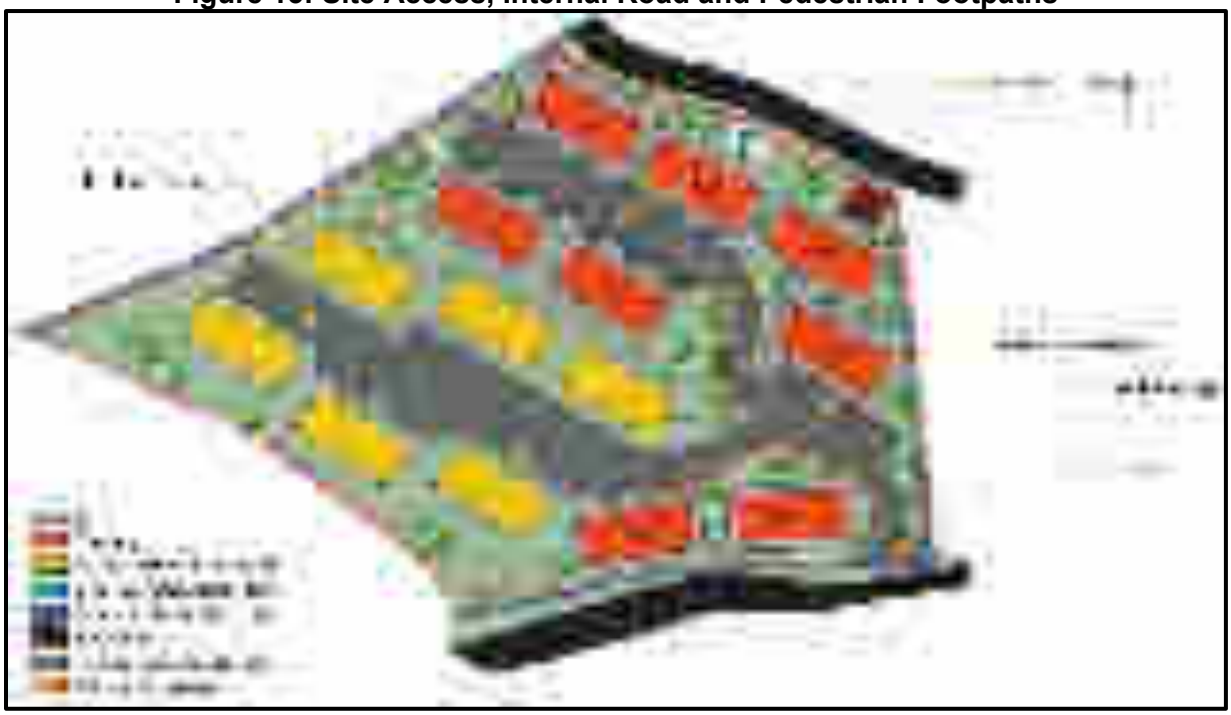


Figure 16: Internal Road and Parking Cross Section Details

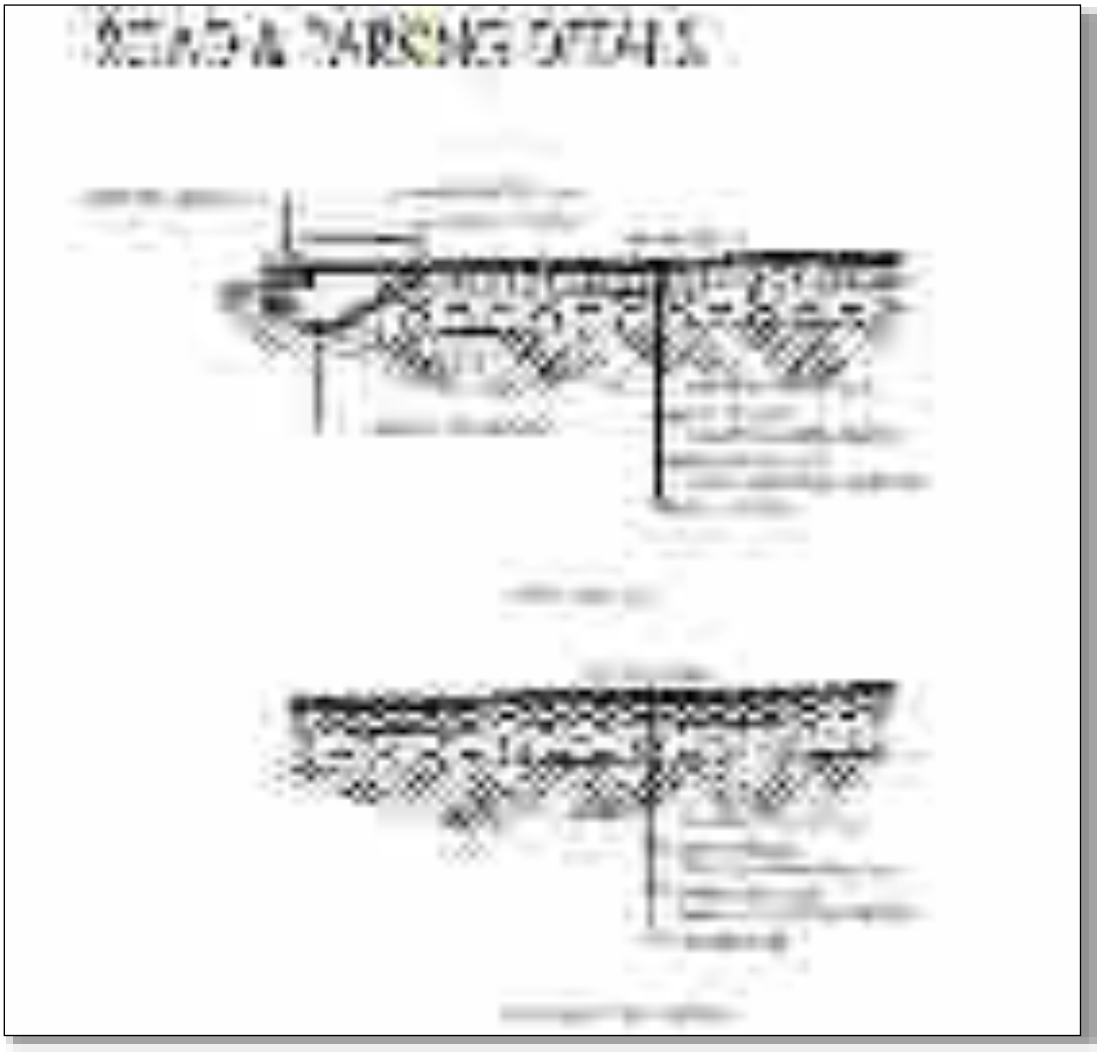
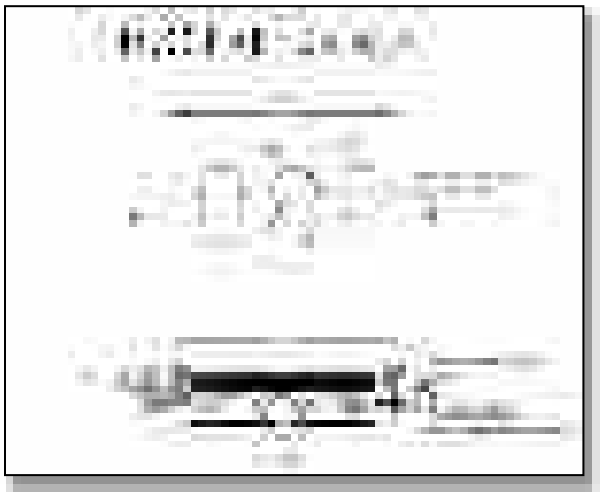


Figure 17: Drain and Footpath Cross Section Details



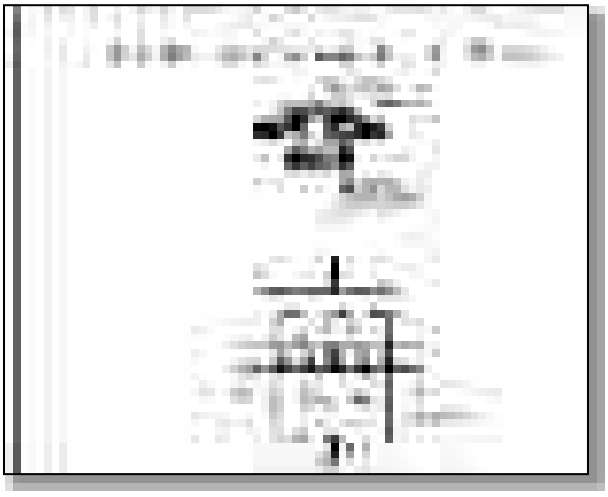


Figure 18: Boundary Wall and Chain Link Fence Details

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

81. Specific to major construction earth-based materials such as aggregate, sand and stone, these will be sourced from local authorized suppliers from Trashigang, SamdrupJongkhar and Mongar. Other materials such as plywood, tiles and bathroom fixtures will be purchased either from local suppliers if available or directly from India.

82. **Construction technology**. The Contractor will engage earth moving equipment, excavator, and construction management software to manage, monitor and ensure timely delivery of projects. Doors and windows will be prefabricated.

83. **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%). As the site is on relatively flat land, there is no risk of landslides. Other site hazard mitigation measures like storm water drains are included in the design.

84. **Fire safety**. In terms of fire safety, the building designs are in compliance with the Bhutan Building Standard (BTS)-014 and Part 6 of the Building Code 2018. According to the Code, exits must be located so that the travel distance to the exit on each floor does not exceed the distances set out in the table at the foot of this clause. For Residential Building the travel distance is 22.5m.

85. 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.

86. **Solid Waste Management**. The Thromde has an established waste collection systems in the town area. Waste is collected twice a week (6 tonnes) from Yangtse Town[33] and disposed at the landfill site by the Municipality. The Contractor will segregate and dispose non-biodegradable wastes with the Evergreen Bhutan Center in Doksum. The center is actively promoting and collecting segregated waste from residents in TrashiYangtse.

87. **Green area and landscaping**. 35% of the 2.48 acres of land will be left as green area. This area serves as a buffer from the main road above and the buildings below, reducing noise impacts from vehicular traffic above. Once the construction is over, the green area as well as periphery of the site will be planted with local species.

88. **Aesthetics**. TrashiYangtse town is being maintained as a model town for its architecture.[34] Respecting this policy, the buildings are only 2 storeys as per the allowable building height for the area. Also, 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

89. The preliminary design works have already begun and once the final approvals are obtained, the contract works will then be advertised. Site works are expected to begin as soon as contractors are selected. The construction work will be complete in 18 months as per the schedule given below.

Table 18: Work Schedule

	Activity	Months Period											
		2	4	6	8	10	12	14	16	18	20	22	24
1	Approval of architectural drawings												
2	Preparation of BOQ												
3	Advertisement of contract works												
4	Establishment of PIU and supervision team												
5	Handing over of site to Contractor												
6	Construction												
7	Taking over of site from Contractor												

F. Resource Utilization

90. The construction of eight buildings will require a significant amount of resources. With the design process still ongoing, the total the total required amount of each resource is yet to be quantified. In general, the major construction materials required include stones, aggregates, sand, cement and timber. Aggregate, sand and stone, and timber will be sourced from local authorized suppliers from SamdrupJongkhar, Mongar or Trashigang and within the district.

[33] Bhutan Broadcasting Service, BBS, 2018. Program on Waste Management in TrashiYangtse. February 7.
[34] As per the meeting with DashoDzongda on April 6, 2021

91. While most construction materials will be sourced locally, other materials 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.

92. Currently the water for the existing housing complex is provided from the municipal water source. The municipality is responsible for ensuring regular supply of water to all buildings within its boundaries. This was assured during the discussion with the District Regulatory Officer on April 6, 2021 and is implicit in the construction approval granted by the Municipal Officer.

93. 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

94. **Location and area.** TrashiYangtse was a part of Trashigang Dzongkhag until 1992 when it became one of the newest Dzongkhags (districts) in the country. The district lies in the northeast of the country between the longitudes 91°20' to 92°46' and latitudes 27°22' to 27°58'. It is bordered by Lhuentse to the west, Trashigang to the south, Mongar to the south-west and India to the east. See **Figure 19**

95. The Dzongkhag covers an area of approximately 1438.8 km^2. The elevation of the Dzongkhag ranges from 500 m to 5400 m above sea level. Administratively, it has 8 Gewogs[35] 41 chiwogs and 117 villages.[36] Trashi Yangtse is 54 kilometres away from Trashigang and 146km from Mongar.[37]

[35] The administrative levels are: Thromde – urban area, Dzongkhag – district, Dungkhag, Gewog – block.
[36] Boomdeling, Jamkhar, Ramjar, Khamdang, Toetshod, Tongzhang, Yangtse, and Yallang
[37] Road Safety Transport Authority Road Map with Distance. https://www.rsta.gov.bt/rstaweb/load.html?id=95&field_cons=MENU

Figure 19: Map Showing the Location of Trashiyangtse District

Source: GNHC.gov.bt and Google earth

A. Subproject Influence Area

96. 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 impact areas beyond 200m from the sub-project site. The distances of sensitive receptors to the site are indicated in Figure 20 and Figure 28, and detailed in Table 19.

Figure 20: Distances of Nearest Receptors Around the Subproject Site

Table 19: Summary Description of Receptors Around the Subproject Site

Receptor	Description	Direction	Distance from the site	Remarks
Residential housing	Existing NHDCL housing complex	East	< 10m	
Houses and shops	Residential houses and shops	Southeast Southwest	20m	
Offices	Kholongchhu Hydropower Office	West	<20m	
Habitat	Winter foraging habitat for the Black necked cranes	Southwest	400m	Used from beginning November- end February
PCR	Trashi Yangtse Dzong	North	324m	On the top of the hill across Yangtse town
PCR	Chorten Kora	South	900m	At the entry of the town
Educational Institute	Lower Secondary School	South	441m	Buffered by settlement and stream

B. Land Environment

97. **Land Use, Topography, and Geology.** The elevations in Trashi Yangtse ranges mostly from 600m to above 3600m but the majority of the district area (23.4%), lies between 2400-3000m. The Dzongkhag falls under the greater Himalayan sequence and the valleys along the Kholongchhu form a variant of the North-South valleys and ranges. Although the valleys are quite deeply cut, with steep convex side slopes and narrow V shaped valley floors the topography is not as steep as other Dzongkhag like Lhuentse. The soil types are temperate soils, stagnogleys,

podzols, and alpine meadow soils (Norbu et al, 2003). The soils upto 300m in the inner valleys are moderately weathered and leached and have bright subsoil colors and think dark topsoils.[38]

98. The subproject site is located in Yangtse valley, where the terrain is a combination of undulating and gentle slopes. Much of the core town area lies along the gentle slopes. The site itself is at the bottom of the hillock where the Dzong is located.

