Initial Environmental Examination

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Bhutan: Green and Resilient Affordable Housing Sector Project – Toed, Samdrup Jongkhar

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CURRENCY EQUIVALENTS

(as of 6 November 2022)

Currency unit	–	Bhutanese Ngultrum (Nu.)
Nu.1.00	=	$ 0.0134
$1.00	=	Nu 81.65

ABBREVIATIONS

ADB	-	Asian Development Bank
AIDS	-	acquired immunodeficiency syndrome
BBR	-	Bhutan Building Regulation
BOQ	-	Bill of Quantities
BPC	-	Bhutan Power Corporation
CA	-	Competent Authority
COVID-19	-	coronavirus disease
DCR	-	Development Control Regulation
DDMC	-	Dzongkhag Disaster Management Committee
DEC	-	District Environment Committee
DOFPS	-	Department of Forest and Park Services
DYT	-	Dzongkhag Yargay Tshogdu
EA	-	executing agency
EC	-	environmental clearance
EIA	-	environmental impact assessment
EMP	-	environmental management plan
FNCA	-	Forest and Nature Conservation Act
FNCR	-	Forest and Nature Conservation Rules
FYP	-	Five-year Plan
GBV	-	gender-based violence
GRC	-	Grievance Redress Committee
GRM	-	grievance redress mechanism
HEMC	-	Health Emergency Management Committee
HIV	-	human immunodeficiency virus
IEE	-	initial environmental examination
MOAF	-	Ministry of Agriculture and Forest
MOF	-	Ministry of Finance
MOLHR	-	Ministry of Labor and Human Resources
MOWHS	-	Ministry of Works and Human Settlement
NC19TF	-	National COVID-19 Task Force
NDMA	-	National Disaster Management Authority
NEC	-	National Environment Commission
NECS	-	National Environment Commission Secretariat
NEPA	-	National Environment Protection Act
NGO	-	non-government 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 Center
NRDCL	-	Natural Resources Development Corporation Limited

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

WEIGHTS AND MEASURES

km	-	kilometer
m	-	meter
km^2	-	square kilometer
m^2	-	square meter

NOTE

In this report, "$" refers to the 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 incorporating 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 collaboration between RGOB, municipalities, private land developers, and corporations is a key to development of a comprehensive and sustainable housing program.

Subproject Scope. This initial environmental examination (IEE) report has been prepared for the Toed Subproject, which is one of the 9 subprojects to be financed under the project. This subproject involves construction of 11 four-storey (G+3) residential buildings comprising 88 units, with a service center, internal access road and parking. Expectedly, 88 families will benefit from this subproject, and this translates to an estimated 440 beneficiary citizens (i.e., approximately 5 members per family). This housing complex will be constructed within a 2-acre residential plot located in the center of Samdrup Jongkhar town.

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 site falls within the built-up area within the Urban Periphery Enclave (UPE) where there are residential, commercial and institutional establishments. It is located next to the new alternative national highway which connects directly to Charkilo Police Checkpost, allowing 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 — pre-construction, construction, and operation of the built infrastructure. Evaluation of the likely degree of impacts has been done on each identified potential impact. 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 there is one Biological Corridor and one key biodiversity area (KBA) within 1 km from the subproject site, and that 38 IUCN Red List species of concern are identified within the default area of analysis. While these two sensitive areas are 1 km away, the implementation of the subproject will not affect these sites considering the nature and impacts of the subproject (housing development only) to be site-specific only. The IUCN Red List species of concern were assessed to determine the likelihood of them being found at the subproject site. Since the subproject site is already within the town proper, the likelihood of these species being found at the site is very low. Nevertheless, the assessment included necessary written confirmation from the Department of Forest, which confirmed that none of these species are found or sighted at the subproject site. Accordingly, these species are found or dwell in the dense forests far from the site.

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

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

The Contractor will be required to (i) obtain all 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 preventive 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.

[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.

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 the 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 a photocopy from the office of the PMU.

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

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

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

This IEE has been updated based on the revised designs of the subproject. If the design is revised or modified, the PMU shall update this IEE based on the final detailed design and submit to ADB for review, clearance and disclosure.

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

The approved updated IEE shall be treated as the final IEE and shall be attached in the bid and contract documents. No work can commence until (i) the final IEE cleared 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 the 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 a higher number of urban poor who struggle to secure adequate housing at reasonable costs. An estimated 10% of Thimphu city's population lives in informal settlements. About a quarter of households (41,039) lack access to improved sanitation and waste management is a concern as it does not reach every corner of the city. Most of the urban contract workers (cleaners, waste collectors, and semi-skilled workers) reside in informal squatter settlements in towns as they are unable to afford decent housing elsewhere.[3]

2. Affordable housing is provided by the National Housing Development Corporation, an agency that was delinked from the Ministry of Works and Human Settlements (MOWHS). As 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 Green and Resilient Affordable Housing Sector Project (GRAHSP) will deliver affordable housing in selected settlements in Bhutan. Improved livability, safety, and sustainability of human settlements through access to adequate affordable housing 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 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 overcrowding in the existing housing (to share costs) and overload infrastructure services, finding accommodation in substandard housing in poorly located and under-served areas (informal

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[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) (footnote 10).[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 (footnote 10). 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 (footnote 1). 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 will be aligned with the following developmental impact: livability, safety, and sustainability of human settlements ensured. The project will have the following outcome: housing affordability for low-income individuals in designated communities improved. The outputs are:

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[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.

8. **Output 1**. Climate- and disaster-resilient, and affordable housing units and public facilities for low-income individuals.[14] This project component will leverage NHDCL's access to developable, serviced land to build an estimated 1,026 – 1,062 units for rent (with the opportunity for home ownership) and six integrated community service centers, serviced with roads, electricity, municipal water and sewerage connections in support of the SDG 1[15] This output promotes mixed-use development and includes components under the Asian Development Fund (ADF) Thematic Pool grant to provide decent accommodation for families of urban workers, integrated service centers,[16] and livelihood support for women within the neighborhood unit. It is expected that the increase in supply of affordable houses will provide immediate relief for the rental shortage and pave the way to close the housing gap. The mid-rise multi-unit buildings will incorporate gender-inclusive features and innovations in universal design, construction methodology, and O&M including the application of resilient and smart technology to improve energy and resource-efficiency and greater use of locally available materials to boost local economic development. Climate- and disaster-resilient design features will be identified through a site risk assessment and take a multi-hazard approach while striving for sustainability through design. Bhutan cultural values and traditional architecture, aimed at improved public amenity, and green features will be reflected in the project.[17] Additionally, the site plans for each area will be designed following urban planning guidelines to incorporate green space, social amenities, and public space to promote social mix and avoid segregation. The sub projects will be integrated with the surrounding community to the greatest extent possible given the constraints.[18]

9. **Output 2**. Institutional capacities, policy, and regulatory framework of the housing sector strengthened. This project component will (i) strengthen the NHDCL's housing management and construction capacity by assessing its current policies and procedures, and develop targeted housing for low-income groups, particularly women and youth, and revamp the rent-to-own scheme;[19] (ii) develop climate- and disaster-resilient designs and related technologies, as a means to also improve safety, resource-efficiency (leading to lower price to income); (iii) review and update the building code and regulations; (iv) conduct awareness trainings and a capacity building program for key project stakeholders on (a) climate- and disaster-resilient designs; and (b) the building code, to effectively implement the designs for enhanced seismic resilience; (v) enhance NHDCL operating business model and pilot a public-private partnership (PPP) focused on O&M and delivery of housing units;[20] (vi) develop sector-wide housing management information system; (vii) create a medium- to long-term road map to identify further interventions in the sector; and (viii) provide project implementation support services, including design and

[14] Resilient housing is housing design that has incorporated climate change and disaster risk reduction measures to avoid, minimize and or recover from the effects of a hazard event in a timely and efficient manner.

[15] Priority investment sites include Phuentsholing, Thimphu, Nganglam (Pema Gatshel), Samtse, Samdrup Jongkhar, and Trashi Yangtse, however these locations are subject to further analysis. The project beneficiaries comprise 70% low-income civil servants and 30% low-income non civil servants (including urban workers residing in informal settlements) that fall in the bottom first and second income distribution quintiles.

[16] The centers will be established within the housing sites and provided with crèches, health services, counseling, legal assistance, court representation, police protection, temporary shelter, livelihood and skills development, and community reintegration, and operated with the support of National Commission for Women and Children.

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

[18] NHDCL has experienced full time engineers, architects, and design staff.

[19] NHDCL will give preference to women-headed households in the rating criteria to provide rental subsidies, and may explore explicitly recording dual (both spouses) names on rental lease or home purchase agreements, if warranted.

[20] There are significant barriers to creating a PPP with full risk-sharing for housing development in Bhutan, not least of which is the limited development finance available to private sector developers. NHDCL has previous experience with private sector entities to implement construction projects. A partnership for O&M would be of value to NHDCL.

supervision, and set up a safeguards unit. This output is critical to ensure that all assets developed under the project are efficiently and sustainably managed.

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

Table 1: Proposed Subprojects

	Location	District	Area (Acres)	Typology	Housing blocks	No. of Units	Service Centers
1	Tading	Samtse	9.00	G+2	37/34	444/408	
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	2.45	G+1	9	32	Yes
8	Semtokha	Thimphu	1.93	G+4	8	110	Yes
9	Trashiyangtse	Trashiyangtse	2.48	G+1	8	32	
			25.49		103/100	1,062/1,026	

C. Purpose of the IEE

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

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

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

D. Methodology

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

(i) Review of project-related documents and literature relevant to the project;
(ii) Site visits to the subproject site to review the existing environmental conditions and develop baseline information for the subproject area;
(iii) Consultation with NHDCL to discuss subproject components, benefits, and impacts;
(iv) Analysis of typical environmental impacts of subproject components and identification of suitable mitigation 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 as follows:

(i) Executive Summary. This chapter provides an overview and summary of the outcome of the IEE;
(ii) Chapter 1. Introduction, which includes the Background, Outcome and Outputs of the Project, Purpose of the IEE, Methodology and Structure of the Report;
(iii) Chapter 2. Policy Legal and Administrative Framework, which includes ADB Safeguard Policy statement, Environment Legislation Framework, National Environmental Act and Legislation, Legislation relating to Occupational Health and Safety, Relevant International Conventions and Treaties, Gaps in Legal and Guiding Instruments, Permits and Clearances and Applicable Environmental Standards;
(iv) Chapter 3. Description of the Subproject, which focuses primarily on subproject location and area, subproject rationale, subproject alternatives, subproject development plan and subproject components, subproject phase, and schedule and resource utilization;
(v) Chapter 4. Description of the Environment, which includes a description of the baseline information, subproject influence area, land environment, water environment, air environment, noise environment, ecological environment, socio-economic environment, and physical and cultural resources;
(vi) Chapter 5. Anticipated Environmental Impact and Mitigation Measures, which includes introduction, impact assessment, anticipated impacts and mitigation measures during pre-construction, construction and operation phases, cumulative impacts and mitigation, environmental benefits and enhancement measures, and a summary of impacts and mitigation;

(vii) Chapter 6. Analysis of Alternatives, which discusses how the alternatives were assessed in terms of site location, design and technology, environmental implications of alternatives, including implication of No-Project alternative
(viii) Chapter 7. Information, Disclosure, Consultation and Participation, which details the process and the approach and methodology for preliminary consultations, and discusses future consultations during detailed design stage and information disclosure;
(ix) Chapter 8. Grievance Redress Mechanism for the project;
(x) Chapter 9. Environmental Management Plan, which includes the institutional arrangement, roles and responsibilities of stakeholders including contractors and environmental performance criteria;
(xi) Chapter 10. Monitoring and Reporting, which includes capacity building, cost and other reporting obligations;
(xii) Chapter 11. Conclusion, which provides overall analysis, conclusion and recommendations 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.[21] 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.