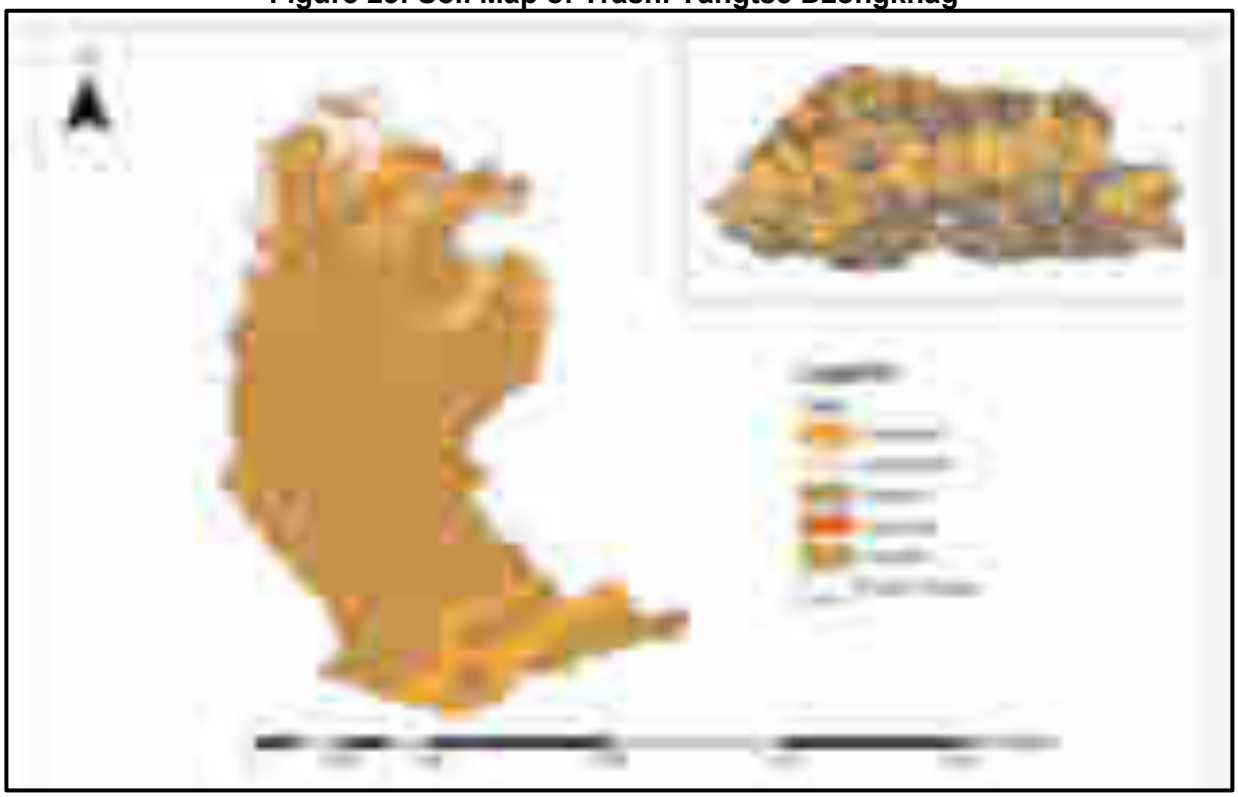
Figure 21: Contour Map Showing Elevations at the Subproject Site

[38] I.C Baillie et cl, 2003. Regolith and Soils in Bhutan, Eastern Himalayas

Figure 22: Panoramic View Showing the Site Location, Terrain and Immediate Surroundings

99. The soil map of the world prepared by FAO and ISRIC is used to extract the soil information for Bhutan. The scale of the latest available soil map is of 250 meters grid; therefore, it is the best available data to extract the soil information for the project areas. There are five different types of soil in Trashi Yangtse Dzongkhag, luvisols type of soil dominates the Dzongkhag covering an area of 982.5 km^2 followed by Cambisols soil covering an area of 301.2 km^2. Luvisols are technically characterized by a surface accumulation of humus overlying an extensively leached layer that is nearly devoid of clay and iron-bearing minerals and Cambisols are soils at an early (incipient) stage of soil formation. Figure 24 shows the soil map of Trashi Yangtse and Table 20 shows the types of soil and their coverage.

Figure 23: Soil Map of Trashi Yangtse Dzongkhag



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

Table 20: Soil Types in Trashi Yangtse Dzongkhag

Dzongkhag	Class	Area (km^2)
Trashi Yangtse	Gleysols	33.76
	Glacier/Ice	110.08
	Leptosols	18.35
	Cambisols	301.21
	Luvisols	982.53

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

C. Water Environment

100. The Kholongchhu is the main river flowing through BWS and it originates from glaciers in the northern regions of the Dzongkhag. At Doksum, the Kholongchhuis joined by a tributary called the Gongrichhu. The major tributaries of the Kholongchhu are Singphelchhu, the Lamzangchhu, the Langmalachhu, the Womenangchhu and the Dongdichhu.TheKhomaChhu starts at the confluence of the SingyeDzongChhu and the RongmatengChhu. Most rivers swell to high levels during the summer and monsoon seasons but reduce dramatically during the dry season. There is little or no information on groundwater in Bhutan. According to the National Integrated Water Resources Management Plan, it is generally believed that there is no real groundwater aquifer due to the steep terrain and deeply incised valleys, although subsurface flow through fluvial deposits is believed to occur (NEC, 2016).

101. The Kholongchhu is about 198m away from the site. It is at an elevation 1,750m,[39] while the site is at 1,844m elevation and buffered from the river by settlements, buildings and roads. Another stream in the area is the Serkhangchhu, which is 220m away from the site. This stream flows south away from the site, into the Kholongchhu just below the main town area. Here too, between the stream and the site are a number of buildings and roads as shown in the maps below.

Figure 24: Map of Rivers Around the Subproject Site

Source. National Integrated Water Resources Management Plan. NEC, 2016

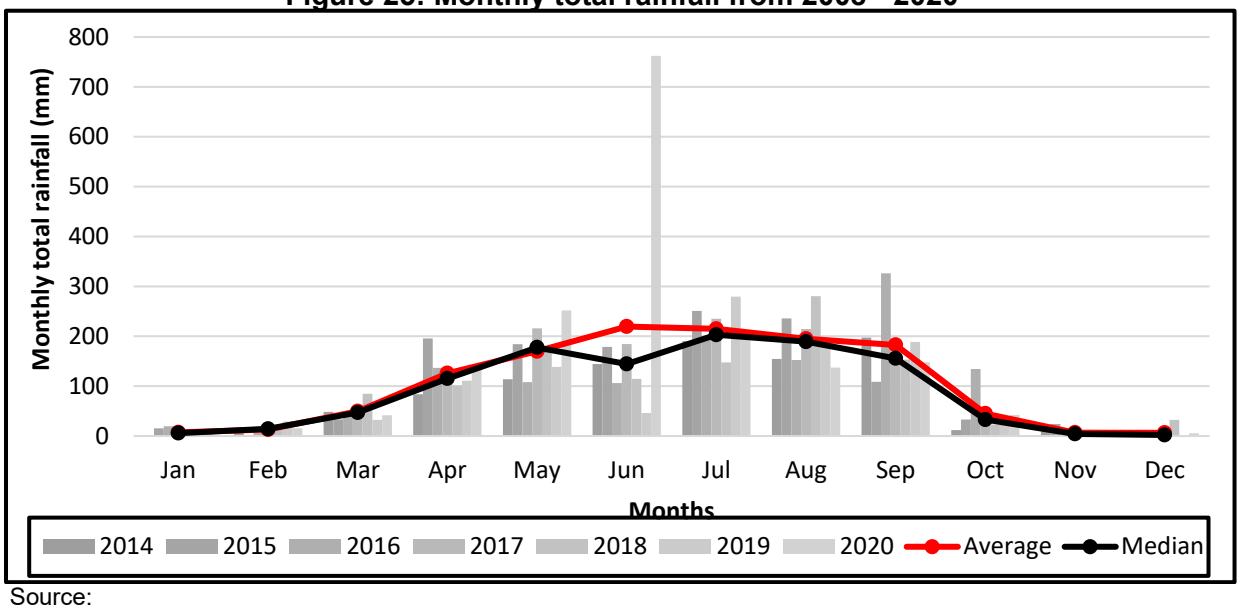
D. Climate

102. The Dzongkhag (District) has two major climatic conditions. Summer is usually very hot, humid and wet while winter months are dry and cold. Heavy rain falls are expected in the month of June-September which leads to abundant water flow causing major flash floods in the plain area. The elevation ranges from 500 – 5,400 meters above sea-level. The Dzongkhag receives an average of annual rainfall of 1,883 mm.[40]

103. The Trashi Yangtse Agro meteorology Station[41] records real time rainfall, temperature and relative humidity. The monthly total rainfall from the year 2014 to 2020 is shown in 3. The month of July received the highest monthly average rainfall (219.47 mm) while the month of December received the least rainfall (6.46 mm). The highest monthly total rainfall was recorded in the month of June 2020, a rainfall of 762 mm.

[39] Elevation of Kholongchhu river estimated from google earth
[40] TrashiYangtseDzongkhag 2018.
[41] located at Latitude: 27.60, Longitude: 91.50 at an altitude of 1830 masl.

Figure 25: Monthly total rainfall from 2008 - 2020

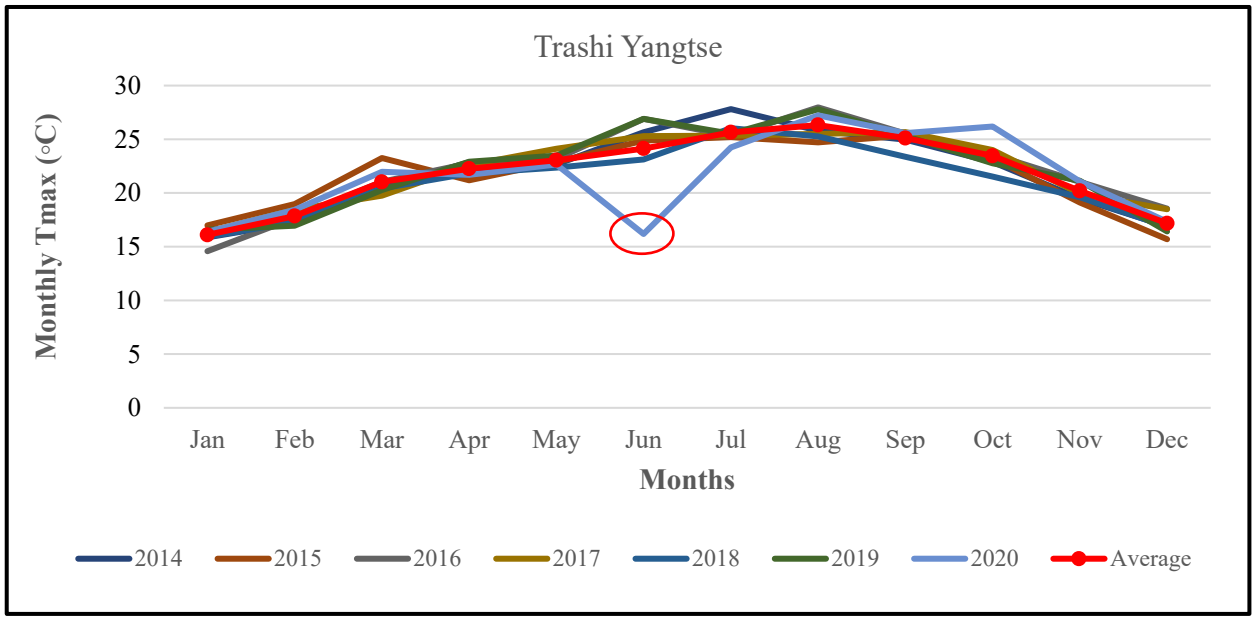


Source:

2. Temperature

104. Figure **26** below shows the variation in monthly average maximum temperature in TrashiYangtse from 2014 to 2020. The highest monthly average maximum temperature was experienced in August, 2016 with a temperature of 27.97◦C while the lowest average maximum temperature was experienced in January, 2016 with a temperature of 14.58 ◦C. However, unusually, the monthly average maximum temperature of June 2020 was only 16.18 ◦C, the daily temperature recorded for June 2020 is observed less compared to the temperature of the same month of other years.

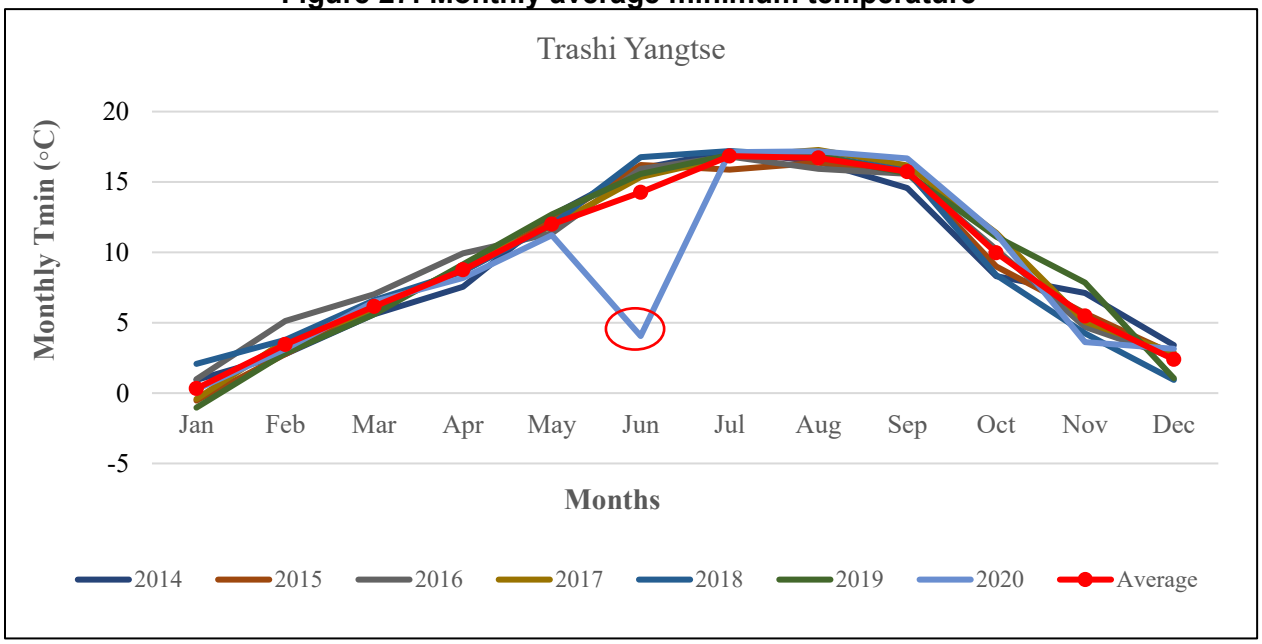
Figure 26: Monthly average maximum temperature from 2014 - 2020



Source:

105. The monthly average minimum temperature from the year 2014 to 2020 in TrashiYangtse is shown in Figure 28. The monthly average minimum temperature was experienced in January 2019 (-1.03◦C) while the highest average minimum temperature was experienced in August 2017 a temperature of 17.27 ◦C. However, strangely, the monthly average minimum temperature of June 2020 was recorded only 4.05 ◦C.

Figure 27: Monthly average minimum temperature



Source:

106. Table 21 shows the monthly average maximum and minimum temperature of TrashiYangtse. The highest monthly average maximum temperature was recorded in the month of August (26.3◦C) while the lowest was recorded in the month of January (0.3◦C).

Table 21: Long term monthly average temperature (2014 - 2020)

Temperature	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. Tmax (◦C)	16.1	17.9	21.0	22.3	23.0	24.1	25.6	26.3	25.1	23.5	20.2	17.2
Avg. Tmin (◦C)	0.3	3.4	6.2	8.8	12.0	14.3	16.8	16.7	15.7	10.0	5.5	2.4

E. Air and Acoustic Environment

1. Air Quality

107. There are no data available on the air quality of TrashiYangtse, but as there is such a low population and no heavy industry or much construction in the dzongkhag, it is reasonable to assume that air quality is likely to be generally good. 99.9% of the district is electrified and electric cookers, boilers and heaters or gas are more commonly used in both urban areas. In rural areas, wood is still the primary fuel for heating so there may be localised increases in levels of smoke,

soot and carbon dioxide in these areas. This is more so when usage is highest (in the evening and during the winter).

108. 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.

2. Noise Level

109. There is also no data on noise in the district. Similar to air quality, due to the lack of economic development and development /construction activities, the entire town is very peaceful and the only noise is from the occasional traffic. Similarly, as in the case with air quality baseline information for the subproject site, the PMU will ensure that prior to construction, noise levels will be assessed during the day time and night time prior to construction for the specific site.

F. Ecological Resources

1. Forest cover and biodiversity

110. 76% of the district is forested, of which 7,022 acres are managed as Community Forests. The majority (87%) of the district falls under warm temperate to alpine zones[42] as can be seen in table below.

Table 22: Percentage of land under various ecological zones

Ecological zone	Wet Subtropical	Humid Subtropical	Dry Subtropical	Warm Temperate	Cool Temperate	Alpine
Elevation, m	100-600	600-1200	1200-1800	1800-2600	2600-3600	>3600
TrashiYangtse	0.2	3.2	8.9	19	32.4	36.4

111. The forest types in TrashiYangtse are mostly warm temperate broadleaf, mixed forest and hemlock forest. The most common shrub species are Bamboo species and Rhododendron species. The most common mammals in the broad-leaved forests are wild pig, serow, sambar and barking deer, Himalayan black bear, Himalayan Crestless Porcupine, Assamese Macaque, Assamese Macaque, Himalayan Yellow-throated Marten, Capped Langur, Himalayan Striped Squirrel, House Rats and Common Leopard.[43]

Table 23: Forest types in TrashiYangtse

Elevation	Forest Type	Common species
1850 - 3800m	Broadleaved forests	*Quercus glauca, Rhododendron kesangiae, Symplocos lucida, Rhododendron arboreum, Alnus nepalensis, Betula utilis, Symplocos glomerata, Acer campbellii, Persea clarkeana*
2650 – 3100m	Mixed and Hemlock forests	*Quercusglauca, Rhododendron kesangiae, Symplocos lucida, Rhododendron arboreum, Alnus nepalensis, Betulautilis, Symplocos glomerata, Acer campbellii, Persea clarkeana*
3250 – 3900m	Mixed and Hemlock forests	*Abies densa, Rhododendron kesangiae, Rhododendron hodgsonii, Rhododendron arboreum*

[42]NSB, 2020
[43]Piet van der Poel, 2013. Result of 2012 Rapid Biodiversity Survey in Bumdeling Wildlife Sanctuary

2. Protected Areas

112. Part of the Dzongkhag (District) falls under Bumdelling Wildlife Sanctuary (BWS), which is one of the protected areas in Bhutan. BWS is located in the north-eastern part of the country covering an area of 1520.6 km^2 and an altitudinal range of 1495 to 6400 masl. It shares international borders with the People's Republic of China in the north and India in the north-east. Wangchuk Centennial National Park is to the west and BWS is connected to Phrumsengla National Park through biological corridors to the south-west. Administratively, BWS covers three Dzongkhags, Lhuentse, Mongar, TrashiYangtse, and 5 Gewogs of which ShermuhungGewog falls under Mongar. BWS covers a wide range of ecosystems from warm broadleaved forests to alpine meadows and scree slopes. There are three main rivers in the park, Kulongchhu in the east, Khomachhu in the west and Sheri chhu in the south. The Ramsar Convention recognizes Bumdeling flood plain as an important wetland area.