[21] ADB. 2009. *Safeguard Policy Statement*. Manila.

(iv) **Category FI**. The project involves the investment of ADB funds to or through a financial intermediary.

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

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

20. The 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.

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 advertisements in the local and national newspapers well before the consultations giving brief project description, location, and specific contact data (including telephone numbers).

In the meetings, presentations will be provided about the subproject's potential environmental and social impacts. Consultation sessions must have attendance sheets prepared and included as part of the documentation. See Table 2 below for the template.

Table 2: Template of Attendance Sheet for Consultation Meetings

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

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

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

26. Subject to approval by NHDCL and clearance by ADB, PMU will disclose the following documents on the project website, and endorse these same documents to ADB for disclosure on the 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 a photocopy from these offices. Electronic versions 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 practicality, 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 Legislations

Table 3: Summary of National Environmental Assessment Act and Related 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	The 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			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
	project level. It defines specific activities of projects where competent authorities can issue an environmental clearance (EC) and those requiring NEC evaluation and approval of EC.					
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,	Sets minimum standards for i) ambient water			The subproject is expected to emit pollutants during		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
and Drinking Water Quality Standards 2016	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.			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 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	Waste disposal permit	Thromde	The subproject is a potential generator of solid wastes during construction and	Design Phase / Pre-construction Phase / Construction Phase / Operation	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	segregation, reuse, and recycling, storage, transportation, environmentally-sound treatment and disposal of waste, and monitoring procedures and coordination at every organizational level			operation phases. The subproject will comply with this Act and ensure waste segregation, collection, storage and disposal as per Thromde requirements.	Phase	
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 equitable, and	No specific permit required, but any development project needs to comply with the provisions of this Act and	National Environment Commission	The subproject is expected to generate wastewater that could potentially impact the environment during	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
	environmentally sustainable manner.	regulation.		construction and operation phases. PMU will ensure compliance with the requirements of this Act.		
Water Regulation of Bhutan 2014	Promulgated to enforce the objectives and purposes of the Water Act 2011, effectively implement and enforce the Water Act by the Competent Authorities; and identify roles and responsibilities of designated Competent Authorities and other relevant organizations.					
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 defines activities that are prohibited in forested areas,	Tree felling permit, if applicable to the site.	Forest Range Office	The subproject will not impact any protected areas, critical habitats or endangered species. However, the	Design Phase / Pre-construction Phase	PMU, PIU, Contractor

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	outlines procedures for sourcing sand and gravel, peat, stone, and surface soil from forested areas.			subproject is expected to cut 8 trees at the site, which requires permission from the Forest Department.		
Forest and Nature Conservation Act 1995	Allows community stewardship of forests and aims to provide protection and sustainable use of forests, wildlife, and related natural resources. Describes activities that require special permits from the Department of Forests and Park Services as well as other activities such as forest clearing and cutting of trees, hunting and polluting which are not allowed in Government			The subproject will not impact any protected areas, critical habitats or endangered species. However, the subproject is expected to cut 8 trees at the site, which requires permission from the Forest Department.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	Reserved Forests. All wild animals whether enlisted under Schedule I (totally protected species) or not, cannot be killed, injured, captured or collected unless under special conditions of self-protection and other genuine reasons.					
Biodiversity Act 2003	Sets forth national sovereignty over genetic resources; ensures conservation 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,	No specific permit required, but any development project needs to comply with the provisions of this Act.	National Environment Commission	Subproject is not located in ecologically sensitive areas. However, the subproject will need to continuously monitor the implementation of the subproject to ensure no protected species (especially the wandering or migratory kinds), if ever found at	Design Phase / Pre-construction Phase	PMU

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	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.			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 ensure the right	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 will be complied by the subproject.	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
	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					

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	forms of discrimination and exploitation against women including trafficking, prostitution, abuse, violence, harassment and intimidation at work in both public and private spheres. • Article 9 (18) takes appropriate measures to ensure that children are protected against all forms of discrimination and exploitation including trafficking, prostitution, abuse, violence, degrading treatment and					

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

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
2009)	and health for employees, as well as other persons at the construction sites, from work related risks to their health, safety, and wellbeing. It also prescribes the roles and responsibilities of the workers and employers in ensuring health and safety at the site.	regulation.		healthy working conditions during construction. Workers will be provided with safety and protection equipment, where needed. PMU will monitor compliance of the Contractor(s).		
Road Safety and Transport Act 1999	Provides for safe and efficient use of road systems and to ensure an efficient and a safe public transport system. Describes the duties of the drivers related to traffic safety signs and safety procedures to prevent and minimize transport accidents.	No specific permit required, but any development project needs to comply with the provisions of this Act.	Road Safety and Transport Authority	The subproject site is adjacent to main roads. Contractor(s) will be required to comply with the relevant provisions of this Act to prevent accidents in the construction sites. PMU will monitor compliance.	Construction Phase	Contractor / Transporter

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
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.	Thromde	The subproject is a housing project requiring designs to ensure disaster resiliency. Provisions for disaster resilience will be included in the infrastructure designs.	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL
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	Building construction approval / permit	Thromde	The subproject involves building construction. The subproject will need to strictly comply with this set of rules and will be adhered to during the design phase.	Design Phase / Pre-construction Phase	PMU

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	others the following: (i) prescribe standards for the construction and demolition of buildings, (ii) prescribe requirements for the design and siting of single dwellings and associated buildings, (iii) prescribe standards and matters relating to the maintenance of fire safety and safety measures, (iv) provide for matters relating to the accreditation of building products, construction methods, designs, components and systems connected with building work, and (v) prescribe qualifications and provide for other matters relating to					

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

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	introduce 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 for the present and future			subproject may use this set of guidelines as reference during the design phase.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	generations.					
Bhutanese Architecture Guidelines 2014	The Guidelines were 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 the design phase.		

C. COVID-19 Pandemic Measures and Protocols

36. The first patient tested positive for COVID 19 was in March 2020. 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 surveillance, quarantine and testing based on scientific evidence. The Ministry of Health (MOH) also has a Media and Risk Communication team responsible for communication and information dissemination to the general public.[22] Measures that 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) COVID 19 Infection Control and Prevention Containment Protocol for import and export of good, Protocols for testing, lockdown, movement with pass, containment of outbreak, containment, decontamination and disinfection, management of dead bodies; [23]
(v) 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;
(vi) Temporary closure of schools and introduction of online classes;
(vii) Compulsory pre-registration online for all inter-district travel on the Check Post Management System, and quarantine for travelers; and
(viii) Three vaccinations of all eligible persons so far (with some already undertaking the fourth vaccination)

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

[22] 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

[23] MOH, 2020a. SOP for decontamination and disinfection of COVID-19 contaminated area. March 2020; MOH, 2020b. SOP for Safe and Dignified Management of Dead body of Suspected or Confirmed COVID-19, March 2020; MOH, 2020c. Containment of COVID-19 outbreak in Cluster Surveillance2nd-Sept-2020; MOH, 2020d. Additional Measures to prevent and contain local transmission in high-risk areas. May 2020; MOH, 2020e. Strategy for Engaging High-Risk Communities for COVID Prevention & Control, April 2020; MOH, 2020f.National COVID 19 Testing Protocols, December 2020.

D. Relevant International Conventions and Treaties

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

Table 4: International Environmental Agreements

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

	International Environmental Agreement	Ratified	Relevance	Remarks
6	Basel Convention on the Control of Tran boundary Movements of Hazardous Wastes and their Disposal	26 August 2002 (accession)	Management hazardous waste in an environmentally sound manner and to follow a system for trans boundary waste movement	The IEE process takes into consideration compliance with this agreement, ensuring that the subproject follows NEC requirements, including management of hazardous wastes.
7	Montreal Protocol on Substances that Deplete the Ozone Layer	April 2004	Protection of the Earth's ozone layer by phasing out the chemicals that deplete it	The IEE process takes into consideration compliance with this agreement, ensuring that the project follows NEC requirements, including 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 project avoid planting invasive and non-native species.

E. Gaps in Legal and Guiding Instruments

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

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

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

Table 5: Comparison of National Regulations and ADB Safeguard Requirements

	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

	ADB SPS Principles	National requirements	Extent of Equivalence or Gaps	Gap-filling Measures
5	Conduct meaningful consultation with affected people	Public consultation is mandatory for any IEE/EIA. Under the EAA, applicants have a duty to inform and consult with "concerned people" and organizations before submitting the environmental assessment documents to the CA where the project is classified 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."	No gaps	None required
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

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

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

43. **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.[24]

44. **Subproject Location**- The subproject is located within the Thromde (municipality), so the following approvals must be sought from the Thromde administration 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 applicable to the site; and
(v) Waste disposal (excavation and construction waste).

45. **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 6: 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 Regulation for the Environmental	National Environment Commission	Environment Clearance	Submission of IEE Note: Environmental Clearance has been obtained. Copy in Appendix 14.

[24] 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
Clearance of Projects 2016			
Bhutan Building Rules 2017,2018	District Regulatory Officer, Thromde Administration	Construction Permit	Submission of Building application
Forest and Nature Conservation Act, 1995 Forest and Nature Conservation Regulations 2000	Forest Range Office, Samdrup Jongkhar	Tree felling permit, if applicable.	Submit application for tree felling. Note: Forest Clearance for cutting of 8 trees obtained. Copy of clearance in Appendix 12.
Labour and Employment Act 2007	Ministry of Labour and Human Resources	Foreign worker permit, if applicable	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

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

G. Applicable Environmental Standards

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

48. 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.

49. The Drinking Water Quality Standards, 2016, was developed in accordance with Section 13 (f) and Section 42 (a) and (b) of the Water Act of Bhutan, 2011, with the aim of ensuring safe drinking water and to protect consumer health. The standard describes the quality parameters set for drinking water and the maximum permissible limit for each of the set parameters, in order to limit the level of contaminants in drinking water.

50. Following the 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 7, Table 8, Table 9 and Table 10 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 11, Table 12, and Table 13.

Table 7: Ambient Air Quality Standards

Parameter	Averaging Period*	Bhutan's Ambient Air Quality Standard, 2020**(µg/m^3)			WHO Air Quality Guidelines (µg/m^3)	
					Global Update^ 2021	
		Industrial Area	Mixed Area***	Sensitive Area****		
TSP	Annual	360	140	70	-	
	24-hour	500	200	100	-	
PM_{10}	Annual	120	60	50	15	
	24-hour	200	100	75	45	
$PM_{2.5}$	1-year	40	40	40	5	
	24-hour	60	60	60	15	
SO_2	Annual	80	60	15	-	
	24-hour	120	80	30	40	
	10-minute	-	-	-	-	
NO_2	Annual	80	60	15	10	
	24-hour	120	80	30	25	
	1-hour	-	-	-	-	
O_3	8-hour	100	100	100	100	
CO	8-hour	5,000	2,000	1,000	-	
	1-hour	10,000	4,000	2,000	-	
	24-hour		-		4000	

* 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,June 2020.
*** 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, sensitiveecosystems.
^ Source: 2021 WHO Global Air Quality Guidelines

Table 8: Noise Level Standards

Receptor/ Source	National Noise Standard Guidelines, 2020* (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, June 2020.

** 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 9: Effluent Standards

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

[a] Standards for Sewage Treatment Plant Effluent. Taken from Environmental Standards, National Environment Commission, Royal Government of Bhutan, June 2020.

51. Table 9 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 10: 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 ^^

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	
	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 11: 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, June 2020. 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 12: 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, June 2020.

Table 13: 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

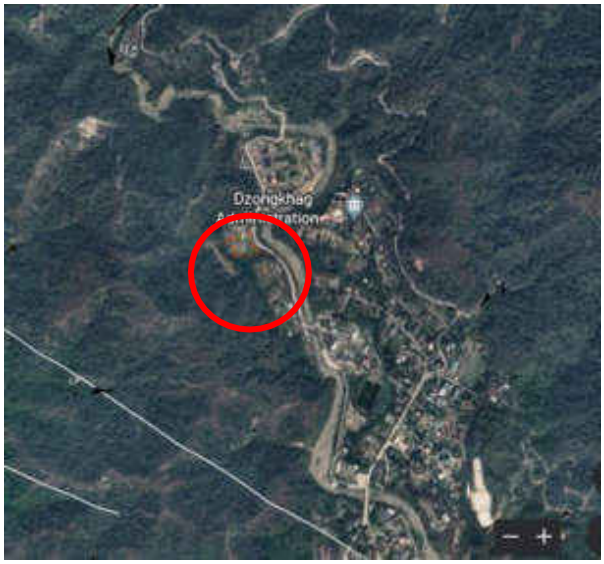
Source: Environmental Standards, National Environment Commission, Royal Government of Bhutan, June 2020.

III. DESCRIPTION OF THE PROJECT

A. Project Location and Area

52. The project site called Toed is located within Thromde (municipality) area, north of the Primary School, under Dewathang Gewog, Samdrup Jongkhar Dzongkhag (26°48' 18" N 91°29' 55" E) at an elevation of 190m. See Figure 1. The total site area allocated for the infrastructure work is 2 acres and the Land User Certificate has been issued to the NHDCL by the National land Commission (Appendix 4)

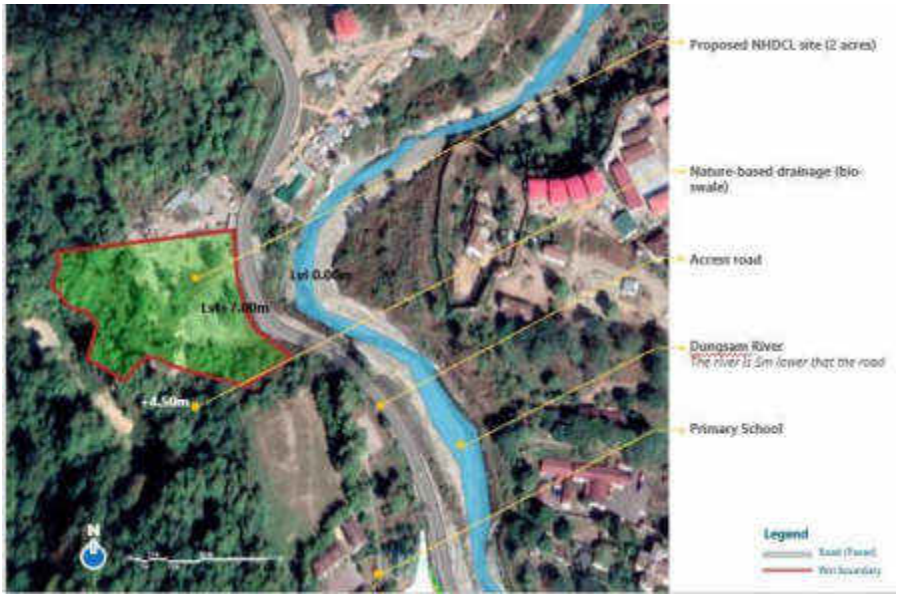
Figure 1: Map of Bhutan with Subproject Location



Source: Google earth

53. The site is located next to the new alternative national highway which connects directly to Charkilo Police Check Post.

Figure 2: Vicinity Map of Subproject Site Showing Immediate Surroundings



Source: NHDCL

B. Subproject Rationale

54. Over the past decades, the growth in urban population due to increasing rural-urban migration and increasing development in urban areas has exerted great pressure on existing services. Samdrup Jongkhar, like all other major towns, is facing acute shortage of housing, declining infrastructures with increasing population of the town over the last five years[25] and as a result of this shortage in rental accommodation, government, corporate and privately employed low-income earners either live in hotel rooms or in temporary structures[26].

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

C. Subproject Alternatives and Site Selection

56. Within the Municipality, this site has been chosen in addition to one other site, which together are still inadequate to sufficiently provide affordable housing for the target beneficiaries. There are no project alternatives because of the shortage of housing in the municipality. The government has placed great emphasis on improving livability and reducing disparities in access to affordable housing for low-income groups, and this subproject is part of the government's effort to reduce housing shortage.

57. Overall, while the housing development is intended for the low-income groups, the site selection has considered several factors that will ensure avoidance of or minimal environmental

[25] GNHC, 2019. 12th FYP document
[26] Public consultation for the preparation of the IEE, May 2022.

impacts, and will safeguard the welfare and well-being of the future occupants, such as, but not limited to, the following:

(i) Complies with all requirements of relevant national, state and local laws, rules and regulations;
(ii) Complies with all requirements of ADB SPS, 2009;
(iii) Does not involve components, processes and technologies that pose significant threat to public health and the environment, such as incinerators, etc.;
(iv) Does not involve works within or near environmentally sensitive locations (must be at minimum distance of 500m), including sites with national or international designation for nature conservation, cultural heritage, or any other purposes
(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),
    - 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 the target number of occupants;
(xi) Avoids areas 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, necessary Forest Clearance will be obtained and if required by the Forest Clearance, new trees must be planted following compensatory replacement required by such clearance;
(xiii) Area that is included in territorial jurisdiction of the municipality/town/city, compliant with land use regulations, and any urban development plans or master plans of the national or local government;

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

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

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

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

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

D. Subproject Components and Design

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

59. For this subproject, development works involve the construction of 11 blocks of 8 units each totaling 88 units housing apartments with a service center block and a Mani Dungkor (prayer wheel) on government land. All buildings will have 4 floors (G+3), internal road, green space, parking, footpath and substation. A service center is also proposed for this site. Table 14 provides the details.

Table 14: Details of the housing complex

S.No	Sub-project Components	Quantity of Structure	Land coverage in (sq. meters) required by each structure
1	Housing Blocks Category III Type I -5 buildings Category IV Type I -6 buildings Service center - 1 Mani Dungkor - 1	Construction of 11 blocks of 8 units each totaling 88 units housing apartments with a service center block and a Mani Dungkor (prayer wheel) on government land. The buildings are of the following dimensions: 19.9m x 8.8m for Category III, 16.9m x 7.1m for Category IV, 19.5m x 10.2m for Service Center and 3.5m x 3.5m for Mani Dungkor.	1970.6

2	Parking lot	Parking for 46 light vehicles and 19 2-wheelers	649.2
3.	Approach and internal road	Road of total length 0.12 km with off- take from government road (assured right-of-way) and aligned all within the plot allotted by NLCS to NHDCL	633.1
4.	Septic tank and soak pit	Septic tank 1= 2 Nos. of (7.65m x 2.8m) & soak pits (3m dia) Septic tank -2 = 3 nos of (6.75m x 2.5) and soak pits (2.5m dia)	121.9
5.	Pedestrian footpath	Footpath of total length 0.432 km located within the demarcated plot registered in NHDC's name	1057.2
6.	Nature based drainage (bio-swale)	Drainage of a total length of 0.11154 km located within the demarcated plot registered in NHDC's name	34.52
7.	Rainwater harvesting tank	Two 1000-L capacity tanks for each building, and installed on rooftop.	2 tanks per building or 22 tanks total
8.	Drinking water tank	Tank of dimensions 4m dia located within the demarcated plot registered in NHDC's name	59.73 (Water Tank Area)
9.	Substation	Substation of dimensions (6m x 6m) located within the demarcated plot registered in NHDC's name	36
10	Service Center	1 building (G+1)	194.6
11	Green space		45.2%

1. Building Design

60. The buildings are designed keeping in mind the location within the Local Area Plan and Development control regulation 2016, Building Regulation, 2018 and the Bhutan Building Code, 2018. These set out the requirements which apply to the construction of buildings. These regulations and codes prescribe the building dimensions, circulation space requirements, design standards, detailing of structures, light and ventilation requirements, water supply and sanitary control, electrical requirements and standards, fire safety, access, parking and provisions for disabled persons.

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

(i) IS 13920_2016 (Ductile Design of Reinforced Concrete Structures);
(ii) SP16 (Design Aids for Reinforced Concrete to IS 456);

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

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

63. The Category III (Type I) building will include 1 Living room, 2 Bedrooms, 2 Toilets, 1 Kitchen and 2 Balconies. Each Unit area will be: 87.02 Sq.m (936.32 sq.ft) and Plinth area (1floor) will be 197.97 sq.m (2130.16 sq.ft).

64. The Category IV (Type I) building will include 1 Living room, 2 Bedrooms, 2 Toilets, 1 Kitchen and 1 Balcony. Each unit area will be 55.08 sq.m (592.70 sq.ft) and Plinth area (1floor) will be 129.11 Sq.m (1389.22 Sq.ft).

65. The Service Center building is two stories. The service center will include an indoor play area, sleeping rooms, separate toilets for males and females, commercial space, community police office and a store on the ground floor. The top floor will consist of a skills development hall, a community integration hall, temporary shelter room, counseling room and separate toilets for males and females. The total plinth area will be 194.6 sq.m (2,094.65 sq.ft).