113. With reference to the location of the subproject site, the nearest boundary of BWS is about 7km away while the Bumdeling Wetland Ramsar Site is more than 10km away. **Figure 28** below shows two maps indicating the locations of these protected areas relative to the subproject site.

Figure 28: Maps Showing Other Sensitive Areas Within Trashi Yangtse District

Source:

Source: Google maps

114. Within BWS, there is roughly 1,000 households and a population of 8,047 persons. The Park also has 42 species of mammals, 734 species of plants, and 343 species of birds (Peljor, 2017). Some highlighted species found within the park include Black-necked cranes, Snow Leopard, Tiger, Asiatic wild dog, and Himalayan Musk Deer.

115. **Critical Habitats**. The Integrated Biodiversity Assessment Tool (IBAT) was used to screen and assess potential risks on the protected areas or critical habitat that may exist around the subproject site (default area of analysis of 50 km radius). Screening results show that 22 IUCN Red List species of concern are identified within the default area of analysis. See Appendix 4 for the results of IBAT Screening.

116. The IUCN Red List species of concern were assessed to determine the likelihood of them being found at the subproject site in consultation with the Divisional Forest Office, Trashigang (which has the mandate for Trashi Yangtse Range, where the subproject site is located). The office confirmed that certain mammal species (Dhole, Macaque, Clouded Leopard, Common Leopard, Capped Langur, Black Bear, Sambar, Otter and Serow), Reptile (King Cobra), Butterfly (Ludlow's Bhutan Glory) and Bird (Black Necked Crane) can be found within 1km of the subproject site (Appendix 4). Upon further discussion to elaborate, it was clarified that these species are found in Bumdeling Wildlife Sanctuary and the forests along the slopes of the valley further away from the town center.

117. Since the subproject site is already in the built-up area of the town, the likelihood of these species being found at the site is very low. The only species that may be potentially found within 200m of the site is the Black necked crane.

118. **Vegetation at the project site**. The subproject site is adjacent to a small patch of Quercus forest (*Quercuslanata and Quercusglauca),* which lies below the Dzong. The site itself is largely being used for potato cultivation. Towards the periphery, there are two Cypress trees (*Pinusbhutanica), 1* peach, 1 pear, 2 walnut and a Thuja sp. The undergrowth comprises mostly of grasses and ferms and weed species such as Artemisia, *Matteucciastruthiopteris*, *Biden pilosa, Chenopodiumambrosioides, Geranium nepalensis, Parthenium sp., Anaphalis sp., Equisetum sp., Cynoglossum sp., Varbascum Thapsus, Pteridiumaquilinum (*fern*)* and *Gamochaetapensylvanica.*

119. The Divisional Forest Office confirmed that the only mammal species found in the neighboring forest are wild pigs and barking deer, due to the agricultural crops. Several commonly found bird species such as Blue-whistling Thrush, White-capped Redstart, sparrows, Grey-bush Chat, Large-bellied Crow, Verditer flycatcher, Spotted Dove, Oriental-turtle Dove, Red-vented Bulbul, Green-backed Tit, Warbler, Oriental White-eye, and Oriental-magpie Robin are found here.

Figure 29: Potato cultivation and Vegetable Garden at the Site

G. Socio-economic Environment

120. Trashiyangtse was created in 1992 when Trashigang was separated into two. It has an area of 1,438.8 km^2.[33] The district headquarters (Dzong) is located in Choekhor, Yangtse town. Within the district, the Dzongkhag Thromde covers an area of 267 km^2, and a Local Area Plan with 12 precincts have been identified so far.[44] The District has one hospital (with four doctors and 20 nurses and 18 technicians), 2 Indigenous Units, 9 Basic Health Units, 24 Outreach Clinics. There are 3 Central Schools, 1 Middle Secondary School, 5 Lower Secondary Schools and 19 Primary Schools. There are 16 Non Formal Education Centers (NFE) and 8 Renewable Natural Resource Offices.

121. In terms of businesses, there are 110 restaurants and hotels, mostly small family operated ones. In total 533 industrial licenses have been issued so far for industry, of which 278 licenses were for construction companies.

[44] Ministry of Works and Human Settlement. Annual Information Bulletin 2020

1. Land Use and Agriculture

122. 76% of the district is under forest cover and 375,607.2 acres fall under protected areas and 7,022.0 acres under community forest[32]. Only 2.43% of the district is under agriculture, but it is still the primary livelihood and occupation for the majority of the people in the district. Popular crops grown are Maize with 1141 acres harvested, followed by Millet (212 acres, Buckwheat (29 acres, Paddy (13 acres), Barley, Wheat, Amaranthus and Quinoa (less than 10 acres).

123. Cattle are raised mostly for milk, butter and cheese. There are over 15,000 cattle (including improved breeds), 13418 poultry, 900 horses and 700 Yak. There are 195 poultry farms but production has decreased from 17200 in 2015.

124. Vegetable cultivation is primarily for self/domestic consumption but over the years has been transported to markets in Thimphu where early season chili is very popular and has gained market attention and demand.[45] Fruit cultivation is not very popular either and mostly grown for self-consumption too. Popular fruits grown include peach, persimmon and mandarin.

125. The major constraints faced by farmers are lack of farm labour, crop damage by wildlife, lack of irrigation, poor yield and access to market. With the assistance from the Government, 347 km of electric fencing has been installed in the farms.

2. Infrastructure Development

126. Modern amenities like street lights, bridges with traditional designs, road networks and parking areas have been developed making it into a relatively well-planned township[46]

127. The Dzongkhag is famous because of its “Dapa” (wooden bowls) and handmade paper derived from Daphne bark. These skills still constitute an important economic mainstay for the people of Bumdeling and Yangtse Gewogs.

3. Tourism

128. The district is more famous among nationals for its pilgrimage sites (such as GomphuKora, ChortenKora and Rig-Sum Goenpa). However, due to its remoteness, only 0.4% of the 229,663[47] tourists who visited Bhutan in 2013 visited TrashiYangtse (NSB, 2014).

4. Demography

129. The total population of Trashi Yangtse as of 2019 was 17,300 persons with 8719 males; and 8581 females. Of all the gewogs, Yangtse town has the highest population with 3547 (1887 M, 1660 F) (NSB, 2020). The population density is 12 persons per km^2. Trashi Yangtse has 694[48] Gungtongs (unoccupied house), and the population is projected to reduce due to the increasing number of unoccupied houses, to 11,278 by 2047.

130. The overall literacy rate in the dzongkhag is 66%. The adult (aged 15 years and above) literacy rate is 57.7%. The literacy rate of males in both rural and urban areas is 72.6% (87.4% in urban and 68.5% in rural). On the other hand, the literacy rate of females in both rural and urban

[45] Business Opportunity Information Centre, 2015
[46] Gnhc.gov.bt. TrashiYangtse District
[47] TCB. 2019. Bhutan Tourism Mointor. This includes tourists whose purposes are Holiday, Leisure and Recreation, Incentives travel and others
[48] Trashi Yangtse Dzongkhag. Dzongkhag at a Glance 2020.

areas is 59.3% (76.4% in urban and 55.2% in rural). The percentage of school attendance of six years and above was 34.2%. (NSB, 2017).

H. Physical Cultural Resources

1. Historical, religious and cultural resources

131. There are 9 religious institutions and 504 religious monuments in the Dzongkhag (NSB, 2018). TrashiYangtseDzong is one of the more famous religious and cultural monuments along with ChortenKora, RigsumGoenpa, GomphuKoraLhakang, Dechenpodrang and Pemaling. The TrashiYangtseDzong was originally called DongdiDzong and was built by GongkarGyalpo but during the period of conflict, the people of Donglum fled and the Dzong fell into ruins. Later on, it was renovated by TertonPemaLingpa and named TrashiYangtse.

132. The district is most famous for the ChortenKora located in Yangtse. This is a replica of the BoudhanathChorten in Kathmandu, Nepal built by Lam NgawangLoday of RigsumGoenpa to subdue the local Demons.

133. Another famous religious site is the GomphuKoraLhakhang that dates back to 850 AD where it is believed that Guru Rinpoche subdued an evil spirit chasing it all the way to the Tibet Autonomous Region in the People's Republic of China (PRC). Guru Rinpoche meditated for three months in the cave after he had suppressed the demon that came out of the cave as a serpent and was subdued again. The imprint of the Guru's hat and body are left on the rock which could be seen today, and also the imprint of snake as well.

134. Other areas of interest in TrashiYangtse include the ruins of TshenkharlaDzong, a historically significant site that dates back to the 9th century and was the first dzong to have been constructed in Bhutan. It was built by a Tibetan Prince named LhaseyTsangma, who settled in the region after being exiled from Tibet Autonomous Region in PRC. Another impressive historical site is the ancient iron chain bridge spanning the Kholongchhu River, which still stands to this day. The great Yogi Duptho by ThangthongGyalpo built the bridge during the 15th century.[49]

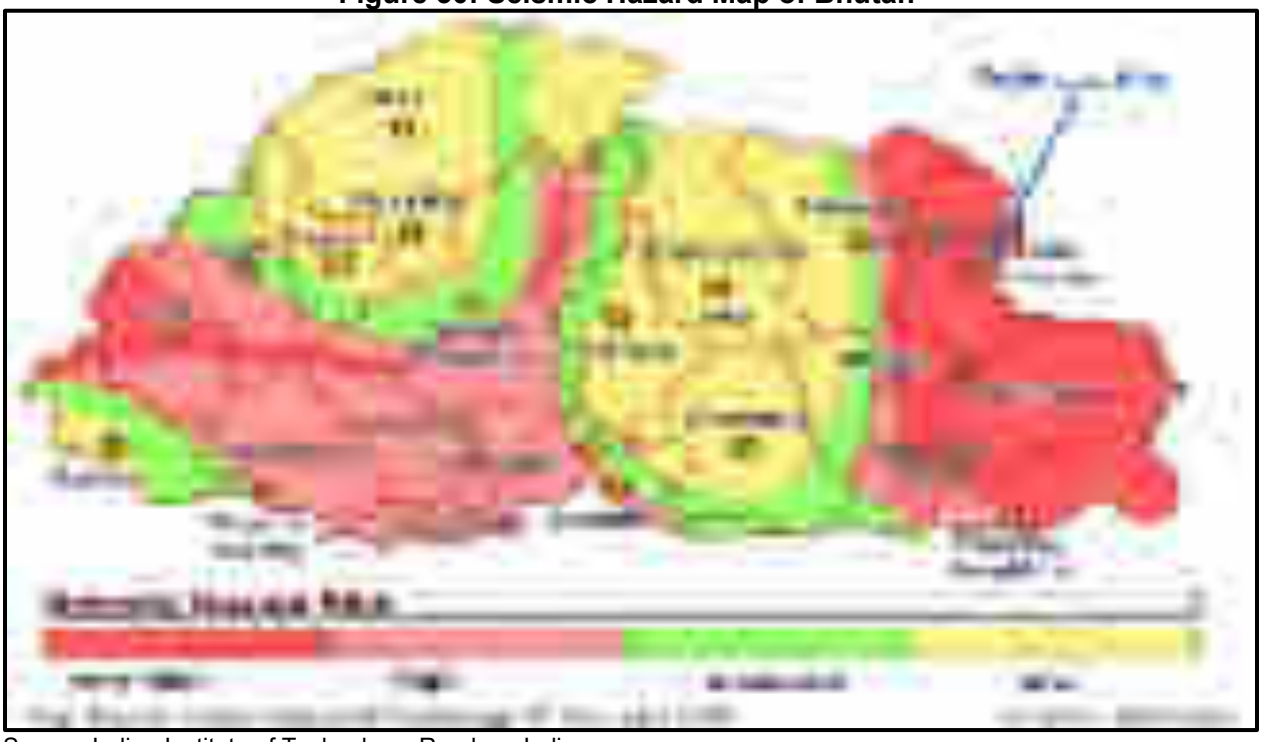
135. TrashiYangtse is an ethnically and culturally diverse district and the inhabitants include Yangtseps, the regions indigenous dwellers, Tshanglas, Bramis from Tawang, Khengpas from Zhemgang and Kurtoeps from Lhuentse. This rich cultural tapestry has resulted in an interesting mix of languages and cultural practices in the region. Three major languages are spoken in Trashiyangtse. In the north, including Bumdeling and ToetshoGewogs, inhabitants speak Dzala. In the south, Tshangla (Sharchopkha), the lingua franca of eastern Bhutan, is spoken in Jamkhar, Khamdang, and RamjarGewogs. In TomzhangtshenGewog, residents speak Chocangacakha.[50]

I. Natural Hazards

136. TrashiYangtseDzongkhag has experienced several disasters in the recent decades, the most devastating being the earthquake, which caused widespread damages to rural homes and government infrastructure in the 2009, 2010, 2011 and 2016. Based on the seismic hazard map of Bhutan, Trashi Yangtse lies in the very high hazard zone (rated in a 4-point scale of low to very high). See **Figure 30** below.

[49]TrashiYangtseDzongkhag. 2018. Dzongkhag Disaster and Contingency Plan.
[50]Tourism Council of Bhutan, 2021. https://www.bhutan.travel/destinations/trashi-yangtse

Figure 30: Seismic Hazard Map of Bhutan



Source: Indian Institute of Technology. Roorkee, India

137. The other major seasonal and recurrent hazards include flash floods, windstorm and hailstorms. These have caused extensive damages to crops and roofs of houses and government infrastructure. A total of 1,386 houses in the district were damaged by earthquake, 203 houses affected by flash floods from the year 2006 – 2019, and 329 by windstorms and 163 by Hailstorms.

Table 24: Number of structures impacted by natural hazards 2010-2019

Sl. No.	Hazard	# Houses affected	# Infrastructure damaged	Total
1	Earthquake	2009 (1166) 2010 (76) 2011 (43) 2016 (101)	2009 (101)	1,386
2	Flash Flood	2014 (28) 2016 (21) 2017 (132) 2019 (22)		203
3	Windstorm	2011 (106) 2012 (10) 2017 (49) 2018 (120) 2019 (44)		329
4	Landslide	2019 (37)		37
5	Hailstorm	2016 (66) 2019 (97)		163
6	Structural Fire	2011 (1) 2012 (1) 2014 (1)		3

Source: Department of Disaster Management

V. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

138. The ADB safeguards policy 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

139. The approach for the environmental assessment of this sub-project involved the following steps:

(i) Review of baseline information on the project area and site location;
(ii) Initial environmental screening using ADB's Rapid Environmental Assessment (REA) checklist and No Mitigation scenario scoping checklist (Annex 1);
(iii) Consultation with the design team on the proposed infrastructure design and plan;
(iv) Site visit and consultation with project staff; and
(v) Discussions between NHDCL, Dzongkhag, District Regulatory Officer, Forest Ranger Officer, Bumdeling Wildlife Sanctuary Manager and community.

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

(i) Type/nature of activities proposed;
(ii) Subproject footprint/spatial scale of the proposed infrastructure work/magnitude of impact;
(iii) Existing baseline conditions at the project site and within the project zone of influence, which in this case is up to 500m;
(iv) Duration of the proposed activities and period of impact (short, medium, or long term); and
(v) Requirements for compliance with national acts, rules and regulations and compliance with ADB policies.

Table 25: 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 26: 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 Subproject components, site boundaries or local area	Within project boundary	Specific location within project component or site boundaries with no

Parameter	Major	Medium/ Moderate	Minor	Negligible
				detectable 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

141. **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 project's potential impacts are outlined in the following table.

Table 27: Parameters for Determining Sensitivity

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

142. **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 28: Significance of Impact Criteria

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

B. Summary of Impacts Rating for the Subproject

143. 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 29: 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	No	Unlikely	Minor	Mild	Low	Negligible
Tree Removal	Long term	Local	No	Certain	Minor	Mild	Low	Negligible
Consents, Permits and Clearances	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Natural Hazards and Disasters	Long term	Local	Yes	Likely[a]	Medium	Mild	Moderate	Negligible
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	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	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Electrical connection	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Mobilization of construction equipment and material transportation-traffic and congestion	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Air pollution	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Dust generation	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Noise Pollution	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Soil erosion and Sediment mobilization	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible

Activity/ Impact	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Ground water quality	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Drainage congestion	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Impact on critical habitat	Short term	Local	Yes	Unlikely	Minor	Mild	Low	Negligible
Impact on endangered species	Short term	Local	Yes	Unlikely	Minor	Mild	Low	Negligible
Impact on Physical Cultural Resources	Short term	Local	Yes	Unlikely	Negligible	Low	Negligible	Negligible
Community Health and Safety	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Aesthetic impacts	Short term	Local	Yes	Certain	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]	Medium	Mild	Moderate	Negligible
Worker health and safety	Long term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Socio-economic status/livelihood	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Positive impact

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

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

144. The potential environmental impacts expected during the pre-construction phase are mostly due to the nature of the activity (Construction of buildings) and project location.

1. Impacts Due to Subproject Location

145. **Impact to protected areas, critical habitats and endangered species**. The subproject site is located within the municipality at a distance of 7 km from the southern border of Bumdeling Wildlife Sanctuary (BWS) and more than 10km from the Bumdeling Ramsar Wetland site, which is the habitat of the Black Necked Cranes. However, with these distances, the implementation of the subproject is unlikely to impact these ecologically sensitive areas. See **Figure 28**.

146. Apart from their roosting habitat at the Bumdeling Ramsar Wetland site, the Black Necked Cranes use the privately owned paddy fields in the periphery of the town as feeding/foraging grounds during the days of winter. These paddy fields is located approximately 400m from the subproject site. In between are several parcels of private lands, residential houses and buildings. Figure 31 show a panoramic view of the town indicating the locations of the subproject site and foraging site. Each year the cranes visit the paddy fields from end of November- Mid March. In 2020, only 65 cranes were sighted. Apart from the black necked crane, there are no other endangered or vulnerable species that can be found within 500m of the project site, which has also been verified by the local Forest Office.[51]

[51] Consultation with the Range Office, Yangtse and the Offtg. Park Manager, BWS on 5 and 6 April 2021

Figure 31: Panoramic View Showing the Location of the Subproject Site and Foraging Habitat

147. **Existing land use**. The site has an existing residential land use and was given to the NHDCL for the construction of residential housing in the district. Towards the western side of the site, there are already 7 existing buildings, with access road and parking.

148. **Mitigation.** Although the site is buffered from the foraging site, there is still the risk of disturbance from the construction, especially from prolonged use of noisy machinery such as rock breakers. The PIU shall plan the work schedule to reduce noise-intensive activities or construction works during the winter period from October – February.

149. **Impact to Physical Cultural Resources.** The closest religious and historical site is the ChortenKora that was built in 1740 by Lama NgawangLoday. The chorten was modelled after Boudhanath stupa in Nepal, which the lama carved out of a radish The Chorten is one of the main tourist attractions for both nationals, Indian and foreign tourists. Locals believe that an 8-year Dakini girl was sealed alive of her own free will in the chorten as an offering from the Dakpa people of Tawang, in India. The site is located about 900m south of the site with Yangtse town in between. The Dzong is perched at about 400m (1.4km by road) uphill of the site, while other famous sites such as RigsumGoenpa and the GomphuKoraLhakhang are more than 10km away from the site.

Figure 32: Map Showing Location of Nearest Physical Cultural Resources

150. Understanding the locations and validating through site visits, the project is assessed to have no significant risk or impact on any physical cultural resource. No mitigation is required.

151. **Risk of natural hazards such as earthquakes and climate change considerations.** Due to its proximity to the north-eastern parts of India, which are in the 'most active' seismic Zone V (according to Bureau of Indian Standards), the majority of Bhutan is also either in Zone IV or V. The Seismic hazard and risk in Bhutan study[52] found that seismic hazards are highest in the southern part of Bhutan where the Main Himalayan Thrust (MHT) is shallow, and site conditions lead to amplification of shaking.

152. The Kholongchhu River is located approximately 400m away from the project site and the Serkangchu stream which runs through the main is located approximately 200m from the site.

[52] "Seismic hazard and risk in Bhutan," Natural Hazards: Journal of the International Society for the Prevention and Mitigation of Natural Hazards, Springer; International Society for the Prevention and Mitigation of Natural Hazards, vol. 104(3), pages 2339-2367, December.

The risk of flooding at the site is low from both the stream and the river. The other natural hazards to the subproject are windstorms and fire.

153. The main associated risks and impacts in the design phase is 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 and other natural hazards including climate change.

154. **Mitigation**. Mitigation measures for seismic, windstorms, hailstones, and flooding (i.e. not due to any receiving body of water, but due to potential water logging during monsoon season) will be incorporated in the design of the housing project and through selection of construction materials.

155. The design process will take into consideration the requirements of Bhutan Building Rules (BBR) 2017.[53] Climate considerations will also be taken care of through choice of building materials which suitable for monsoon rains, hailstorms and winter snow conditions.

2. Impacts of Consents, Permits and Clearances Requirements

156. All development within the city is controlled by the Development Regulatory Authority (DRA) which is part of the District Administration. The DRA is mandated to ensures the promotion of Yangtse town as a model town for its architecture and therefore, the office strictly monitors to ensure that only two-storey buildings with local materials wherever possible. Without approval of the subproject plan by the District Administration, subproject implementation may not be able to proceed.

157. **Mitigation**. Site surveys and preliminary designs have been completed and the detailed design has ensured that buildings are not more than 2 storeys. 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 DRA through the Dzongkhag (District) administration, where it will be scrutinized in detail. 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 DRA, this will be communicated back to the design team for rectification and revision of drawings.

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

3. Impacts on Trees and Vegetation

159. **Impact.** There are only 5 trees which would need to be cut to construct the new buildings, create parking and internal access road.

160. **Mitigation**. Permit for tree felling will be sought from the Range Office in Yangtse prior to initiating the work. Once this is done, the trees can be cut and the timber can be reused as fuel wood or as required by the Forest Permit. To compensate for the trees felled, double the number of trees will be planted during landscape development and beautification works in the town, which will be provided from the local nursery, upon the advice of the Forest office.

4. Impacts on Construction Schedule, Cost Estimation and Bidding Process

[53] 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

161. **Impact.** There is a general lack of awareness by most contractors on ADB environmental safeguard policies and EMP requirements and therefore mitigation measures are not budgeted in the contract cost. Due to COVID 19 restrictions, there is also a huge shortage of skilled national workers.

162. **Mitigation**. The PMU will incorporate the costs of implementing OHS measures and the EMP, as well as specific provisions requiring contractors to comply with all other conditions required by ADB, into the bidding and contract documents. Once the Contractor has been selected, the PMU/PIU will arrange an awareness training for contractors on their responsibilities in EMP implementation, compliance with ADB and RGOB requirements, self -monitoring and reporting procedures.

163. 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.

164. The Bhutan Schedule of Rates - 2020 includes a Guideline for Occupational Health and Safety Cost to be used by procuring agencies for estimating the Bill of Quantities for each contract.[54] 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

165. The cost of transportation of waste from the construction site must be incorporated into BOQ to avoid additional claims or improper disposal of waste.

5. Risk on Compliance with Relevant ADB Loan Agreement and Safeguard Policy Statement Requirements

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

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

6. Project Disclosure and Community Awareness

168. The neighbouring community must be informed of the project activities and schedule so that they are well informed in advance and aware of the project activities in advance.

169. **Mitigation**. The project management has been in constant communication with the District Office to plan, layout and design the housing colony. An official visit was also conducted to inform

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

the District Administration of the plans and verbal approval on the project location was already sought.

170. The first round of consultation with current residents of the NHDCL housing and future potential tenants has already been carried out. The project must disseminate information on the objectives of the proposed project, the preliminary design of proposed project components; potential environmental and social impacts (positive and negative) of the project, and proposed mitigation measures for the perceived negative impacts; and the Grievance Redress Mechanism and contact details of the project. Subproject signboards must be designed and constructed according to the design standards and specifications of the Thromde (as there are no specific guidelines for TrashiYangtse). The signboards must disclose project contact information for easy contact for any issues or clarification.

D. Anticipated Impacts and Mitigation Measures during Construction Phase

1. Impacts on socio-economic conditions

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

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

172. **Impact.** Once the contract is awarded, the site will be handed over to the Contractor by the PIU. The entire housing project will be located within 2.48 acres of property allocated to NHDCL. There is nearly half an acre of empty barren land towards the southern corner of the site, to establish and construct site office and worker camps and material storage sheds.

173. **Mitigation**. There will be no need for additional space or land to construct site office, worker camps and material storage shed. No mitigation is required. 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.

3. Impacts of Recruitment of Workers

174. **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 labor because it is very difficult to find skilled national workers.

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

176. **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"[55] 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.

177. 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".*

178. 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.

179. 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.

4. Impacts on Occupational Health and Safety

180. **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.

181. **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;[56] 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

[55]RGOB. Regulations on Working Conditions, 2012
[56]IFC World Bank Group. 2007. Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Construction and Decommissioning.

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 2km from the District Hospital where emergency medical facilities easily accessible but the Contractor however must provide transportation during emergencies for workers.

182. 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 as well as the prevailing norms and requirements. This includes online registration of travelers on the Check Post Management System (CPMS) when workers or staff are traveling to and from the district.

5. Excavation Work

183. **Impact.** Excavation work will be carried out for the footing of 8 buildings, which will result in loose soil requiring space for storage and creating dust piles during windy days.

184. **Mitigation**. There will not be much excavated earth to be dumped because the excavation is only required for two-storey buildings. Most of the excavated material will be reused for filling and levelling works. The remaining soil, if any, will be disposed at an approved site by the District Regulatory Office or District Environmental Officer.

6. Material Sourcing and Storage

185. **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.

186. **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.

187. Aggregate, sand and stone will be sourced from local authorized suppliers from Trashigang, Mongar or within the district. 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.

188. 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.

7. Water Requirements

189. **Impact.** TrashiYangtse ranks moderate[57] in terms of basic infrastructure with 86 percent receiving piped water supply. In terms of the rural population, 100% have access to safe drinking water supply and improved sanitation.[58] The water supply for Yangtse town is covered through the 0.24 MLD capacity source at Sergangchu.[59]

190. 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).

191. **Mitigation**. The Contractor will be required to ensure adequate water for domestic (drinking, cooking, washing and sanitation) and construction purpose. The existing water supply line will be utilized for this the project so there is no need to install new water pipelines or seek waste sources. To reduce the risk of water shortages and to conserve water, the Contractor will 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 to prevent leakages or blockages.

8. Electrical Requirements

192. **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.

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

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

9. Sewerage

[57] MOWHS. 2018. Bhutan National Urbanization Strategy 2008.
[58] TrashiYangtseDzongkhag, 2020. Dzongkhag at a Glance.
[59] MOWHS, 2019. Annual information Bulletin

195. **Impact.** There is no sewerage treatment system in TrashiYangtse, so all buildings are connected to tanks. The municipal provides the septic tank cleaning system within the municipal area. 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.

196. **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 town, 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.

10. Mobilization of Construction Equipment

197. **Impact.** The operation of vehicles and mobile construction equipment at the construction site will pose a risk to workers and public 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.

198. **Mitigation.** To minimize the risk to workers working nearby, the machine operators must be trained and competent and use the horn when backing, be assigned a signal person to guide him when reversing and workers must be restricted from working in close proximity during these periods, 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.

11. Erosion and Sedimentation

199. **Impact.** The Dzongkhag receives an average of annual rainfall of 1883 mm.[60] The heavy monsoon period from June-September, will wash away the exposed parts of the site, leading to erosion of exposed surfaces and runoff downslope onto the existing road downslope. The excavated area, worker camps and material storage areas all require drainage to ensure that materials are not washed away during the rainy season, adding to the erosion.

200. **Mitigation.** All excavation work should be mostly completed before the onset of the incessant rain to reduce the runoff. There is already a storm water drain downslope of the site as shown in figure below.

[60]TrashiYangtseDzongkhag, 2018. Disaster Contingency Plan

Figure 33: Photo showing storm water drain below site

201. The Contractor must construct drains to divert the rain water away from areas where soil is exposed and connect this to the main storm water drain. For the new buildings, the infrastructure design will incorporate efficient drainage system that will connect with the existing drain.

12. Air Quality

202. **Impact.** The use of fuel wood for heating in winter will result inair pollution from fires. Also, exhaust emission from operation of machinery and vehicles will contribute to the air pollutant load (primarily particulate matter (PM), NO_x, $S_{Ox,}$, CO etc.) in the ambient air.

203. **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. This is as per the notification Ref No/Yangdzong/Environment (10)/2020-2021/6769 issued by the District Administration (Annex). Stockpiles of soil, sand and other construction materials will be covered to prevent it from being carried off on windy days.

204. **Worker camps** –The Contractor will provide alternatives fuel (electricity or LPG) at worker camps and restrict use of firewood for cooking but may be allowed for heating (as this is permitted in the city). However, open burning of waste will be restricted and enforced strictly.

13. Dust generation

205. **Impact**. Dust will be generated during demolition, excavation, transportation and unloading of sand and other construction materials as well as during material storage. Dust generated will potentially elevate the level of air pollution in the area in terms of particulate matter.

206. **Mitigation**. To prevent too much dust during excavation works, the area will be enclosed/cordoned with construction fabric. Water will be sprayed over bare or newly excavated areas especially on windy days. The excess excavated soil will be removed from the site within 2

weeks of excavation at disposed at the approved disposal site. Material transporters will be instructed to cover dust generating materials to prevent dust and spillage along transport routes.

14. Noise and Disturbance

207. **Impact.** During the construction period, the main sources of noise will be from the actual construction activity such as use of welding machines, sawing of wood, concrete mixing, batching plant operation, excavators and movement of vehicles and trucks. Loud noise will be especially disturbing for the rare and endangered Black Necked Cranes that fly over from BWS to forage in the bare paddy fields in winter. Another source of disturbance especially in the evenings is when workers play loud music, engage in brawls or drunken behavior. All these impacts are centered on work sites and camps, and last until the end of the construction period.

208. **Mitigation**. Measures to minimize disturbance to the community include restricting construction work between 9PM -8AM,[61] 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.

209. To minimize disturbing the Black Necked Cranes, the project will either plan to complete all noisy construction activities such as rock breaking before or restrict such work from End October/ Beginning November –Mid March, to avoid disturbing the Black -necked cranes. This must be factored into the construction timeline so that the Contractor does not get penalized for delay.

15. Solid waste generation and management

210. **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 lead to land contamination, proliferation of vectors of diseases, foul odor and other nuisance impacting local communities.

211. **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.

212. The Contractor will ensure that workers are briefed on proper waste management and good housekeeping at worker camps enforced. Separate bins for “bio-degradable” and “non-biodegradable” for staff quarters and worker camps, and a separate bin for hazardous waste. Waste storage areas will be identified until these are collected by the municipal trucks. Hazardous waste will be stored separately and disposed with the guidance of the Environment Officer.

213. Construction waste will be segregated into reusable, recyclable parts and disposed at a designated site with the approval from the District Regulatory Officer.

[61] As per Development Control Regulations 2016

16. Community health and safety

214. **Impacts on Nearby Establishments.** Although the construction site lies in the center of Yangtse town, the site is separated on three sides by urban road and the road leading to the Dzong, Baylling and other villages further north and on the upper slopes. The immediate neighbours on its western front, are those residing in the existing NHDCL buildings, while on the upper slope is the Kholongchhu Hydropower Project Office as shown in figure below.

Figure 34: Photo Showing Site and Adjoining NHDCL housing (left) and Kholongchhu Project Office (right)

215. **Impacts on community access**. There is a small footpath/shortcut that the public use to walk across the site which will pose hazard for public, especially small children when construction is ongoing.

216. **Mitigation**. Measures to minimize risks to community health and safety include a) cordoning the construction site to exclude public from the site, b)controlling access to the site, c) installing signboards and warning signs to notify passers-by of ongoing work.

17. Congestion and traffic management

217. **Impact.** The stretch of the urban road from the bridge to the site will be utilized during construction phase for movement of heavy vehicles carrying construction material. This is also the main route to the Dzong and other offices such as the District Court and the Kholongchhu Hydropower project among others. TrashiYangtse is very remote and accessible only via the Trashigang-Mongar Highway. Apart from traffic from local residents, and the few 1000 tourist that visit during the festival season, there is no traffic in Yangtse town and there are not much developmental works ongoing in the district either.

218. **Mitigation**. The only mitigation required is for the Contractor to avoid storing any construction material along the access road, causing obstruction and to instruct transporters to observe and reduce speed limit while driving through the town area.