Figure 3: The Proposed Layout of the Housing Complex

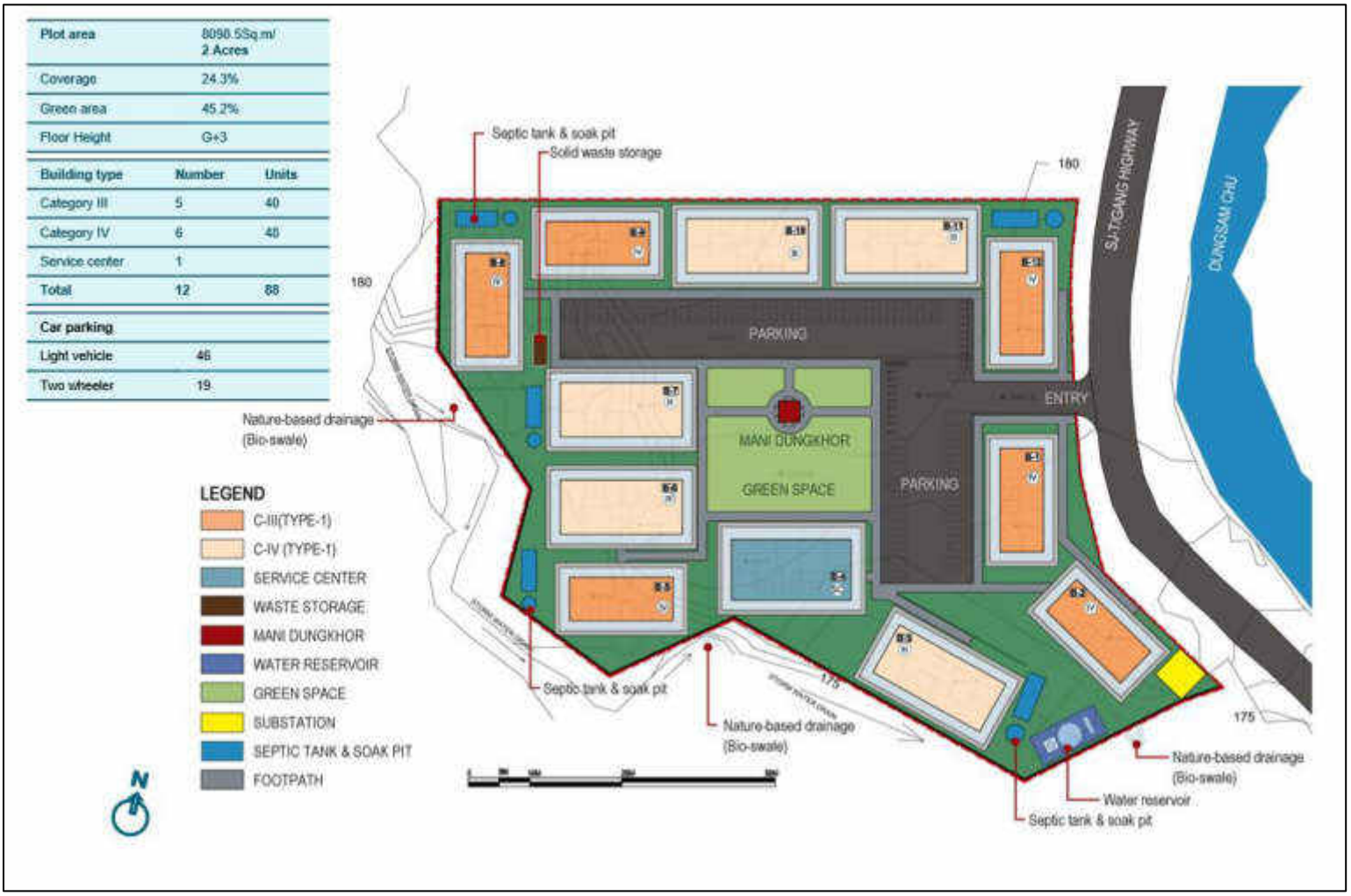


Figure 4: External Façade or Building Sections

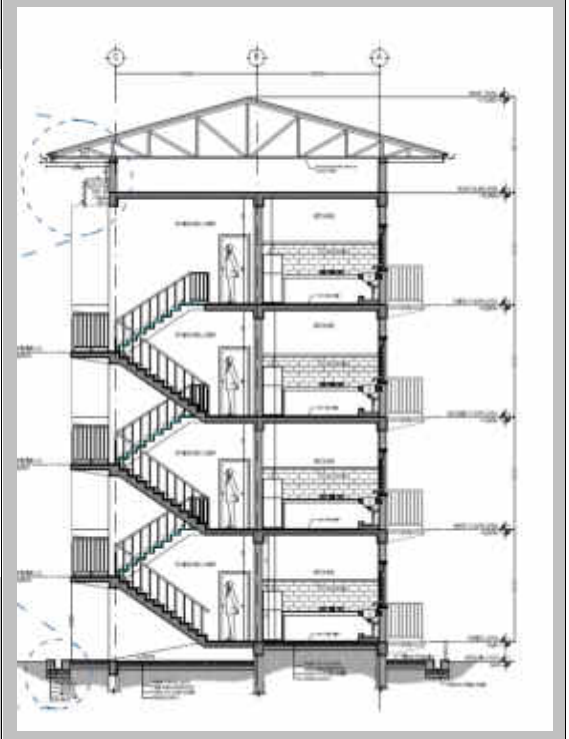
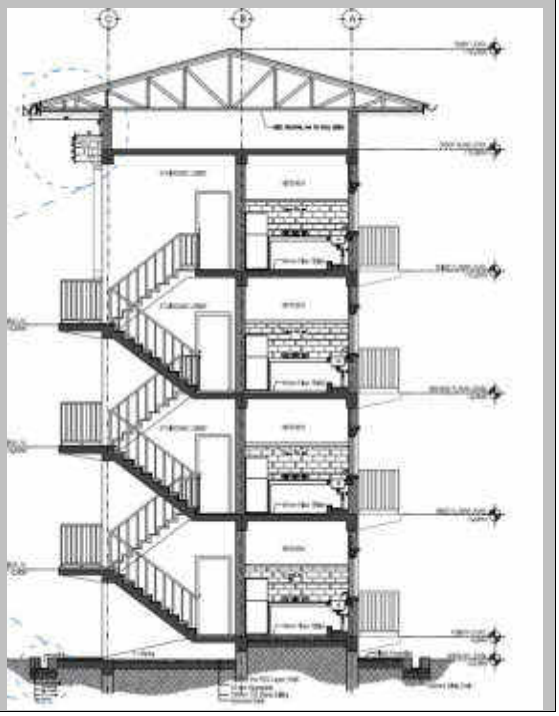
FRONT ELEVATION	BUILDING SECTION
Category III (Type I) building 	
Category IV(Type I) building 	

Figure 5: Layout Plan (Category III)

Figure 6: Layout Plan (Category IV)

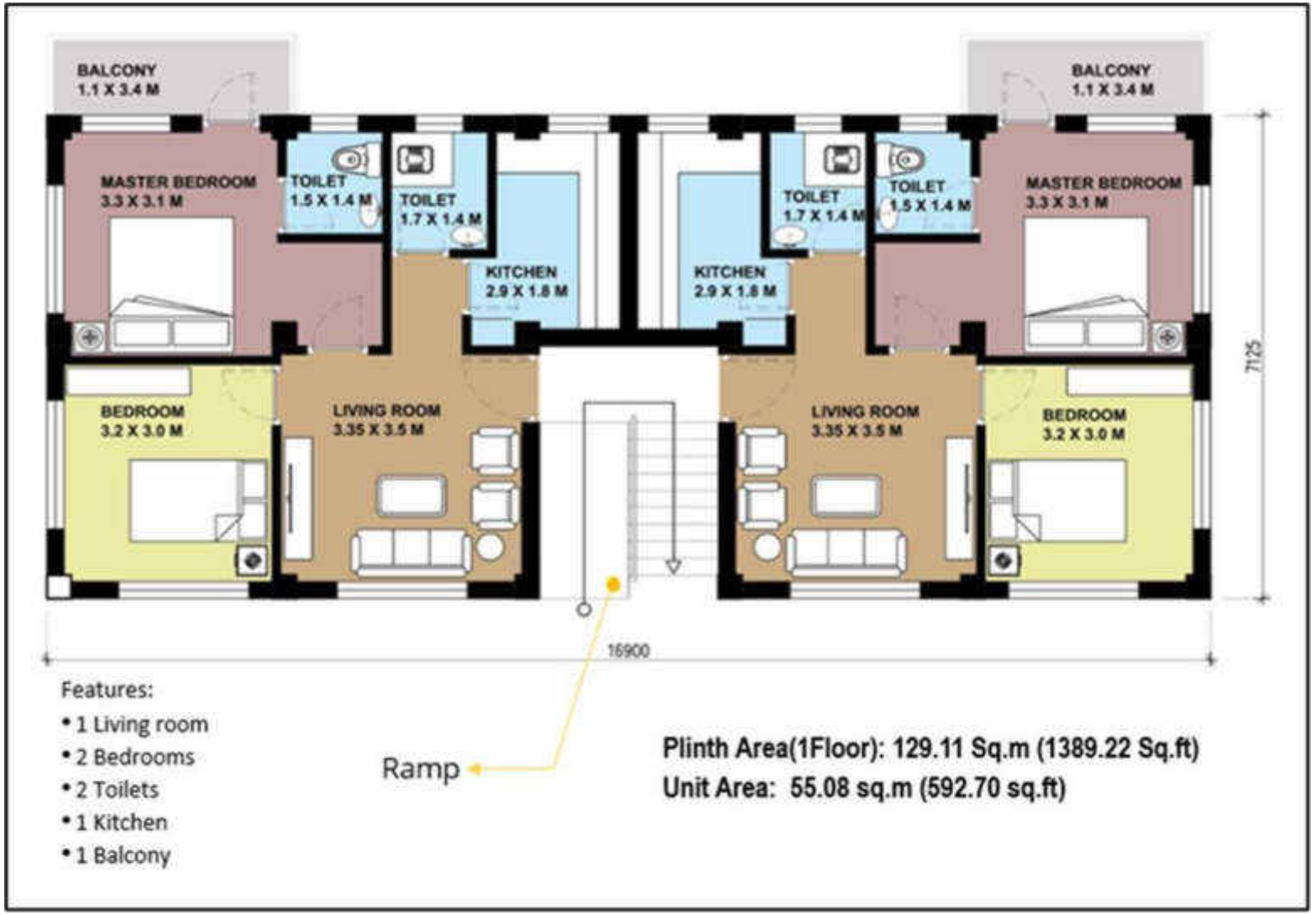
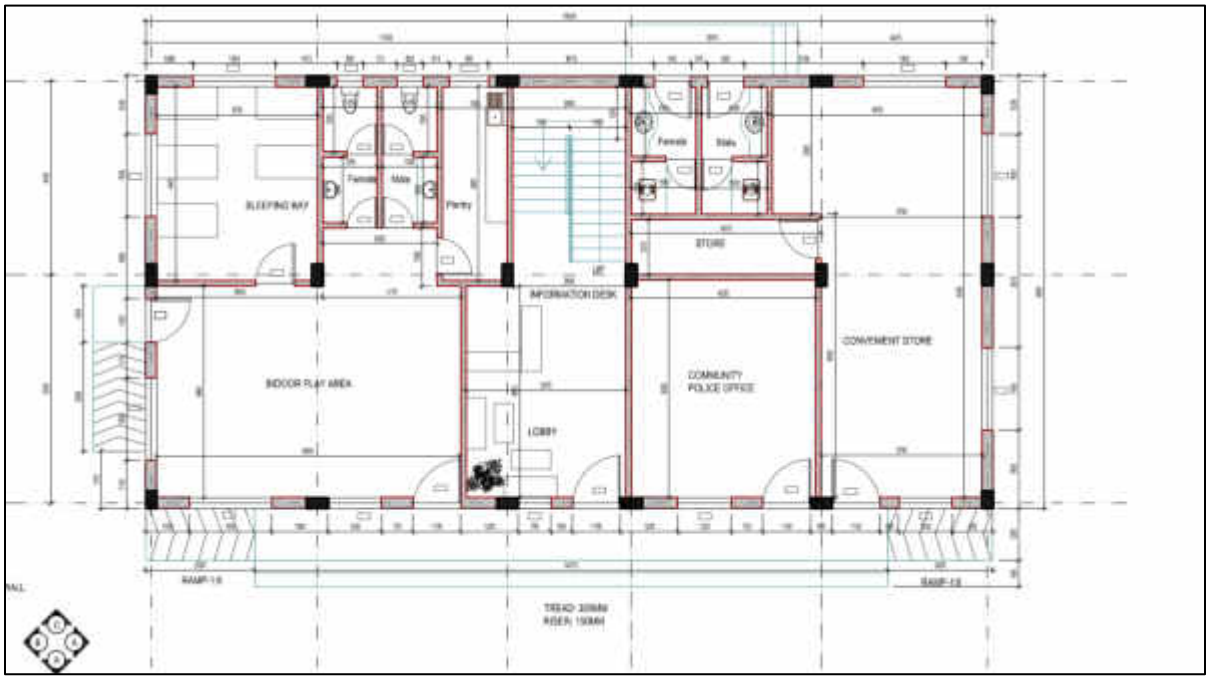
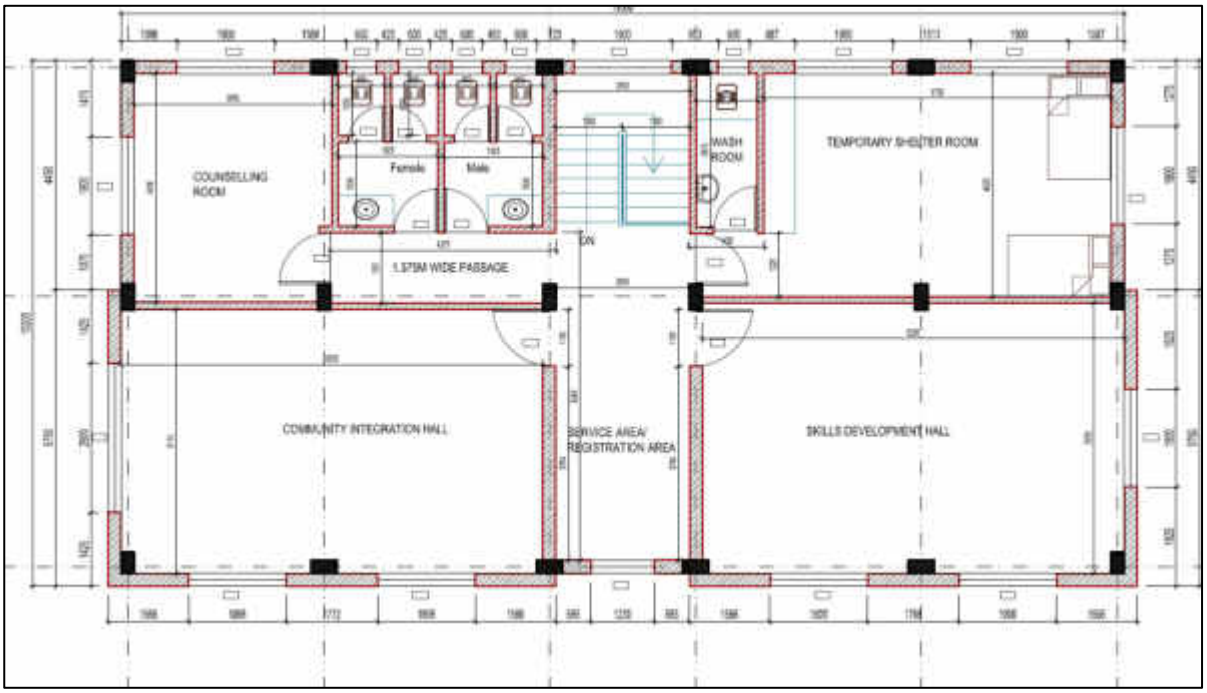