18. Aesthetic impacts

219. **Impact.** The entire housing project will be located on land that was specifically allocated to NHDCL, to construct and provide affordable housing to less privileged people. If not properly designed, the buildings can have negative aesthetic impacts as the site is in a highly visible area. The negative impacts will be more obvious during excavation and construction due to the use of heavy equipment, construction of worker camps and material storage sheds. This however will only last until the end of the construction phase.

220. **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 limit. The building designs will also utilize the Bhutanese Architecture Guidelines[62] as a reference to ensure that the buildings blend in with the surrounding landscape while maintaining certain elements of traditional Bhutanese architectural designs. Landscaping and vegetation will be carried out to further improve site conditions once these activities are completed.

19. Chance Finds

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

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

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

20. Disasters, Natural Hazards and Emergencies

223. **Impact.** TrashiYangtse Dzongkhag has experienced several disasters in the recent decades, from earthquakes (2009, 2011 and 2015), windstorms (2011, 2016 and 2017) to floods (2014, 2016 and 2017), causing extensive damage to houses, government infrastructure and agricultural land from these hazards, the probability of occurrence is ranked 'HIGH' by the district administration.[63]

224. **Mitigation**. Seismic risks have been considered during the building design to ensure the structures are earthquake resistant. The construction will be monitored by the supervision team to ensure quality construction practices and material usage. By its location, the housing complex

[62] MOWHS, 2014. The Bhutanese Architecture Guidelines
[63]TrashiYangtseDzongkhag 2018.

is included under the mandate of the Dzongkhag Disaster Management Committee (DDMC) led by the Dzongda. The DDMC has prepared a Dzongkhag Disaster and Contingency Plan, wherein the roles and responsibilities at each level has been specified. In case of an emergency, the Dzongkhag Emergency Operation Centre (DEOC) will be immediately operationalized and all gewogs/thromdes warned with orders to evacuate and for deployment of search, rescue or assistance.[64] In case of a major disaster/hazard/emergency, the Contractor and PIU will follow the instructions from the Dzongkhag Disaster Management Committee (DDMC).

225. Site specific mitigation measures for workers are already covered under OHS. Emergency numbers of Fire, Police must be posted near the fire extinguisher or at a visible location.

21. Completion of construction work

226. **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.

227. **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, septic tanks and soak pits covered with an adequate amount of soil and construction materials, cleaning the site of debris before handing it back to PIU. Any damaged property (government or private) will be repaired and/compensated before final leaving the site. The site will then be replanted with appropriate species during landscaping.

228. 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.[65]

E. Anticipated Impacts and Mitigation Measures during Operation Phase

1. Impacts

229. 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.

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

2. Mitigation Measures

231. **Maintenance and delivery of services**. The NHDCL has a Real Estate Management Services Division (REMSD) that is responsible for managing and carrying out maintenance work

[64] Type I – Disaster that can be managed with available resources and is within the coping capacity of the Gewog/Thromde; Type II- within the available resources and coping capacity of the Dzongkhag; Type III- beyond available resources and coping capacity of the Dzongkhag.

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

on its buildings. It also has a pool of trained and certified electricians, plumbers and masons in case repairs are urgently required. However, since TrashiYangtse is so remote, it will be outsourced by the REMSD to local technicians.

232. **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.

233. REMSD will follow instructions from the Dzongkhag Disaster Management Committee (DMC) on procedures to follow in case of emergencies

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

235. **Waste generation.** This is not a significant concern as the site is serviced by the municipal waste disposal service providers. NHDCL will promote waste segregation, storage and disposal as per the town's collection requirements and procedures and ensure that garbage is not allowed to accumulate on the premises. The new buildings will be connected to septic tanks with soak pits to be desludged/emptied by vacuum tanker services provided by the town/municipality. In the future, when the area is connected to a sewerage treatment plant, the buildings will then be connected to the sewer pipeline network.

F. Cumulative Impacts and Mitigation

236. Due to its location, TrashiYangtse is accessible only by road. It is 24 km from Trashigang and 120km from Mongar. With the establishment of domestic airport in Yongphula, the accessibility to Trashiyangtse is easier as compared in the past wherein it would take two days to reach from Thimphu to Yangtse via Bumthang and Mongar, or from SamdrupJongkhar through Trashigang. The entire district population is only 17,300, of which 3,547 live within the urban areas.

237. Tashi Yangtse is considered one of the lesser developed districts in terms of socio-economic development, mainly due to its low population and increasing number of gungtongs (unoccupied houses), which are private-owned. In fact, due to rural–urban migration, it has 694 gungtongs spread across the district and a net outmigration of 6,271.

238. While it does have all of the basic facilities in terms of health, educational, agricultural, livestock, banking and other amenities, private sector businesses and enterprises have not picked up due to lack of market, long travel distances and lack of manpower. The primary residents in the town are the students of the schools, the College of ZorigChusum (a vocational training institute), government and corporate staff.

239. According to the National Human Settlement Strategy report TrashiYangtse's overall ranking is 15/20, due to reasons cited in the above paragraphs, but also because a large portion of the district falls under the Bumdeling Wildlife Sanctuary, wherein large scale developmental activities are restricted.

240. Apart from the 600 MW Kholongchhu Hydropower Project[66] and the town development activities in term provisioning of streetlights, roads and religious monument maintenance, there is not much development in the district.

241. The project is not anticipated to have any cumulative impact because of the lack of ongoing developmental activities in the district center.

Table 30: Comparative national ranking of TrashiYangtse across various domains

Domain	Indicators	Ranking
Infrastructure	• Electrification • Drinking water supply Latrine/toilet availability • Internet penetration • Road length per Dzongkhag area	8/20
Housing	• Availability and Affordability	12/20
Economy	• Annual household income • Labour force participation rate • Agricultural land • Number of hydropower projects • Number of mines • Number of industries • Number of tourist arrivals • Number of accommodation providers (star category)	19/20
Social Infrastructure	Number of schools Number of hospitals Mean healthy days in a month	14/20
GNH index	Measured across 9 domains of GNH.	19/20
Culture	Number of heritage villages Number of lhakhangs/temple	13/20

242. Farming is the predominant occupation. TrashiYangtse is mostly only famous for “Dapa” (wooden bowls), handmade paper, religious sites and the Black necked cranes. Yet due to the distance from Paro or Thimphu, despites its rich religious and cultural heritage sites, it is not a major tourist destination and there are just a couple of standard hotels.

243. Another reason for the lack of development is also because 375,607.2 acres[67] of the district falls under the Bumdeling Wildlife sanctuary where commercial infrastructure development is restricted.

244. The focus of the 12th FYP is on enhancing agriculture and livestock productivity, tourism development (which could not materialize due to COVID 19 pandemic), promotion of cottage and small scale industries to enhance household incomes and create jobs for the local communities, moving forward with the Kholongchu Project and promotion of the Rural Economy Advancement Program in target gewogs.[68] As there are no developmental activities in the project site, and none planned in the near future, there will be little or no cumulative impact due to the subproject.

[66]Kholongchhu Hydropower Project is currently constructing the dam, access roads, adits and other related structures further downsteam of Yangtse town at the lower course of Kholongchhu just before its confluence with Drangmechu (Gongrichu).
[67]TrashiYangtseDzongkhag 2021.
[68]GNHC, 2017. 12th Five Year Plan for TrashiYangtse

G. Environmental Benefits and Enhancement Measures

245. Despite the transient negative environmental and social impacts, the project will generate substantial environmental benefits and enhancements measures as described below.

1. Provision of Affordable Housing and Improved living conditions

246. Currently, due to the lack of affordable government housing, most government and corporate employees rent private accommodation. In recent times, the Kholongchu Hydropower Project resulted in an influx of a large number employees, increasing the demand for accommodation and with it a hike in the rental prices- creating both a shortage and price hike. The subproject will therefore, provide affordable housing for both civil servants and corporate employees. The improved housing facility will providemajor positive impact through savings on rent, improved living conditions and enhanced safety due to the development of disaster and climate resilient infrastructure.

247. The sub-project will also produce job opportunities for skilled and unskilled workers. It will enhance the capacity of local contractors through constant supervision and guidance on safe construction practises

H. Summary of Impacts and Mitigation

1. Pre-construction phase

248. The subproject entails construction of 8 two-storey residential buildings comprising of 80 units, with internal access road and parking, within 2.48 acres of land.

249. The sensitive receptors that lie within the zone of influence (within 200m of the proposed infrastructure development work) are the shops, offices, and residential houses in the area. While the positive benefits of low-income housing and generation of employment are high, the primary concerns with the infrastructure development is due to its location.

(i) There will be no need for land acquisition, resettlement or compensation;
(ii) The land was already allotted, and the Land User Certificate to NHDCL to construct housing;
(iii) The sites are located within the municipal boundary and 300m away from the protected area, so there will be no impact on critical habitats and protected areas;
(iv) Only 5 trees need to be removed;
(v) There will be no impact on Physical Cultural Resources;
(vi) There will no disruption on existing public utilities;
(vii) There are no rivers and streams within 200m of the site;
(viii) Land use will change from barren land to residential/housing;
(ix) There are no existing structures on the site to be demolished; and
(x) There is already an existing road, water supply and electrification network at the site, so there is no need to construct access road, source water or construct transmission lines.

250. The draft designs and drawings have incorporated seismic and natural hazards risks, suitability to the local climatic conditions, and availability of construction materials. The buildings are also designed in compliance with Bhutan Building Regulations in terms of maximum

permissible plot coverage as per plot size, setback and the District restrictions on permissible height for buildings (2 storeys), and incorporation of traditional architectural designs.

251. Other activities during pre-construction include site selection, approval of architectural drawings, advertisement and hire of contractors.

252. Relevant officers of the PMU and PIU will be briefed and made aware on ADB safeguard requirements, compliance monitoring and reporting requirements. The EMP will be attached to the Contract documents along with OHS requirements.

253. The team/staff will be assigned to supervise and monitor the construction activities with a clear Terms of Reference.

2. Construction Phase

254. All construction work will be carried out within the designated 2.48 acres. There is adequate vacant land (almost half an acres) nearby which will be used to construct workers camps and storage sheds.

255. The primary environmental concern during the construction phase is that the site is within 300m from the foraging habitat of the Black Necked Cranes and as the town is very quiet with not much development or traffic, the birds will be disturbed by the constant and loud noise from the construction site. This however is only an issue for 4 months and can be avoided by scheduling of construction activities to minimize disturbance.

256. Other environmental and social impacts are those normally associated with construction work. These include:

(i) Risk to worker health and safety;
(ii) Impacts on community safety;
(iii) Air, dust, noise pollution from material transportation and construction work;
(iv) Increase in demand for resources including water;
(v) Generation of excavated materials, construction and household waste; and
(vi) Post construction impacts from improper camp closures or clean-up of site.

257. All these concerns will be addressed in the Environmental Management Plan which be included in the bid document and the construction contract.

258. Apart from these anticipated risks, the subproject is not expected to cause major negative impacts spatially or temporarily because the construction work itself is relatively straightforward and can be completed in a fairly short time. The selection process will ensure that Contractor selected has adequate experience in such infrastructure works and the work will be contracted out as per prevailing government procedures. The Contractor will therefore be accountable for managing the construction sites responsibly, delivery of quality structures within the stipulated period while ensuring compliance with the EMP.

259. As part of its responsibility to prevent unwanted/unsafe development, the District Regulatory Authority will also be closely monitoring the site and construction work through regular site visits during various stages of the construction process (foundation, completion of each floor, and roofing). The issuance of an occupancy certificate upon completion of the project 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.

260. The cost for Occupational Health and Safety requirements will be included in the contract cost and mandatory for the Contractor, who will also be required to pay for or repair any damage to public or private property during the course of the construction work.

261. 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, including COVID 19 safeguard requirements and procedures.

3. Post-construction / Operation phase

262. The project will bring significant positive socioeconomic benefits to the Government and corporate workers – in terms of saving on rental prices, improved disaster resilient housing with adequate parking, water supply and regular maintenance.

263. There are no significant environmental impacts during the Operation phase. Post construction, NHDCL will ensure regular Maintenance and repair of its newly constructed structure so that its residents can enjoy the benefits of the new housing colony.

VI. ANALYSIS OF ALTERNATIVES

A. Alternatives Relating to Site Location

264. Locating the site is basically dictated by the availability of government-owned land. For TrashiYangtse, the project has identified a government land in an area that is ideal for residential purpose. Since the project is geared for urban low-income staff and wage workers, and to provide maximum benefit to future tenants, the project site must be located at a reasonable distance from their workplace, which is the Yangtse town. This will reduce transportation cost for the tenants. In this respect, the site selected is ideal as it is located within the town center and in a predominantly residential area with developed access roads and availability of basic utilities.

B. Implication of No-Project Alternative

265. Both the “no project” and “with project” options have been studied and a comparison of ‘No Project’ and ‘with Project’ options are presented Table 31.

Table 31: Comparison of “with project” and “no project” options.

Description	No Project	With Project
Social impacts	Maintain status quo Civil servants and corporate employees will continue to struggle with housing shortage and unaffordable private rent	The Project will assist the Royal Government of Bhutan (RGOB) establish affordable housing infrastructures for 32 civil servants and corporate employees, and their families.
Physical impacts	No impacts	8 two storied buildings will be built in 2.48 acres of land in the middle of Yangtse town. The planned housing complex will be designed based on the terrain and will fit in with the existing architectural design requirements

Description	No Project	With Project
Potential impacts due to seismic risks, environmentally friendly and climate resilient	No impact	The buildings will be designed as per Bhutan Building Regulations 2018, Bhutan Building Code of Bhutan 2018, Bhutanese Architectural Guidelines, 2014 and the Bhutan Green Building Guidelines, 2013. The project will integrate innovative approaches to enhance resilience to geophysical events, extreme weather events, incorporate green space and adequate parking for all tenants
Environmental impacts Potential impacts to ecologically sensitive areas, critical habitats, biodiversity and physical cultural structures	No impact	The project will cause some disturbance to the Black necked cranes if noisy construction works such as rock breakers/loud machinery is used during winter months.
Social impacts Potential impacts to indigenous people	There are no negative social impacts or indigenous people that will be impacted by the project	The project will have positive social impacts by provision of affordable housing to 32 families.
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 noise from workers camps and construction noise. There is a potential increase in material transporting vehicles during construction period of 2 years.
Employment opportunities for locals	None	The project will provide employment opportunities for able, skilled and non-skilled workers (both foreign and local)

266. “No Project” option: The “No Project” option means that the existing housing crunch, a chronic issue being faced by civil servants and corporate employees will continue. The lack of affordable housing further aggravates already existing housing shortage woes and steep rental prices in TrashiYangtse. It also encourages construction of temporary huts, and overcrowding/sharing in existing apartments resulting in unhealthy living conditions. The unaffordable housing also undermines the employees ability to save money further widening the gap between the rich and the poor.

267. “With Project” option: The new project will provide affordable housing for 32 families. The new housing complex will be designed to suit the topography, geology and existing land use. It will incorporate universal design features (sufficient parking, pedestrian footpaths and efficient drainage systems), will be disaster resilient and fitted with fire hydrants and fire extinguishers, incorporate environmental friendly/green features such as use of locally produced materials, improved window designs, waste management units, adequate access and parking. Above all, it will provide opportunities for vulnerable families especially women with the opportunity to save money, and live in a healthy, spacious environment. 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

268. Consultation, participation, and disclosure constitute an integrated process in the project design preparation and implementation. As required by ADB SPS, NHDCL will disseminate information the local community and consult with them in a manner that is commensurate with the anticipated project impacts on the affected communities.

B. Approach and Methodology

269. Key stakeholders identified during the project planning process are as follows:

(i) Current residents in the NHDCL housing complex;
(ii) Future potential residents such as corporate employees, Thromde staff and Civil servants who are living in private apartments;
(iii) Dzongkhag Administration;
(iv) District Environmental Officer;
(v) District Regulatory officer;
(vi) Forest Range Office; and
(vii) Bumdeling Wildlife Sanctuary Management.

270. **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 5). 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

271. Consultations were carried out by NHDCL with the District Administration, during project design, to ascertain the need for the project, to assess land availability and seek land user certificate prior to the design phase (early 2021).

272. A site visit to TrashiYangtse, was carried out in early April, 2021. During the visit, meetings and consultations were carried out with the Dzongda, Forest Ranger and Park Manager on 5, 6 and 7thApril, 2021. Public consultation was organized on the 6th, during which 11 local employees or their spouses, current tenants or potential future tenants were present. The Objective of the meeting was to understand the experience of the current tenants living at the NHDC housing and incorporate their suggestions for future housing design, and also to see the views of the members of the community especially the potential future tenants. The NHDCL officer informed the meeting about the primary objectives of the Bhutan Affordable Housing Project and the subproject in TrashiYangtse. The participants were informed on the location, design, price range and allocation of housing.

273. The participants were asked to share their experiences (three out of eleven participants living in private housing). High rents, lack of tenancy agreement, the risk of rents being increased,

the difficulty in securing affordable housing due to the housing demand from the Kholongchu Hydropower Project and the lack of tenure are some existing issues being faced.

274. The current NHDCL tenants raise a number of maintenance issues with the existing housing complex as well- from drainage, chimneys, toilets, water leaks, weak ceilings, broken windows to electrical fixtures. The NHDC Head Office Representative acknowledged and attributed maintenance issues to the lack of a full time NHDCL staff to ensure repair and maintenance works and also because of the age of the structures which were constructed in 2007. Copies of minutes of consultations are in Appendix 6.

Table 32: Summary of Issues and Clarifications During Public Consultation

Topic	Key questions/issues	Clarification by NHDCL
Housing design	Query about new housing design and rent	a minimum of two bedrooms, two toilets, a living room, kitchen and balcony/verandah and the rental range would be Nu. 4000/month for about 600 square feet of space
Allocation	How the selection process will be carried out	Housing allocation will be as follows- 70% for government employees and 30% for corporate and industrial workers
Existing NHDCL housing complex	Many issues were raised with the existing housing complex that require immediate attention in some cases	NHDCL committed that NHDC management would expedite the maintenance work especially where the damages pose safety risk to tenants
Application	Application and eligibility process	Applications for housing are now online to promote and ensure transparency and to avoid criticism of unfair allocation of housing. In terms of eligibility-mostly women are allocated because they are eligible due to the criteria that prioritizes the spouse who is in a lower grade
Feedback on future design and material	Participants recommended the following -concrete verandahs/balcony -two toilets - cement flooring is better for better sound and dust proofing. -requests for street lighting -use new electrical fittings - electric heating -geysers	On the request for geysers, the NHDC Head Office Representative mentioned that if geysers are provided the cost of rental will increase and therefore it has to be kept affordable
Improvements to current housing	Improvement of the blacktopping (re-surfacing) of present parking was also requested.	
Water supply and storage for the housing colony	Tenants also recommended for a different water tank as there are many sources and there is no dearth of water	
Waste management	the tenants clarified that was is being collected in waste collection trucks and	

Topic	Key questions/issues	Clarification by NHDCL
	disposed at the district disposal site. There is no separate disposal area for construction waste at the moment	
Maintenance management		It was clarified that the NHDC focal point, who also lives in the NHDC colony, is the contact person for all NHDC tenants for any matters concerning housing, tenants, and maintenance.

Figure 35: Photos of Public Consultation in 2020

D. Consultation with the Bumdeling Wildlife Management and Forest Ranger, TrashiYangtse Range

275. Two consultations were held with the Offtg. Chief Forest Officer (CFO), Bumdeling Wildlife Management on the 5th of March, 2021. The key discussion topics were (i) the boundary of the BWS, BWS buffer and Ramsar Site, (ii) information on Black Necked Cranes (BNC), and (iii) concerns from the BWS regarding the subproject.

276. The CFO confirmed that the site is at least 10km from the Ramsar wetland site at Bumdeling which is the habitat of the BNC. He also confirmed the boundary of BWS, which is at a distance of 300m from the site, and north of the bridge to Bumdelinggewog.

277. In terms of the BNC, Bumdeling is second to Phobjikha in terms of crane numbers. It is the eastern most habitat and the BumdelingRamsar site is within the Bumdeling Wildlife Sanctuary and includes riverine wetlands along the KholongChhu. For some time now, the BWS management has been undertaking management interventions to clear out the river banks and marsh of debris from past flood events. Efforts are also underway to remove the alnus trees that are growing quite rampantly so as to maintain the roosting habitat at the wetland site. The Cranes use the privately owned wetlands (paddy fields) within the thromde area also, as feeding grounds during the day and return to their roosting habitat in Bumdeling at night. Each year, the number of cranes arriving are counted and these are monitored during their stay in Bhutan since the late 1980's. The national crane count was conducted in February 2021, and of the total 552 cranes that arrived in Bhutan in 2021, only 65 were counted in BWS.

278. In terms of other species, apart from the Cranes, the management does not have any concerns, because the subproject falls under the jurisdiction of the Forest Range under the Trashigang Divisional Forest Office. The only request is to ensure that minimal disturbance is caused to the cranes during the construction period because the number of cranes have significantly declined since 1987 when 200 cranes were recorded.

279. On the same day, the Forest Ranger Officer was also consulted and visited the site with the environmental consultant. He confirmed the number of trees to be felled and also clarified that the Division would review the list of species submitted by the consultant for review and validation (IBAT) in consultation and through with the Divisional Forest Office. Since the minimum distance used by IBAT is 1km, the list would definitely contain some endangered species found in farther areas . Due to the small size of the town, proximity to nearest forest area is within 1km of the Thromde. The Ranger also confirmed that the tree removal application must be processed through the Division and not through the BWS.

E. Future Consultations and Information disclosure

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

281. The project IEE, EMP and environmental monitoring reports will also be available on project website and ADB website for information. If any changes are made to the project design or location, the IEE will be revised and disclosed as well.

VIII. GRIEVANCE REDRESS MECHANISM

282. 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.

283. 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.

284. **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.

285. **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.

286. **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.

287. **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.

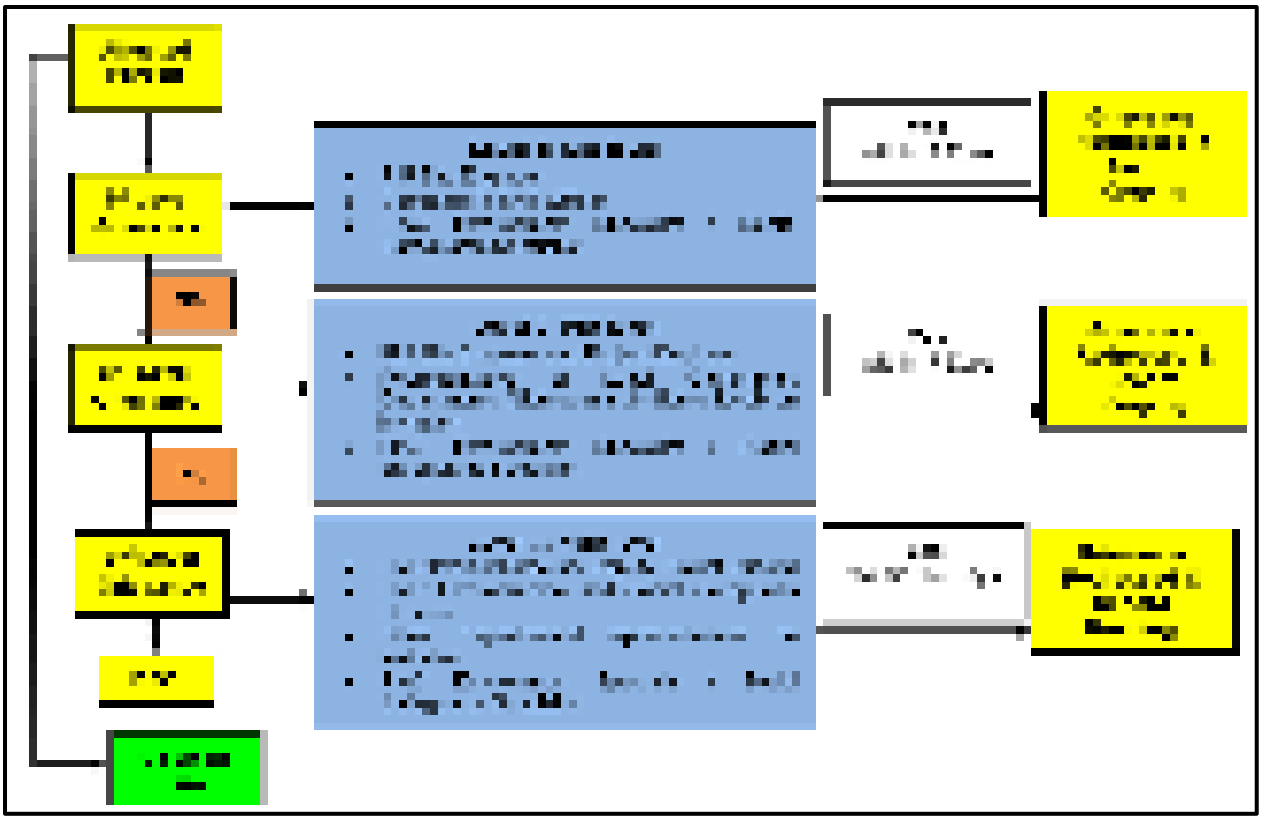
(iii) **3rd Level Grievance (PMU):** All the grievances that are not addressed at 2nd level by PIU will be brought to the third level. The third level will meet once a month and determine the merit of each grievance/s brought to the committee. The third level grievance redress committee will resolve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

288. 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.

289. 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.

290. The process of the project GRM is given in Figure 31.

Figure 31: 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

291. 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.

292. **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.

293. **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.

294. **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.

295. **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.

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

297. **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

298. The Environmental management plan outlines the mitigation and management measures to be taken during project implementation to avoid, reduce, mitigate, or compensate for adverse environmental impacts. The environmental management plan has been prepared based on the assessment of potential impacts (environmental and social) at the selected site.

A. Institutional Arrangement

299. **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 (GRAHSP). MOF and NHDCL will engage with relevant government agencies[69] and NGOs[70] in designing and operationalizing the project. International and national

[69] The project will liaise with relevant government agencies to ensure the project complies with statutory requirements. These agencies may include Department of Disaster Management (Ministry of Home and Cultural Affairs); Department of Engineering Services; Department of Geology and Mines; National Environment Commission; etc.

[70] NGOs will be engaged to help implement the gender-related activities under the project. These activities will be funded through an ADF Grant attached to the loan.

consultants will be recruited to provide expert assistance.[71] A central project steering committee (PSC) set up under the project will facilitate and ensure adequate coordination among relevant stakeholders and provide guidance for PMU and PIUs for this proposed project. In particular, the PSC will: (i) meet at least semi-annually or more frequently if required; (ii) provide guidance for and ensure the implementation of government and ADB policies for the proposed Project; (iii) assist in resolving any interagency implementation problems; (iv) review relevant reports and audit statements from PMU and PIUs, as and when required; and (v) ensure that conditions of the Loan Agreement with ADB are met.

300. NHDCL being the implementing agency for the project, will be responsible for management, coordination and execution of all activities funded under the loan. A central PMU at NHDCL will be responsible for implementing the affordable housing project. The PMU will be supported by Project Implementation Units (PIUs) at district and sub-district level.

301. The PMU will be supported by the PIUs and the Project Implementation Assistance Consultant (PIAC) in project management and implementation respectively. Figure 37 below details the responsibilities for the project preparation, construction and operation.

[71] These consultants refer to both consulting firm (i.e. project implementation consultant team) and other individual consultants hired to support the project at various stages of project implementation.

Figure 37: Overall Project Implementation Arrangement

302. **Specific Institutional Arrangement for Environmental and Social Safeguards, and Gender** Figure below depicts the implementation arrangement for environmental and social safeguards, and gender.

Figure 38: 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.

303. **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.

304. **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.

305. **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.

306. **Civil Works Contracts and Contractors.** The IEEs with EMPs will form part of bidding and contract documents and verified by PMU. Each contractor will be required to designate an environment, health and safety officer (or equivalent) to ensure implementation of EMP during civil works. Contractors are 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.

307. Specifically, the contractor/s 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 find procedures to discovery of any physical cultural artifact.

308. 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.

309. 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 33: 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 consultant, to conduct Rapid Environmental Assessment (REA) for each site of proposed subprojects using checklist available from ADB. Based on the REA,	Environment Specialist Consultant will assist PMU and conduct IEE (or update existing IEE) for all subprojects, which will include an EMP. The environmental expert and other consultants will work	ADB to review the REA checklists and reconfirm the categorization.

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

Project Management Unit	Environment Specialist Consultant	ADB
Corrective actions to be undertaken if needed.	contractors' 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.	
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

310. 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.

311. 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 34: Environmental Management Plan

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
Design / Pre- construction phase					
1.Subproject Location	Impact on protected area, critical habitats and endangered species	None required as the project site is located in the center of Yangtse town at a distance of about 7km from the boundary of Bumdeling Wildlife Sanctuary and more than 10km from the Bumdeling Ramsar Wetland site. The designated land use of the subproject site is for residential housing. Currently it is being used for potato cultivation and backyard gardening by the NHDCL tenants.	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. The nearest PCR is Trashi Yangtse Dzong, which is at approximately 324m away.			
	Risk of natural hazards such as earthquakes and climate change considerations	• Design of buildings in line with Bhutan Building Regulations 2018, Bhutan Building Code of Bhutan 2018, Bhutanese Architectural Guidelines, 2014 and the Bhutan Green Building Guidelines, 2013. • Choice of construction materials must be based on climatic conditions and suitable for monsoon rains and winter snow conditions	Included in Subproject design cost	PIU	PMU
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 District Regulatory Officer, Dzongkhag Administration. • Seek approval for environmental clearance from NEC.	PMU Operating cost	PIU	PMU
Removal of trees	5 trees need to be cut	• Seek approval removal of trees from the Yangtse Forest Range Office. • Replant the area with at least double the number of trees cut during landscaping as compensatory measure.	PMU Operating cost (permit) Contractor's cost	PIU (permit) Contractor (tree removal and replanting)	PMU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
			(removal and replanting)		
Aesthetics	Change in aesthetics at the site due to new infrastructures that could obstruct views.	• 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. • Comply with the Bhutanese Architecture Guidelines[72] 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.	PMU Operating cost	PIU	PMU
Compliance with ADB Loan Agreement and SPS	Lack of technical capacity on environmental safeguards	Conduct briefing/orientation for designated staff to be aware of ADB safeguard policies and RGOB regulations relevant for the project, including EMP, and compliance monitoring and reporting requirements.	PMU Operating cost	PIU / PMU	PMU
	Lack of awareness by the Contractor on ADB environmental safeguard policies and EMP requirements and therefore mitigation measures not budgeted	• 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	PMU Operating cost	PIU / PMU	PMU

[72] MOWHS, 2014. The Bhutanese Architecture Guidelines

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		requirements, self -monitoring and reporting procedures.			
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 • Design and install project signboards as per design standards and specifications of the District and include relevant contact numbers for GRM	PMU Operating cost	PIU / PMU	PMU
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%.	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"[73] 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.	Contractor's cost	Contractor	PIU

[73]RGOB. Regulations on Working Conditions, 2012

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• 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 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.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• 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 Guidelines on Construction and Decommissioning Activities;[74] • 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.			

[74] 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
		• 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, 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.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Seek approval/permit for disposal of soil/spoil from District Regulatory Officer/Municipal, and remove unwanted soil from the site within 2 weeks of excavation at pre-approved site. (At least 50% of the soil will be reused for building foundation, road works or levelling works)			
	Dust generation on windy days	• Enclose excavated areas to contain dust. • Spray water over loose soil piles especially on windy days.	Contractor's cost	Contractor	PIU
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 • Stacked 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

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
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.	Contractor's cost	Contractor	PIU
Mobilization and operation of construction equipment	Risk of accidents and injuries to workers	• Train machine operators • 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.	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 Dzongkhag 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 District Regulatory Officer for desludging and vacuum cleaning of septic tank annually	Housing Management Cost	PIU	PIU / PMU
	Solid waste generation that could impact the environment	• Follow District 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

X. MONITORING AND REPORTING

312. 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.

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

(i) Meet government approval/ permit conditions and ADB requirements;
(ii) Assess project performance against agreed criteria;
(iii) Identify any environmental damage/impacts or non-compliance issues;
(iv) Prepare corrective action plans; and
(v) Provide data to support compliance.

314. 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.

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

316. The PIU will submit quarterly environmental monitoring reports to PMU, which will include summary of daily monitoring activities of Contractor and results of any independent monitoring or inspection activities of the PIU. A sample inspection checklist is in Appendix 11. This checklist is indicative which can be further enhanced depending on the actual situations at subproject construction site.

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

318. 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 35: 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 Affected people and community	One time	NHDCL	PMU
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	Monthly	Contractor	PIU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
		• 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)			
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
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

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
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
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)	Monthly	Contractor	PIU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
		• No. of safety signs • Installation of barricades • Obstruction of access routes/paths • No. of accidents occurred • No. of complaints received			
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

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

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

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

A. Capacity Building

321. 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.

322. 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.