Figure 7: Design of Service Center

Service Center Ground floor



Service Center First floor



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

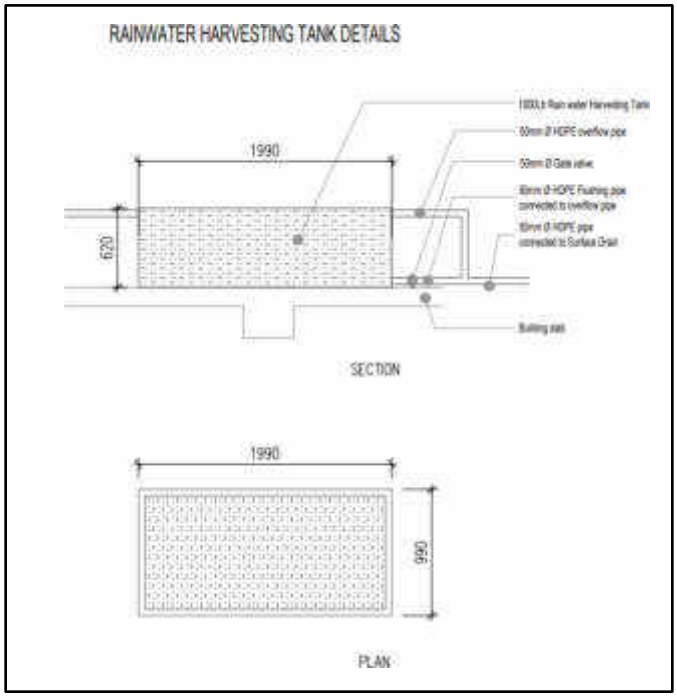
67. **Water supply details**. The supply of water for the housing complex will be from the municipality through the existing water supply line in the area. The municipality is responsible for ensuring regular supply of water to all buildings within the locality. The design assumes five persons to reside in each unit which translates to about 440 total residents in this housing complex. Estimating that on average each person will consume about 100 liters of water per day and the water consumption for service center is 1000L, the daily water requirement is calculated at 45,000 liters per day. To provide for this, 59.73 **sq.m** water storage tank will be built towards the eastern side of the site, and each building will be provided with 5 no. of 1000L storage tank, which will ensure sufficient water for the entire housing colony.

Table 15: Daily Water Requirement Calculation

Building	Total Number of Units	Number of Persons	Water Consumption
Category III	40 units	40x 5 persons = 200 persons	200 persons x 100 liters/person = 20,000 liters
Category IV	48 units	48 x 5 persons = 240 persons	240 persons x 100 liters/person = 24,000 liters
Service Center			1000 liters
Total for All Buildings (Residential and Service Center)			45,000 liters

68. **Rainwater harvesting**. To further supplement the water storage tank, two numbers of 1,000-liter rainwater storage tanks will also be installed for each building on the roof. Figure below shows the rainwater harvesting tank details.

Figure 8: Rainwater Harvesting Tank Diagram



69. **Electrical power supply**. Although the existing buildings adjacent to the site are already connected to the power supply, due to the substantial increase in the 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.

70. **Septic tank and soak pits**. The Thromde does not have a central sewerage system. The design of the Septic tanks will ensure that the gray water from the septic tank will be fed to a series of soak pits. The septic tank will receive both water closet (WC) waste and sullage from the buildings. In this housing complex, there are 5 proposed septic tanks and soak pits of two varying sizes. Based on the number of buildings connecting to the septic tank, the standard dimensions of septic tank including wall are 7.65 m x 2.8 m & 6.75m x 2.5m. Each tank will have 1 soak pit (3m & 2.5m diameters). The septic tank will have two sections; Settling chamber 1 (4.85 m x 2.8 m) & (4.25m x 2.5m) and Settling chamber 2 (4.2m x 4.2m) & (2.5m x 2.5m) for the two types of septic tanks. The clear overflow water (supernatant) will seep from the soak pit into the ground.

Figure 9: Schematic Diagram of Septic Tank and Soak Pit (Top View / Cross Section)

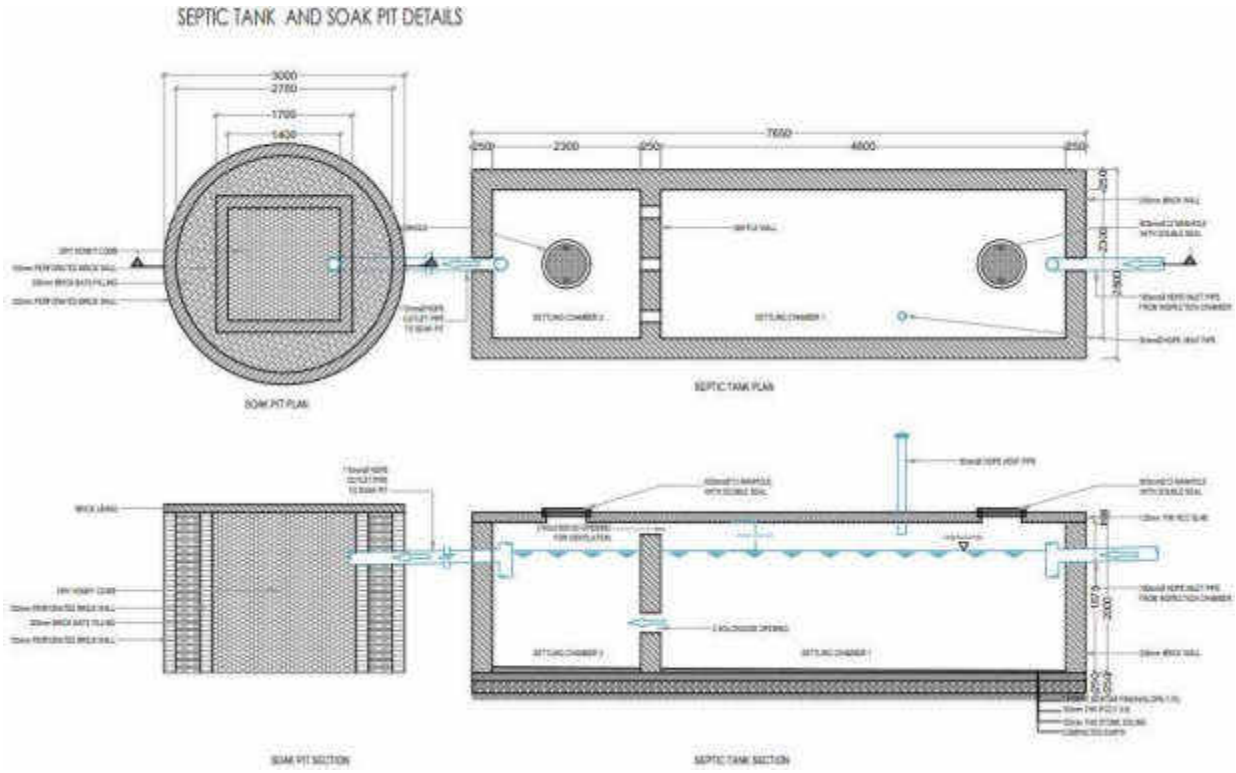
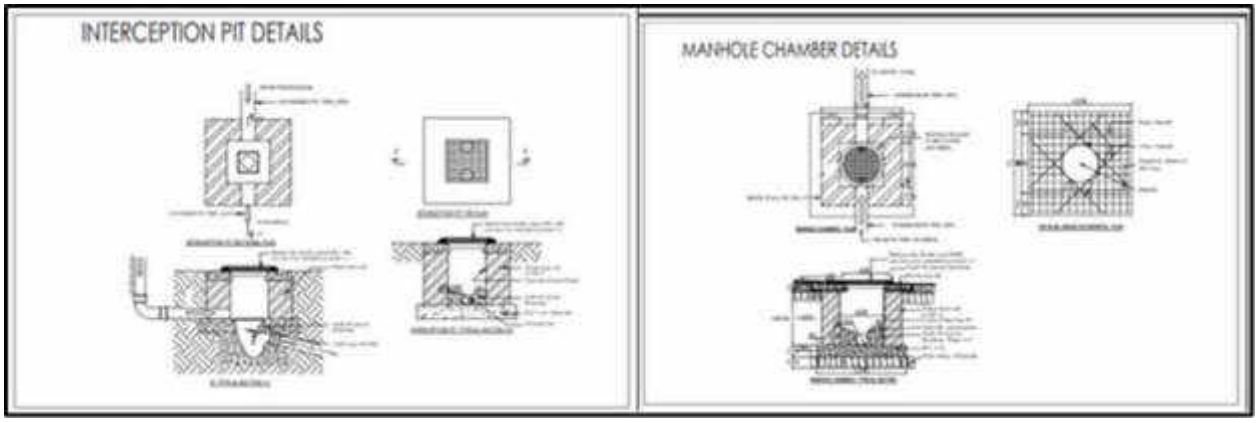