323. 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 36: 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 policies including but not limited to core labor standards, OHS, etc.; • Sensitization on environmental concerns, environmental impacts of urban infrastructure improvement projects.	Once during Pre-construction	NHDCL engineers / management team, officials responsible for implementing the Project, PMU staff, PIU staff, contractor/s.	Environmental Specialist Consultant
2. Project training on hazards, health, safety and environmental issues pertaining to the project (two-day workshop and site visits): • EMP mitigation and monitoring measures; • Roles and responsibilities; • Public relations, • Consultations; • Grievance redress; • Monitoring and corrective action planning; • Reporting and disclosure;	Once before and during construction	NHDCL engineers and management professionals, to be involved in on-site execution and operation of the proposed facilities, PMU staff, PIU staff, contractor/s	Environmental Specialist Consultant

Module	Frequency of Sessions	Target participants	Conducting Personnel
• 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.			
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

324. 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. Costs associated with activities that are borne by the PMU, PIAC 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 37: 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	person	50 X 2	25.00	2,500.00

	Activities or Items	Unit of Measure	No. of Units	Unit Cost ($)	Total ($)
	Contractor and records to be submitted to client).				
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 (Note: For air quality and noise monitoring, reports should be submitted along with the signature of witness/consultant on the conduct of sampling).**				
B.1	Monitoring of **Air Quality at downwind location**	Samples	4	250.00	1,000.00
B.2	Monitoring of **Noise Level at 4** locations. (At site, eastern at the existing NHDCL housing, and western and southern sides near commercial establishments)	Site	16 (4 locations x 4)	20.00	320.00
C.	**Enhancement Measures**				
C.1	Landscaping after the construction period	m^2	Cost included in Contractor's BOQ cost.		
D	**Compensatory Afforestation Activities**				
D.1	Compensatory tree plantation - Total loss of 5 nos. of trees (2:1 replacement ratio), including maintenance for 5 Years	Fruit trees	5 x 2 = 10	10.00	100.00
E.	**COVID-19 HEALTH AND SAFETY PLAN**				
E.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

	Activities or Items	Unit of Measure	No. of Units	Unit Cost ($)	Total ($)
E.2	Contactless attendance system. (This is biometric attendance system unit. Prices for contactless system are not available)	unit	1	110.00	110.00
E.3	Liquid Soap & Hand washing arrangement at site	L.S.			100.00
E.4	Contactless, sensor-based/ pedal operated sanitizer [Metal foot sanitizer dispenser]	unit	3	30.00	90.00
E.5	Additional rest areas at sites and dining spaces in camp site	L.S.	Cost included in Contractor's BOQ cost.		
E.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.			
E.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
E.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.			
E.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%)				**4,774.00**
	Total				**52,514.00**

XI. RECOMMENDATION AND CONCLUSION

325. 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.

326. The NHDCL will construct 8 residential buildings to provide 32 units/apartments within 2.48 acres of land within the Yangtse town boundary.

327. The subproject does not require land acquisition, resettlement or compensation as there are no affected people and the few vegetables that are current being grown will be harvested by the end of the growing season (July), before construction commences.

328. There is no impact on ecologically sensitive areas per definition of ADB SPS. The project design will take into consideration the required building design regulations and guidelines to ensure earthquake and windstorm resilience, select construction materials adapted to the local climatic conditions and will be in line with Bhutanese architectural designs.

329. All necessary approvals and permits required have been identified and will be processed. The land user certificate (LUC) has already been processed from the National Land Commission. See Appendix 3 for the copy of the LUC with the corresponding cadastral map.

330. Most 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.

331. Based on the findings of the IEE, most impacts identified are predictable, manageable and temporary. The overall conclusion of this process is that providing the mitigation and enhancement measures are implemented in total, there should be no significant adverse environmental impacts as a result of location, design, construction or operation of the subproject. Therefore, no further special study or detailed EIA needs to be undertaken to comply with ADB SPS requirements or national regulations.

332. As well, the subproject will result to beneficial impact in terms of major improvements in quality of life for the low-income support staff and their families who will be the beneficiaries of the subproject.

333. 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 (REA) 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?		✓	The site is located in TrashiYangtse Town, where the population is only 3,547. The population density is 12 persons per km^2 for the district.
▪ Heavy with development activities?		✓	Although the town is the district headquarter and therefore most of the offices are located in the town, there is not much development activities in TrashiYangtse town.
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		✓	The site is located about 900m away from ChortenKora and at about 324m (1.4km by road) from the Trashi Yangtse Dzong, which is uphill of the site.
• Protected Area		✓	The project is located within the municipality. The closest protected area is Bumdeling Wildlife Sanctuary (BWS), which southern border is about 7km from the project site.
• Wetland		✓	The site is 10km from the Ramsar wetland site at Bumdeling, which is the documented habitat of the Black Necked Cranes.
• Mangrove		✓	Trashi Yangtse is in the highlands. There are no coastal areas in Bhutan.
• Estuarine		✓	Trashi Yangtse is in the highlands. There are no coastal areas in Bhutan.
• Buffer zone of protected area		✓	The closest protected area is Bumdeling Wildlife Sanctuary (BWS), which southern border is about 300m from the project site.
• Special area for protecting biodiversity		✓	The closest protected area is Bumdeling Wildlife Sanctuary (BWS), which southern border is about 300m from the project site.

Screening Questions	Yes	No	Remarks
• Bay		✓	Trashi Yangtse is in the highlands. 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 8 residential buildings comprising of 32 units, with internal access road and parking,. 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 availability of 32 units will generate housing for approximately 160 (estimated at 5 people per family) residents. However, this does not necessarily mean that the local population will increase because the housing will be given to those living in private housing. It will however increase the intensity of water use or waste generation at the said location
▪ degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	Although community forests is found near the site, the project activities are not expected to degrade this community forest area.
▪ dislocation or involuntary resettlement of people?		✓	There are no structures at the site so there will be no dislocation of people.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable group?		✓	The land is being used by existing tenants of the housing complex as kitchen garden only.
▪ degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	The site is not adjacent to any cultural property and tourism site. The site was allocated by the District to NHDCL to be used for housing purposes to resolve the housing crunch.
▪ 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 residential purpose. There are existing NHDCL housing units adjacent the site. The site is being used as kitchen garden by some tenants in these housing units.
▪ water resource problems (e.g., depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?		✓	Water will be sourced from pre-existing community water source that has already been connected to the site and is being used in the existing NHDCL buildings adjacent the site. There is no surface water near the site. The closest river is about 198m away, and impacts during construction and operation phase is not expected.

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 are anticipated but these 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?		✓	The site is wide enough to accommodate all construction works, heavy equipments and raw materials. Excavation works are limited to foundation works within the site boundary, so it is not expected to cause any road blocks. The EMP of the project will provide measures to avoid or minimize temporary flooding, such as for example, avoiding or minimizing excavation works during monsoon season.
▪ noise and dust from construction activities?	✓		Yes, anticipated but will be temporary during construction phase and limited to the project site. Any construction work is expected to disturb the Black necked cranes during the winter season. The EMP of the project will provide measures to mitigate this impact.
▪ traffic disturbances due to construction material transport and wastes?	✓		Yes, because the access road for the housing complex is also the main access road through the town and going towards the Dzong and other district offices, school and villages. However these impacts will be temporary during construction phase only. The EMP of the project will provide measures to mitigate this impact.
▪ 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 mitigate this impact.
▪ hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	Not anticipated as the construction activities will be carried out within the site boundary that will be cordoned off

Screening Questions	Yes	No	Remarks
▪ water depletion and/or degradation?	✓		There will be an increase in demand for water use for construction activities as well as for domestic purposes, but this will be temporary during construction phase only. Once the project is in operation, there should be no issue with water supply as rainwater harvesting is included in the design and water storage tanks will also be installed There is no stream/river adjacent the site, so no surface water degradation is expected.
▪ overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		✓	Underground water will not be extracted at all. This is not a practice in Trashi Yangtse.
▪ contamination of surface and ground waters due to improper waste disposal?		✓	Not anticipated as waste collection and disposal is the responsibility of the municipality
▪ pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	This is not anticipated. The project 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 and sanitation will be provided by the contractor
▪ social conflicts if workers from other regions or countries are hired?		✓	Not anticipated as most workers will be Bhutanese as COVID 19 restrictions do not encourage large number of foreign workers.
▪ 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.
▪ 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: Trashi Yangtse)
Sector : Water and Other Urban Infrastructure and Services
Subsector : Urban Housing
Division/Department : SAUW

Screening Questions		Score	Remarks[75]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	0	*The site is not located close to any river, or steep or drought prone areas.*
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	
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)?	1	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	1	
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 lifetime?	0	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high-risk project.
Result of Initial Screening (Low, Medium, High): Medium

Other Comments:_____

Prepared by:
NHDCL

[75] 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.

Appendix 2: No Mitigation Measures Scenario 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 involve actions which will cause physical changes in the locality (topography, land use, changes in waterbodies, 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.
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 will not cause large change in environmental conditions. . Only 7 trees will be removed, and this will not have any effect to the ecology in the area. Trees are abundant in the area.
1.3	Creation of new land uses?	No		The area is already for residential use.
1.4	Pre-construction investigations e.g. boreholes, soil testing?	Yes	Noise, due to potential drilling.	Not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures.
1.5	Construction works?	Yes	Ambient air quality and noise level; due to impacts of construction works.	Not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures.
1.6	Demolition works?	No		There are no buildings or structures at the site
1.7	Temporary sites used for construction works or housing of construction workers?	No		There is ample land within the project site, and there is no need to acquire or rent private land for this purpose.
1.8	Above ground buildings, structures or earthworks	Yes	Ambient air quality, and noise level; due to	Not significant because the activity is temporary and

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)*
	including linear structures, cut and fill or excavations?		potential dust generation, and elevated noise level during construction works.	any impacts are short term and can be readily mitigated through standard measures. Further, 60% of the excavated soil will be reused for landscaping and filling works and cut and fill will be used for internal access road and parking.
1.9	Underground works including mining or tunnelling?	N/A		
1.10	Reclamation works?	N/A		
1.11	Dredging?	N/A		
1.12	Coastal structures eg 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 disposal of solid wastes	Not significant because the impact can be mitigated through efficient functioning of the facilities as per design. 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

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)*
				centralized municipal sewerage system in the future.
1.17	Facilities for long term housing of operational workers?	N/A (Not required)		
1.18	New road, rail or sea traffic during construction or operation?	No		The project site is already adjacent an existing main road.
1.19	New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No		The project site is already adjacent an existing main road.
1.20	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No		The construction phase of the project is not expected to cause any closure or diversion of routes on the adjacent road. The site is wide enough to accommodate all construction activities, equipment, etc. without disturbing the traffic flow on such adjacent roads.
1.21	New or diverted transmission lines or pipelines?	No		
1.22	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	N/A		
1.23	Stream crossings?	No		There is no stream crossing. The closest stream is about 198m away.
1.24	Abstraction or transfers of water from ground or surface waters?	No		The site is already connected to the local community water supply.
1.25	Changes in water bodies or the land surface affecting drainage or run-off?	No		The site is too far (198m) from the nearest stream. At this distance, the impact of the subproject on the surface water is not anticipated.
1.26	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Noise, due to potential elevated noise during delivery of	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)*
			construction materials at the site.	mitigated through standard measures.
1.27	Long term dismantling or decommissioning or restoration works?	N/A		
1.28	Ongoing activity during decommissioning which could have an impact on the environment?	N/A		
1.29	Influx of people to an area in either temporarily or permanently?	Yes	Noise and other community disturbance due to workforce at the site during construction phase.	Both foreign and national workers will be recruited by the contractor for the construction work temporarily (until the duration of the construction period). Not significant impact because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures
1.30	Introduction of alien species?	No		Landscaping will be carried out with local species
1.31	Loss of native species or genetic diversity?	No		Only 7 trees will be removed
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?	No		The subproject will be carried out on 2.48 acres of undeveloped land (a few patches being used for temporary backyard-type gardening). The land is considered as a residential lot.
2.2	Water?	Yes	Water supply availability, due to additional users.	Not significant because the water users for the housing facility are already existing users in Trashi Yangtse.
2.3	Minerals?	Yes	Land cover and stability, due to potential quarrying or mining activities relative to the production of raw	Not significant. Although minerals such as fuel and other earth-based resources (sand, stones, marble) will be required during construction, the amount will not be high to

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)*
			materials to be used for construction.	cause significant impact to natural resources.
2.4	Aggregates?	Yes	Land cover and stability, due to potential quarrying or mining activities relative to the production of raw materials to be used for construction.	Not significant. Will be required for construction purposes, but the amount will not be high to cause significant impact to natural resources.
2.5	Forests and timber?	Yes	Forest cover, due to potential cutting of trees.	Not significant. Timber will be required for making doors and windows and other woodworks , but the amount will not be high to cause significant impact to natural resources.
2.6	Energy including electricity and fuels?	Yes	Climate, due to potential additional power generation from fossil fuel.	Not significant. The increase in power demand brought about by the new housing facility is marginal/negligible as compared with the demand of the entire locality. Future occupants of the housing facility are already existing electricity users in Trashi Yangtse.
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, water supplies)?	Yes	Human health, groundwater quality; ambient air quality, including odor. Releases of these substances can potentially pollute the different environmental media.	Solvents, primers, adhesives, paint will be utilized. However, not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures.
3.2	Will the project result in changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)?	Yes	Human health, groundwater quality; ambient air quality, including odor. Sanitation quality at the site (including Contractor's camp) could affect the	Not significant because standard measures are available to mitigate the impacts.

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? *(See last page for Questions to Guide Assessing Significance of Impacts)*
			immediate environment wastewater releases, and hygiene due to solid waste generation. These are potential sources of disease vectors.	
3.3	Will the project affect the welfare of people e.g. by changing living conditions?	Yes	Better welfare of the housing beneficiaries, due to improved facilities.	Significant but on positive aspect. The project will significantly improve the living conditions of the new tenants/beneficiaries.
3.4	Are there especially vulnerable groups of people who could be affected by the project e.g. hospital patients, the elderly? (check this with the Social Safeguards Team)	No		There site is undeveloped with no residents
3.5	Any other causes?			
4. Will the Project produce solid wastes during construction or operation or decommissioning?				
4.1	Spoil, overburden or mine wastes?	Yes	Aesthetic, , Ambient air quality, due to potential indiscriminate handling or disposal of spoils that could pollute the environment.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts. Further, top soil will be stored aside for landscaping works. 60% of the excavated soil will be reused for filling works
4.2	Municipal waste (household and or commercial wastes)?	Yes	Aesthetic, Odor; due to potential dumping and mismanagement of solid wastes that could pollute the environment.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts. Also, general household and office waste- these will be segregated into organic, non-organic, recyclable and hazardous waste and disposed accordingly.
4.3	Hazardous or toxic wastes (including radioactive wastes)?	Yes	Surface water quality; Ambient air quality, including Odor; due to potential releases that	Pre-approved solvents, primers, adhesives, paint will be utilized and

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)*
			could pollute the environment.	disposed as per municipal requirements. Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
4.4	Other industrial process wastes?	N/A		
4.5	Surplus product?	N/A		
4.6	Sewage sludge or other sludge from effluent treatment?	Yes	Groundwater quality, odor due to potential release of untreated effluents the could pollute the environment.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
4.7	Construction or demolition wastes?	Yes	Aesthetics, community safety, due to potential unmanaged bulky construction wastes.	Construction waste will be disposed at a pre-approved site only. Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
4.8	Redundant machinery or equipment?	No		
4.9	Contaminated soils or other material?	No		
4.10	Agricultural wastes?	No		
4.11	Any other solid wastes?	No		
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	Ambient air quality, due to emissions from heavy equipment, service vehicles, generator sets, and other vehicles, such as those transporting materials at construction sites.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.2	Emissions from production processes?	N/A		
5.3	Emissions from materials handling including storage or transport?	Yes	Ambient air quality, due to emissions from stored materials at site, such as the	Not significant because the impacts are short term and localized. Standard

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)*
			dangerous volatile components of chemicals (e.g. paints, oil, fuel, etc.)	measures are available to mitigate the impacts.
5.4	Emissions from construction activities including plant and equipment?	Yes	Ambient air quality, due to emissions from heavy equipment, service vehicles, generator sets, and other vehicles, such as those transporting materials at construction sites.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.5	Dust or odours from handling of materials including construction materials, sewage and waste?	Yes	Ambient air quality, due to emissions from unmanaged liquid and solid wastes at construction sites.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.6	Emissions from incineration of waste?	N/A		
5.7	Emissions from burning of waste in open air (eg slash material, construction debris)?	No		
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 eg engines, ventilation plant, crushers?	Yes	Noise level, due to noisy operation of heavy equipment (including drills, concrete mixers, tile cutters, chain saw during tree cutting), excavation work, and other construction activities at the site.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
6.2	From industrial or similar processes?	N/A		
6.3	From construction or demolition?	Yes	Noise level, due to noisy operation of heavy equipment (including drills, concrete mixers, tile cutters, chain saw during tree cutting), excavation work, and	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? *(See last page for Questions to Guide Assessing Significance of Impacts)*
			other construction activities at the site.	
6.4	From blasting or piling?	N/A		
6.5	From construction or operational traffic?	Yes	Noise level, due to noisy operation of heavy equipment (including drills, concrete mixers, tile cutters, chain saw during tree cutting), excavation work, and other construction activities at the site. Additional noise can also be generated due to increase in vehicular movement for material drop off to the site.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
6.6	From lighting or cooling systems?	N/A		
6.7	From sources of electromagnetic radiation (consider effects on nearby sensitive equipment as well aspeople)?	N/A		
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	Soil/land contamination, due to potential unwanted release of fuels, solvents, primers, adhesives, paint.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
7.2	From discharge of sewage or other effluents (whether treated or untreated) to water or the land?	Yes	Soil/land contamination, due to potential unwanted release of untreated wastewater	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
7.3	By deposition of pollutants emitted to air, onto the land or into water?	Yes.	Soil/land quality due to deposition of emissions from heavy equipment and other machines used during construction activities.	Not significant. The deposition, if any, is very negligible to affect the quality of land/soil in the area.
7.4	From any other sources?	No		