Figure 10: Schematic Diagram of Interception Pit and Manhole Chamber



71. **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; manholes; and layout plan of the internal plumbing system of each floor, with details of pipe sizes and material. Water meters will be provided for each dwelling unit; the building drains will be connected to the secondary storm water drain of 450mm wide and the secondary storm water drain runs N-S through the site.

72. **Site accessibility, entry, exit and internal roads**. The proposed main access to the site is from the existing national highway road which connects to the Charkilo Police Checkpost. There will be only one entry and exit for the site. On the site, the parking is designed to accommodate 46 light vehicles and 19 two-wheelers. From the main parking lot, internal roads to connect each building will also be accessible through the pedestrian staircase from the Parking. The housing complex will have a boundary wall with chain link fencing.

Figure 11: Road, Footpath and Drain Crossing Details

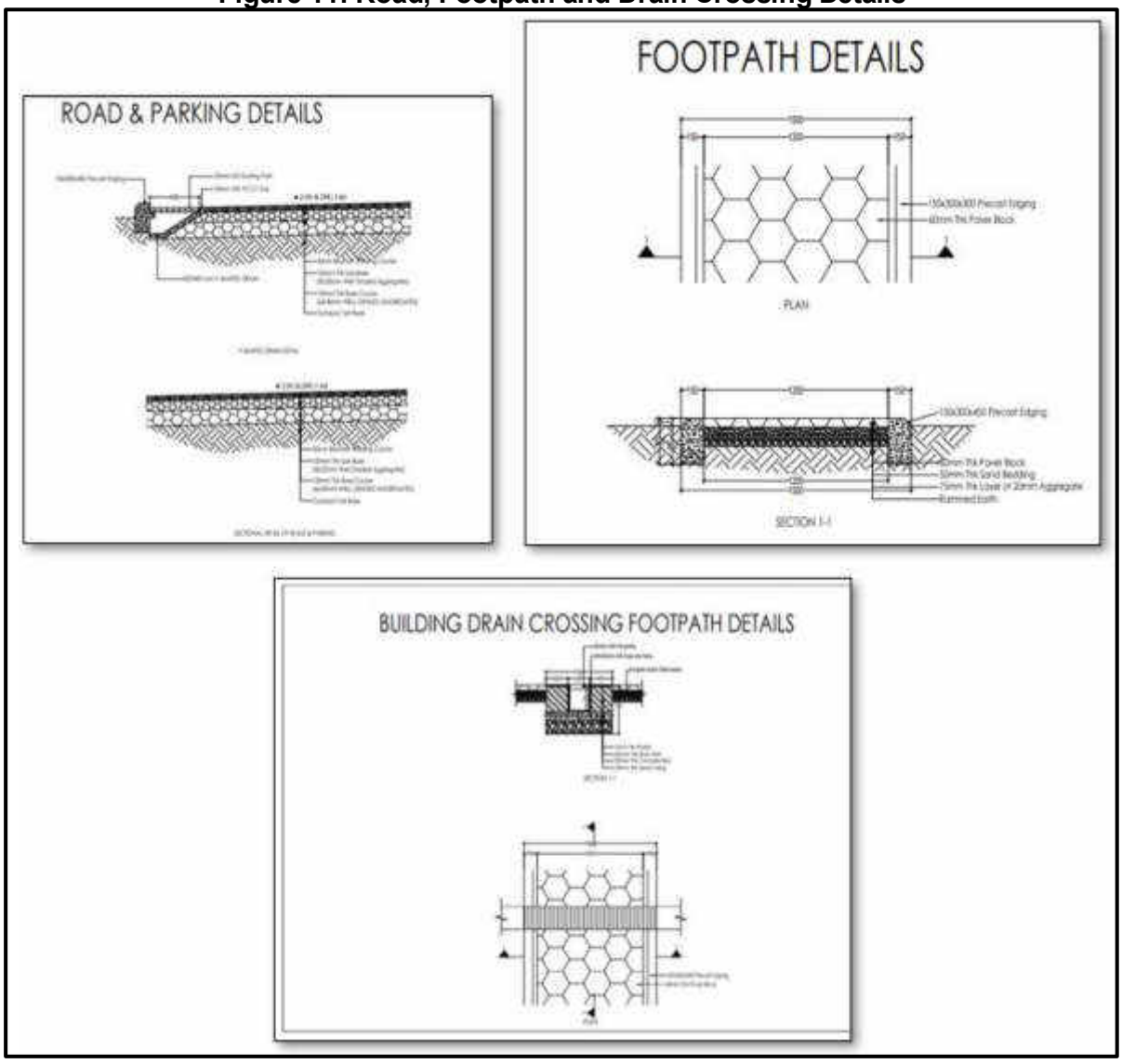
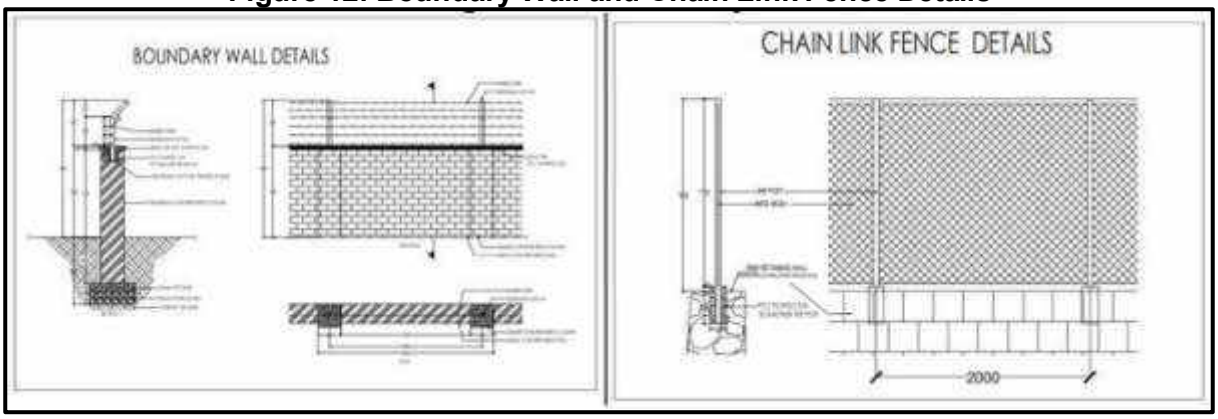


Figure 12: Boundary Wall and Chain Link Fence Details



Building Construction Materials and Construction Technology

73. **Building construction materials.** Building materials to be used include (i) RCC for footing, columns, beams and slab; (ii) Random Rubble Masonry (RRM) wall for foundation; (iii) hard stones for stone filling; (iv) cement, sand, and graded crushed rock for concrete works; (v) Aerated Autoclaved Concrete blocks (AAC) for walls; (vi) WPC for door frames; (vii)FRP for window frames; (viii) tiles for flooring; ix) Unplasticized Polyvinyl Chloride (UPVC) for window shutters; (x) mild steel for railings; (xi) steel tubular truss; and (xii) Pre-Painted Galvalume Steel (PPGL) sheet for roofing. For toilets and drainage, materials to be used include (i) Chlorinated Polyvinyl Chloride (CPVC) pipes; (ii) HDPE Pipe; (iii) Indian-type vitreous water closet squatting pan; and (iv) European-type vitreous water closet pedestal for plumbing and sanitary works.

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

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

76. **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%). Although the site is on flat land and is not on a hillside, there is still a low risk of landslide in the area. This risk of landslide (although low or minimal) is attributable to the site's proximity to the Dungsam river (about 40m away) wherein landslide could potentially occur at the slopes bordering the river during extreme or unexpected weather (e.g. strong cyclones and continuous heavy rains that have never been experienced as yet) or seismic events. When this happens, the landslide could worsen with cave-ins possibly progressing towards the subproject site. Hence, mitigation measures are still necessary in the design to ensure this possibility (although very low or minimal) will not impact the subproject in the future.

77. While the Dungsam river and adjacent river banks are within medium to high risk zone for flood, the site itself is within the low hazard, low risk zone and at elevation higher by 7-10 meters from the normal level of Dungsam river. See Figure 27 for the flood hazard and risk map.

78. **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 is 22.5m.

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

80. **Solid Waste Management**. Within the city, waste collection is carried out twice a week. On an average, waste generated per day within the Thromde area has been estimated at 0.607kg/capita/day for dry waste and 0.45kg/capita/day for wet waste[28].

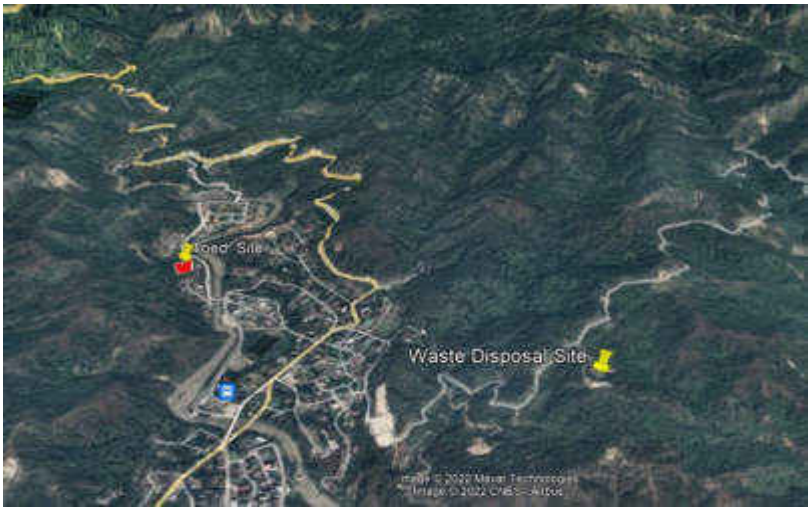
81. Within the Housing Complex, large Colored bins (Green-wet waste; Blue- dry waste; Red-hazardous household waste) will be provided in a specific area near the parking area (see Figure 3), to promote waste segregation and allow safe waste storage. This will be especially useful when and if waste collection services are disrupted. The waste storage areas will be maintained and regularly emptied by the housing management.