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)*
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	Humans/people, due to potential release of these substances that could affect the workers at site and nearby human receptors (residential areas, institutions)	Not significant because the impacts are short term and localized. Standard community and occupational health and safety measures are available to mitigate the impacts.
8.2	From events beyond the limits of normal environmental protection e.g. failure of pollution control systems?	N/A		
8.3	From any other causes?	No		
8.4	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslip, etc)?	Yes	Humans/people, due to risk of natural disasters that could lead to injuries or death.	Not significant because there are designs available that could mitigate the impacts.
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?	Yes	Humans/people, due to change in lifestyles of future occupants of the housing facility.	Positively significant during operation phase due to improved living conditions. Not significant in terms of demography. The housing complex will cater to government staff, corporate employees and industrial workers who are currently either renting in private houses, living with relatives or living in temporary structures. These however are already living in TrashiYangtse town so there will be no change in population age, structure or social groups.
9.2	By resettlement of people or demolition of homes or	No		

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)*
	communities or community facilities e.g. schools, hospitals, social facilities?			
9.3	Through in-migration of new residents or creation of new communities?	Yes	Humans/people, due to new communities that will be created at the location of housing facility resulting to new dynamics within the community.	Not significant. A new community will be created at the site. However, no in-migration is expected since residents of the 32 units will be the residents of Trashi Yangtse, who will move out of their existing apartments in various parts of the town.
9.4	By placing increased demands on local facilities or services eg housing, education, health?	Yes	Humans/people, due to increased demand for these services in the locality resulting to stress on availability to accommodate such demand.	With all 32 new families all living within the core town area, the demand for municipal services such as waste disposal will increase at the site. The demand for health and education facilities may not change significantly because there will be no in migration of families- just adjustments in housing within the town
9.5	By creating jobs during construction or operation or causing the loss of jobs with effects on unemployment and the economy?	Yes	Humans/people, due to creation of employment opportunities.	Positive significant impact. The project will generate employment for foreign workers and nationals during construction phase.
9.6	Any other causes?			
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?	No		The site already has access and is adjacent to the main access road. Consequential development will only be permitted as long as it is within the local plan. There is available vacant land next to the site. However, any development requires the approval of the municipality.
10.2	Will the project lead to development of supporting facilities, ancillary	No		

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)*
	development or development stimulated by the project which could have impact on the environment e.g. supporting infrastructure (roads, power supply, waste or wastewater treatment, etc) housing development extractive industries supply industries other?			
10.3	Will the project lead to after-use of the site which could have an impact on the environment?	No		Government regulations require that all camps have to 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	Humans/people, due to potential future developments that could improve the living conditions of more citizens.	Positively significant. If carried out well, NHDCL housing could be an example for future housing projects in the country.
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.
  ○ Wetlands,
  ○ Watercourses or other waterbodies,
  ○ the coastal zone,
  ○ mountains,
	Although the southern boundary of the Bumdeling Wildlife Sanctuary is about 300m away from the site, the site is located in the heart of TrashiYangtse town.
	
	The site is separated from the Sanctuary by settlement (shops, roads, houses) and all construction impacts (apart from noise) will occur within the site boundaries.
	
	The Black-necked cranes visit Bumdeling each year from end of November- Mid March. Towards the northeast, about 300m from the site, the Black necked cranes use the privately owned wetlands

Question	Remarks
○ 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?	(paddy fields) as feeding ground. They feed here during the day and return to their roosting habitat in Bumdeling). Between the foraging ground and the proposed housing site, there are several residential houses and buildings, but the birds could be disturbed by the construction noise especially if rock breakers or other noisy equipment is used during the winter months. Mitigation measures to reduce disturbance during this period will be included in the EMP
Is the Project in a location where it is likely to be highly visible to many people?	Yes, it is along the main access road through TrashiYangtse town and highly visible to all travellers
Is the Project located in a previously undeveloped area where there will be loss of greenfield land?	The land is undeveloped but was specifically allocated for housing years ago
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?	No
Are there any areas on or around thelocation which are occupied by sensitive land uses which could be affected by the Project? • hospitals, • schools, • places of worship, • community facilities	No. The closest religious and historic site is the Chortenkora which is 900m away. The Lower Secondary School is located 200m from the site, separated by shops, roads and houses. The hospital is located on the hill across town 2km away.
Are there any areas on or around the location which contain important, high	No

Question	Remarks
quality or scarce resources which could be affected by the 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 site hazard risk is high for earthquakes and windstorms. Mitigation measures for these are included in project design (seismic considerations for building design and choice of construction materials). Also, the buildings are only 2 storeys high
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 quality 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	Material transportation (especially dust and excavated soil) and excavation work will impact local air quality and increase dust levels. These effects will be temporary and restricted to the construction site and its immediate surrounding (which is bounded on two sides by access road, forest and bare land).
Is the Project likely to affect the availability or scarcity of any resources either locally or globally? • fossil fuels	The project will increase the local demand for water for drinking, washing and construction and other associated activities. Water will be provided from

Question	Remarks
• water • minerals and aggregates • timber • other non-renewable resources • infrastructure capacity in the locality - water, sewerage, power generation and transmission, telecommunications • waste disposal roads, rail	municipal source. Construction materials (minerals, aggregates and timber) which will be sourced from local suppliers At the local level, the project will increase the demand for water, minerals, aggregates, timber and waste disposal services in TrashiYangtse town.
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?	The project is expected to greatly improving the existing housing crunch in TrashiYangtse especially for government employees, corporate staff and industrial workers It will also generate local employment for skilled an unskilled workers and also contribute to the local economy.

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, 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: Land User Certificate and Cadastral Map

Appendix 4: Results of IBAT Screening (Page 1)

IBAT –page 2

IBAT page 3

Appendix 5: 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.[76] 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[77].

C. Common Symptoms of Corona Virus Disease[78]

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.

[76] Gross National Happiness Commission. 2019. Twelfth Five-Year plan. 2018-2023. Thimphu.
[77] World Health Organization. https://www.who.int/health-topics/coronavirus#tab=tab_1
[78] 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 6: Copies of Minutes of Consultation Meetings

Current Housing residents and those waiting for allotment in NHDC Housing
06/04/2021

Introduction and Objectives of the meeting

The NHDC Focal point of TrashiyangtseDzongkhag welcomed all to the meeting and encouraged the participants to share their views and opinions and experiences with the Team. The NHDC Head Office Representative welcomed all to the meeting as well and explained the main purpose of the meeting which is to understand their current experiences living at the NHDC housing and based on that their suggestions for future housing design. He also explained the site where the housing is being established and the type of housing mainly that a minimum of two bedrooms will be provided as well as two toilets and a sitting room and a kitchen as well as a verandah. He also explained that the rental will be in the range of Nu. 4000/month for about 600 square feet of space in the new housing complex once developed.

Experience of tenants living in private housing

Responding to queries on experience of three out of eleven participants living in private housing some of the people working in corporations mentioned in private housing the services are good but that most don't have a tenancy agreement. Also, they pay around Nu. 7000 – 8000 per month whereas those who work in BPC and have housing through BPC pay around Nu. 3000/month for a two-bedroom house. While the rent in the NHDC Colony is almost less by half. When KHEL was established, their staff paid higher rents to private landowners and therefore rental prices increased and it became more difficult for lower level government staff to afford even private housing. Also, in the private housing no agreement is signed with the landlord and therefore tenure is insecure. Besides, the rent in private housing is raised even after one year and not after two years so tenants are at the mercy of landlords. On the other hand, NHDC housing tenants enjoy a lot of freedom.

Experience of tenants living in NHDC housing

On inquiries with those living in NHDC housing, the tenants pointed out to several issues they face. They mentioned that drainages are not covered plus chimney blocked, pipes in toilet too are blocked, windows are broken down, ceilings are made of plyboard, electrical fixtures pose a risk, water leaks through the walls in toilets, safety tanks getting blocked and overflow causing odor to surroundings. Therefore, it is urgent that NHDC quarters require renovation. They also suggest that if old quarters can be repaired while the current occupants shifted to new quarters after completion then they can shift back.

The NHDC Head Office Representative confirmed that 70% of the allocations will be done from among government staff and 30% from corporate and industrial workers. He also indicated that since there were no NHDC staff in Trashiyangtse, the maintenance work will be outsourced to private contractors who can take up the maintenance of one or two blocks at a time and indicated that the houses must be vacated during maintenance so that there is no hindrance and that the work can be completed within a maximum of two months and that NHDC will review the best maintenance strategy. The NHDC Head Office Representative acknowledged that because the houses were constructed in 2007, and with an elapse of more than a decade, maintenance has

become necessary. He committed that NHDC management would expedite the maintenance work since for some tenants damages have become extreme and therefore almost an emergency needing immediate intervention.

Payment of rental charges

On the inquiry on the mode of payment of rent, the tenants mentioned that the rent is deducted from the salary by Accounts personnel before salary is paid. Tenants felt that this is better as sometimes tenants may not pay rent if they have other urgent expenses to incur. Some even shared the experience of people who live in private houses who have a backlog of unpaid rentals when they are about to vacate the private housing. On an inquiry about rental revision, the NHDC Head Office Representative clarified that the revision will be done on square feet rate so if the rate is raised people will have to pay the new rate.

Demand for NHDC housing

Also, on trying to assess demand for NHDC housing in Trashyangtse, the focal point shared that there are six people on waiting list. The NHDC Head Office Representative clarified that this low number of applications is because the chances of housing getting vacant is less since people can occupy for a term of ten years and many do not get transferred often. Moreover, 2014 has been kept as the baseline year from which tenancy has been offered for 10 years. On inquiry the people waiting for housing also mentioned that Nu. 4000 per month is affordable, still cheaper than private housing and of better quality. The NHDC Head Office Representative further informed that only 7-8% of total civil servants currently provided housing (2100 units of housing). He also informed that applications for housing are now online and is now transparent and done to ward off criticism of unfair allocation of housing. To the question of who is eligible for housing if both husband and wife are both eligible, it was clarified that mostly women are allocated mostly because they fulfill the criteria of being in lower grades whereas husbands are in much higher posts and ineligible for that class of quarters.

Suggestions for design of new NHDC housing

On inquiry about any suggestions on new housing based on their experience of living in current housing, current tenants mentioned that concrete verandah are required, also need two toilets as current one has only one toilet. Further, they mentioned that cement flooring is better for better sound and dust proofing. There were also requests for street lighting as an important facility for the housing colony as well as the need to use new products in terms of electrical fittings for easier availability during maintenance. Others mentioned the problem with chimneys in NHDC housing and the alternative of using electric heating instead of wood was also raised. Improvement of the blacktopping (re-surfacing) of present parking was also requested. On the request for geysers, the NHDC Head Office Representative mentioned that if geysers are provided the cost of rental will increase and therefore it has to be kept affordable.

Water supply and storage to the housing colony

Tenants also recommended for a different water tank as there are many sources and there is no dearth of water. The NHDC Head Office Representative mentioned that the mandate of the Thromdes is to supply treated water, so Thromde has to maximize efforts and resources for this. However, all agreed that dedicated storage tank is an option that can be installed to supply water

during emergency shortages when water from the current source is disrupted. They also informed that unsegregated garbage is collected twice a week mainly on Wednesday and Sundays.

The Environmental Specialist also asked to verify reports of water problems. The focal point clarified that the problem is with infrastructure but foresee that this will be solved as the Dzongkhag has proposed Nu. 100 million for rehabilitating the entire water system for the whole town. The Environmental Specialist reiterated that installing water tanks for the housing units for storage is a good measure for backup water storage during shortages. This will also place less pressure on Thromde. Private owners might complain when asked between issues of LHC and ADB resources.

NHDC Housing Management

On the present management structure for the housing as well as maintenance, the tenants mentioned that the NHDC focal point, who also lives in the NHDC colony, is the contact person for all NHDC tenants for any matters concerning housing, tenants, and maintenance.

PARTICIPANT LIST

Appendix 7: SAMPLE GRIEVANCE REGISTRATION FORM

(To be available in the local language)

The _____Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date		***Place of registration***			
Contact Information/Personal Details					
Name		**Gender**	• **Male** • **Female**	**Age**	
Home Address					
Village / Town					
District					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official registering grievance)	
Mode of communication: • **Note/Letter** • **E-mail** • **Verbal/Telephonic**	
Reviewed by: (Names/Positions of Official(s) reviewing grievance)	
Action Taken:	
Whether Action Taken Disclosed:	• **Yes** • **No**
Means of Disclosure:	

Appendix 8: SUGGESTED TEMPLATE FOR RECORD-KEEPING OF GRIEVANCES

S. No.	Date of receipt of grievance	Name and contact details of complainant	Description of complaint	Nature of complaint	Decisions taken	Response given to complainant and date	Whether closed/ resolved

Appendix 9: COVID-19 Standard Operating Protocol (SOP) and plan


HIGH RISK COMMUNITIES AND TOWNS

Appendix 10: Sample Environmental Site Inspection Checklist for Contractors
DAILY MONITORING SHEET FOR CONTRACTORS

GREEN AND RESILIENT AFFORDABLE HOUSING SECTOR PROJECT
Contractor Monitoring Sheet

Name of Subproject: _____
Location of Subproject: _____
Chainage covered (for linear works): _____
Supervising PIU: _____
Contractor: _____
Contractor EHS Supervisor (or equivalent): _____
Date of monitoring: _____

Summary of Findings

Monitoring Item	Status	Remarks
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 11: Sample Environmental Site Inspection Checklist for PMU/PIU

INSPECTION CHECKLIST FOR PMU AND PIUs

GREEN AND RESILIENT AFFORDABLE HOUSING SECTOR PROJECT
SITE INSPECTION CHECKLIST

Subproject: _____ Date: _____
Location: _____
Chainage (for linear works): _____

Monitoring/Inspection Questions		Findings			Comments / Clarifications
1.	Supervision and Management Onsite	Yes	No	NA	
	a. Is an EHS supervisor available?				
	b. Is a copy of the SEMP available?				
	c. Are daily toolbox talks conducted on site?				
2.	The Facilities	Yes	No	NA	
	a. Are there a medical and first aid kits on site?				
	b. Are emergency contact details available on-site?				
	c. Are there PPEs available? What are they?				
	d. Are the PPEs in good condition?				
	e. Are there firefighting equipment on site?				
	f. Are there separate sanitary facilities for male and female workers?				
	g. Is drinking water supply available for workers?				
	h. Is there a rest area for workers?				
	i. Are storage areas for chemicals available and with protection? in safe locations?				
3.	Occupational Health and Safety	Yes	No	NA	
	a. Are the PPEs being used by workers?				
	b. Are excavation trenches provided with shores or protection from landslide?				
	c. Is breaktime for workers provided?				
	d. How many for each type of collection vehicle is in current use?				
4.	Community Safety	Yes	No	NA	
	a) Are excavation areas provided with barricades around them?				
	b) Are safety signages posted around the sites?				
	c) Are temporary and safe walkways for pedestrians available near work sites?				
	d) Is there a record of treated wastewater quality testing/measurement?				
5.	Solid Waste Management	Yes	No	NA	
	a. Are excavated materials placed sufficiently away from water courses?				
	b. Is solid waste segregation and management in place?				
	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 12: Semi-annual Environmental Monitoring Template

I. INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number	Roles
1. PMU				
2. PIUs				
3. Consultants				

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components/List of Works	Contract Status (specify if under bidding or contract awarded)	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M)[79]	If On-going Construction	
				%Physical Progress	Expected Completion Date

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

II. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS[80]

Package No.	Subproject Name	Statutory Environmental Requirements[81]	Status of Compliance[82]	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish[83]

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)		

[80] 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.

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

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

[83] *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)[84]

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						

[84] 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**

Appendix 13. District Cleanliness Notification

Strategy for unlocking during COVID 19 Pandemic lockdown