[28] Sharma et al (nd). Study on sustainable waste management in Bhutan. A case study in Samdrup Jongkhar Municipality. Project Report. Jigme Namgyel Engineering College

Figure 13: Waste storage (behind the green cloth barricade) along the highway adjacent to the site

82. All waste is transported to the landfill site, which is located at Matanga (marked on the map below) which is about 3km away. This landfill site will also be used to dispose of construction waste (after segregation of recyclable, reusable and hazardous waste), unless otherwise instructed by the Thromde.

Figure 14: Location of Waste Disposal Site



83. **Green area and landscaping**. 45.2% of the land will be left as a green area. The green area is centrally located and easily accessible to all buildings through pedestrian footpaths. Once

the construction is over, the green area as well as the periphery of the site will be planted with local species.

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

E. Subproject Implementation Schedule

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

Table 16: Work Schedule

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

F. Resource Utilization

86. With the design process still ongoing, the total required amount of each resource is yet to be quantified. In general, however, the major construction materials required include boulders, aggregates, sand, cement, aerated autoclaved concrete blocks, TMT bars, brick, glass, tubular steel and timber. Most of the materials will be sourced from local authorized suppliers within the country wherever possible.

Table 17: List of Major materials and quantities to be used

	Description		Unit	Quantity
1	Concrete Block Brick		No.	4094.17
2	Boulder		Cum	2939.15
3	Aggregates 40-20mm		Cum	86.52
4	Aggregates 20- 6mm		Cum	127.85
5	Cement		Tonne	4330.85
6	Sand		Cum	7567.83
7	100mm KerbStone		Sqm	254.93
8	Angles, Flats & Plates		Kg	56988.69
9	Paver Block		Sqm	
10	Reinforcement Bars		kg	533898.84
11	Red Brick		No.	18.12
12	Ballis		Mtr.	37254.62
13	Timber		Cum	492.73
14	CGI Sheet		Tonne	11.89
15	Cement Bonded Particle board		Sqm	27.69
16	40mm & 50mm Tubular Steel		Mtr.	11078.21
17	Crushed rock		Cum	7629.44
18	Aerated autoclaved concrete blocks		No.	2286.00
19	fiber-reinforced plastic for window frames and cornices		Mtr	311.96
20	Checkered Tiles -25mm in Sqm		No.	8967.12
21	Tiles		kg	22063
22	Chlorinated Polyvinyl Chloride (CPVC) pipeslines - 25mm		Mtr.	2685.80
23	H.D.P.E Pipe (160mm)		Mtr.	1640.63
24	G.I barbed Wire in Mtr.		Mtr.	2405.34
25	G.I chain-link mesh in Sqm		Mtr.	476.63

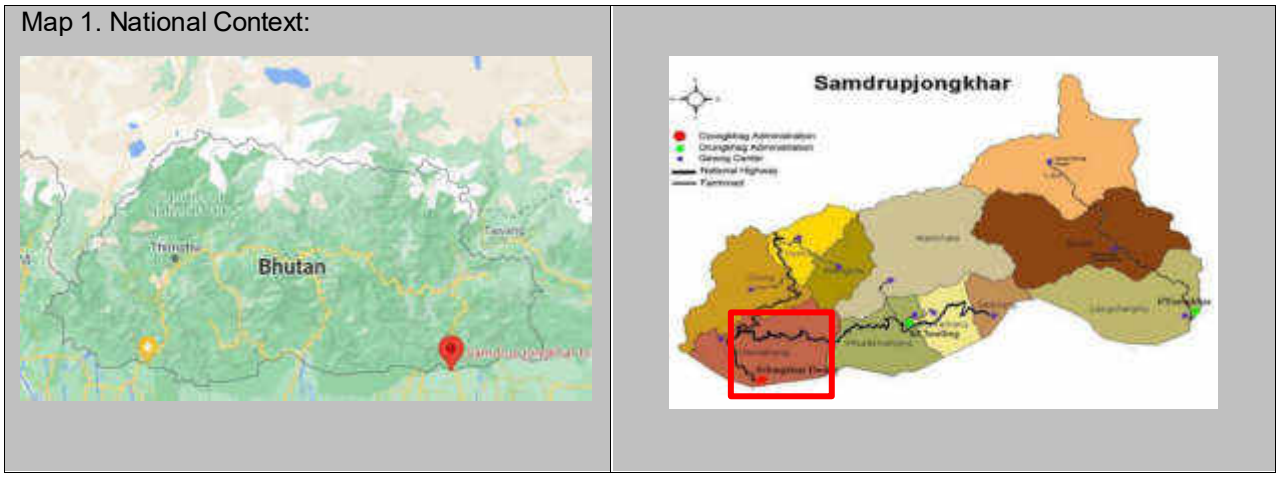
87. Approved construction materials will be sourced from local Bhutanese manufacturers and suppliers.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Baseline information

88. Samdrup Jongkhar Dzongkhag is located in the extreme south-eastern part of the country, sharing its southern border with the Indian States of Assam, northern border with Pemagatshel Dzongkhag to the west, and Trashigang Dzongkhag to the north. The Dzongkhag covers an area of 1877.94 km^2 and is subdivided into 11 gewogs (Dewathang, Gomdar, Langchenphu, Lauri, Martshalla, Orong, Pemathang, Phuntshothang, Samrang, Serthi and Wangphu) and 2 Dungkhags (Jomotsangkha, and Samdrupchoeling) (Figure 1). The total population of the Dzongkhag showed 35,079 persons as per PHCB 2017 with 5,191[29] number of households. Out of the total population, 52.2% were males and 47.8% were females, 12,174 people live in urban areas and 22,905 people live in rural areas.

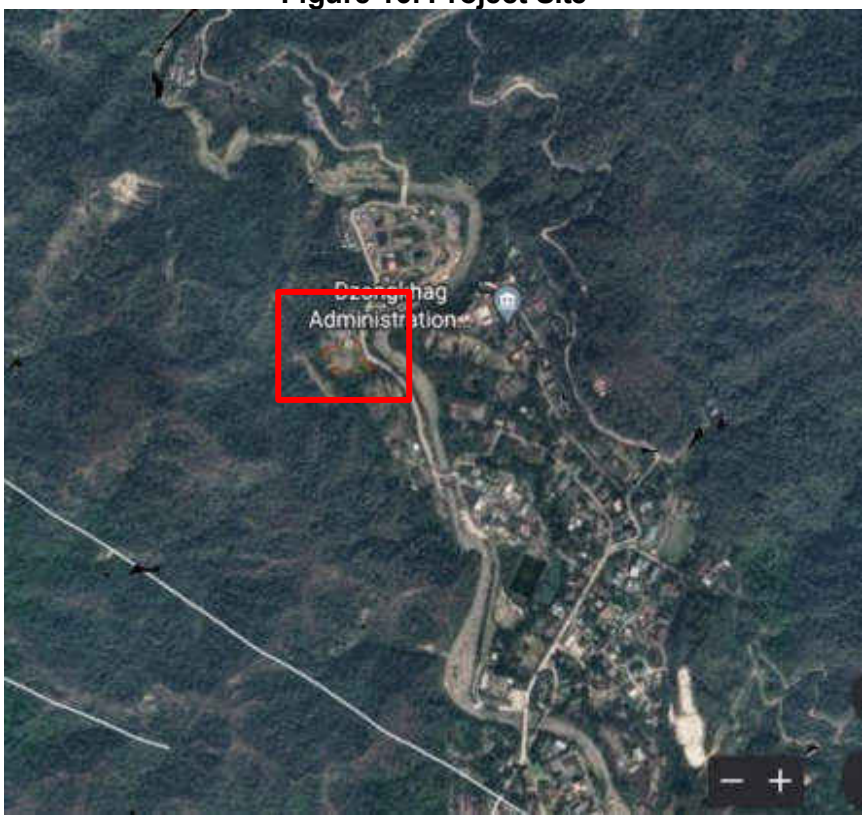
Figure 15: Map Showing Project Site



Source:Google and NHDCL office and Samdrup Jongkhar Dzongkhag website http://www.samdrupjongkhar.gov.bt

[29] Figure of number of households from the Samdrup Jongkhar Dzongkhag website (www.samdrupjongkhar.gov.bt)

Figure 16: Project Site



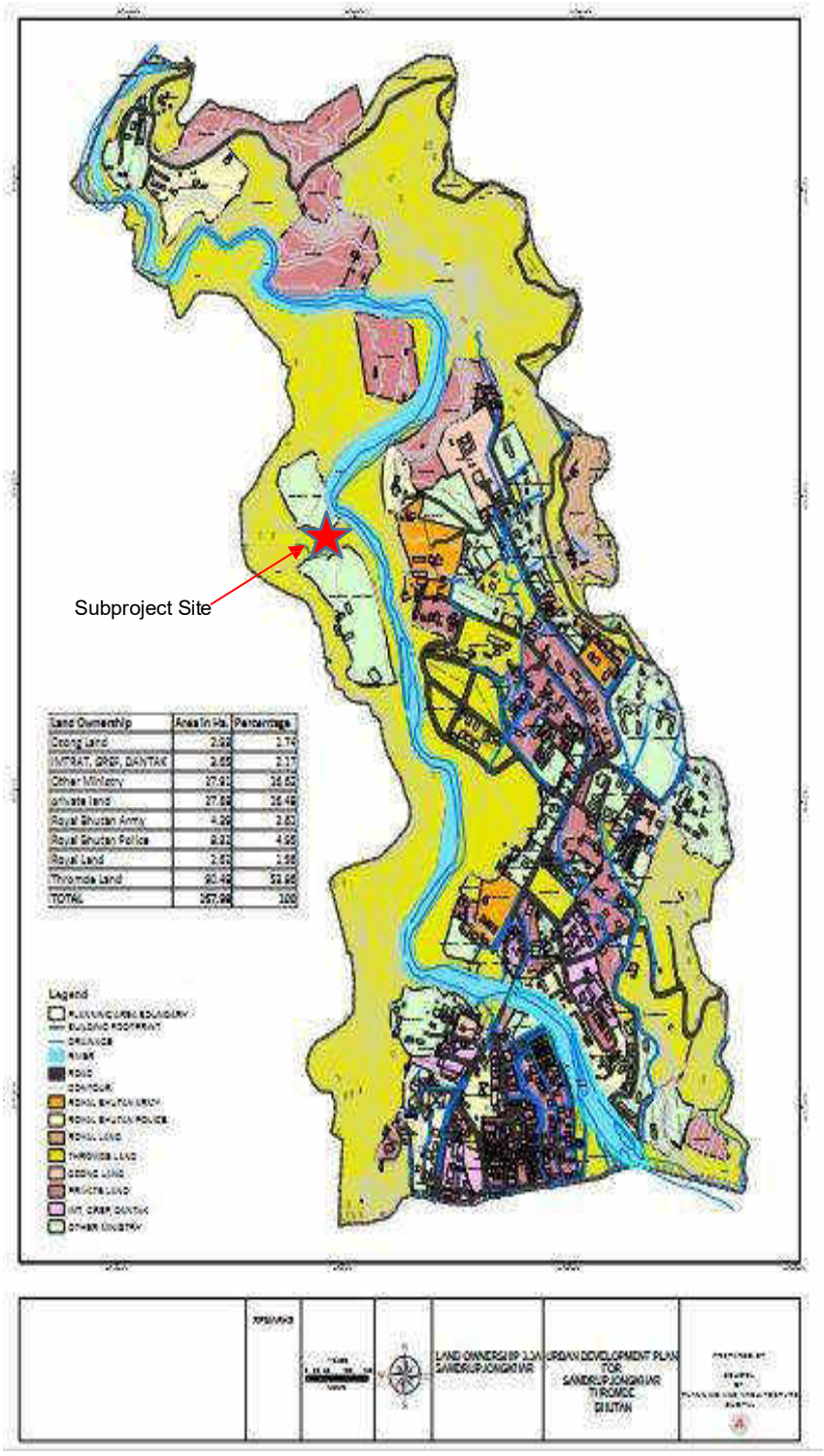
Source. Google Earth. June 2022

89. Samdrup Jongkhar Thromde stretches down from Dewathang to the India-Bhutan gateway in the south, sharing its border with the Indian state of Assam. Samdrup Jongkhar Thromde was approved as one of the four Class A Thromde by the Parliament in August 2010. The Thromde has a population of 9,325[30] with an area of 4.47 square kilometers. The Thromde area includes the area under the Samdrup Jongkhar town as well as the settlement in Dewathang, 18 km uphill with the connecting road in between. The area of Samdrup Jongkhar town is 2.08 km^2 and the area of Dewathang town is 2.39 km^2

90. There are two project areas in Samdrup Jongkhar. The two being at Dradulthang and Samdrup Jongkhar Toed. The site falls under the residential area where the permissible land use is mixed (all types of residential dwellings including apartments and group housing, professional services, commercial, institutions, etc.). The land user certificate has been issued for 2 acres for construction of affordable housing

[30] Population and Housing Census of Bhutan, Samdrup Jongkhar Dzongkhag, NSB, 2017

Figure 17: Delineation of the Thromde



91. The site is accessible from the alternative national highway which connects directly to Charkilo Police Checkpost.

Figure 18: Proposed Subproject Site

Source: NHDCL

B. Subproject Influence Area

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

Figure 19: Access to the Site

93. The Figures below show immediate receptors on the four boundaries (North, South, East and West). Towards the North is a Bitumen preparation plant which shares the northern boundary with the site. Towards the East is the alternative highway, the river and the Samdrup Jongkhar Jail. The Samdrup Jongkhar Primary School lies towards the southern and the archery range lies towards the west.

Figure 20: Visualization of Boundaries

North (Bitumen Preparation Plant)

East (SJ Jail Premises)

Project site

South (SJ Primary School)

West (Archery Ground)

94. The hospital is about 1.5km aerial distance southeast of the site and the Secondary School is about 20m southeast of the site. The closest religious structure is the *Tendrel Thang Chorten* that is located about 850m southeast of the site. A Mani Dungkhor (prayer wheel) is in the center of the town at about 1,170m south of the site and Zangtopelri is about 980m southeast of the site. None of these religious structures is considered protected historical or cultural assets. Table below shows the maps identifying locations of these structures relative to the subproject site.

Table 18: Distances of Receptors Around the Subproject Site

Physical Cultural Resources (Zangto Pelri at about 980 meters away southeast, Thendrel Thang Chorten at about 850m southeast, and Mani Dungkhor at 1,170m south).	
Closest forested area, about 20m to the south-southwest of the site.	
School (Samdrup Jongkhar Primary School), about 20m south-southeast of the site.	 

Hospital, about 1km southeast of the site.	

C. Land Environment

95. **Land Use, Topography, and Geology**. Bhutan has very rugged terrain with elevations ranging from 160 meters to more than 7,000 meters above sea level.[31]. The Himalaya of Bhutan can be tectonically divided into three east west trending belts, (i) The southern frontal belt, which includes the lesser Himalaya and the foothills (Siwalik), (ii) The central crystalline belt, which includes greater Himalaya and the lesser Himalaya; and, The Tethyan belt, which includes portion of the greater Himalaya and portion of lesser Himalaya.

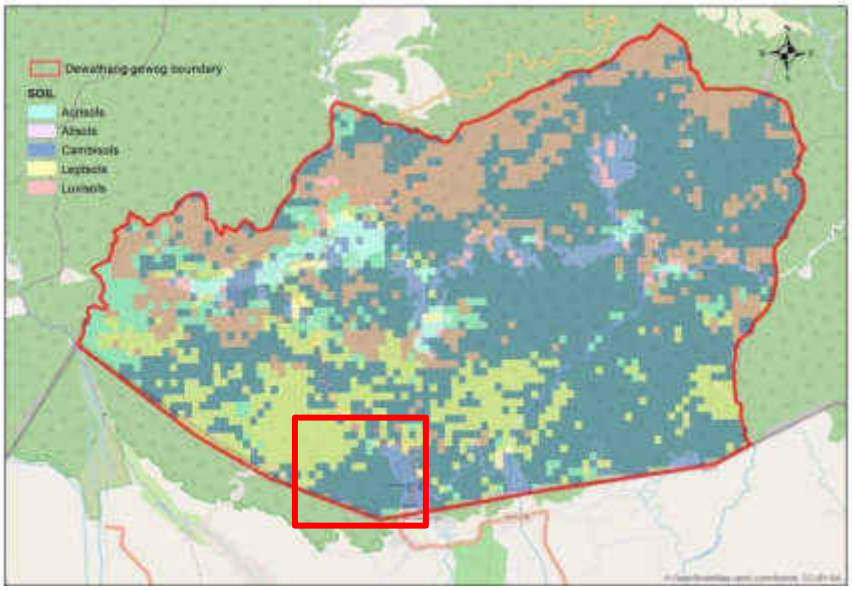
96. The southern frontal belt borders India in the south and comprises a very narrow strip of Tertiary Siwalik rocks represented by sandstone, mudstone, siltstone and boulder conglomerates. The Lesser Himalaya north of the Main Boundary Fault/Thrust (MBT) is represented by the rocks of Permian-Paleozoic formations. The elevation of the Dzongkhag extends from 200 to 3600 meters with a major portion of the land within 600 to 1200 meters. Samdrup Jongkhar is mostly at elevations of less than 160-600m within the wet subtropical agro ecological zone.

97. The soil map of the world prepared by the International Soil Reference and Information Centre (ISRIC) was used to extract the soil information for Bhutan. The scale of the latest available soil map is of 250 meters grid; therefore, it is the best available data to extract the soil information for the project areas.

98. Specific to the subproject site, the topography in the area is relatively leveled and flat terrain. The area is bounded by a combination of low-lying hilly and flat areas. On the eastern and farther northern sides are hilly areas with community forest cover, which are at elevation ranging from 20 m to 50 m high relative to the subproject site. On the farther eastern side of the area past the road (about 50 - 80m distance from the boundary) is a relatively steeper downhill terrain to the river below, with elevation ranging from about 5m to 10m lower than the subproject site. All natural drainages in the area flow down to this river. With this terrain configuration at the site, flooding and landslide risks may be low.

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

Figure 21: Soil Map



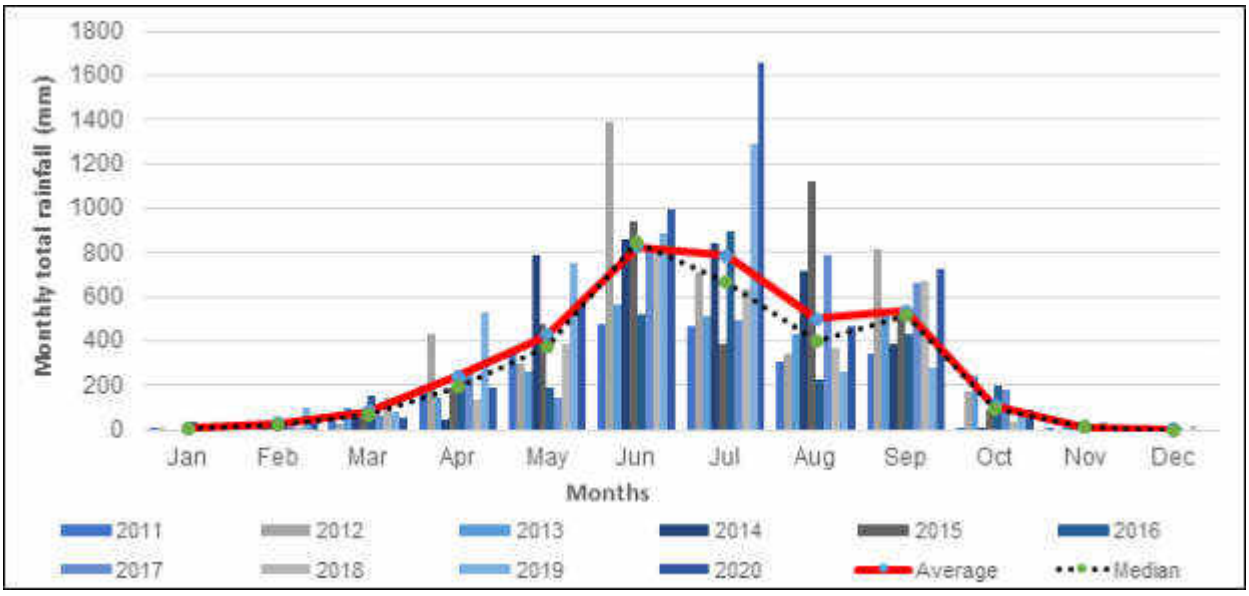
Source: National Soils Services Centre, DOA and ISRIC (International Soil Reference and Information Centre)

99. The map above shows that while the gewog has 5 types of soils, the primary soil type found at the site is Cambisols soil.

D. Air Environment

100. **Temperature**.Samdrup Jongkhar Dzongkhag is located in the subtropical climatic zone of the country. The meteorology station of the Dzongkhag is located in Deothang at latitude: 26.86, and longitude: 91.47 and at an altitude of 300 masl. Samdrup Jongkhar receives most of its annual rainfall during summer monsoon, the month of May to September. The monthly total rainfall in Samdrup Jongkhar from 2011 to 2020 is shown in Figure 22. The month of July in the year 2020 received the highest total monthly rainfall (1656 mm) while in winter, the Dzongkhag receives little to no rainfall. The highest daily rainfall recorded in Samdrup Jongkhar (2014–2020) was a rainfall of 267 mm on 29th April 2019.

Figure 22: Monthly total rainfall in Samdrup Jongkhar (2011 – 2020)



Source: Deothang Agrometeorology Station, SJT Climate.ods

101. Figure 23 shows the monthly average maximum temperature in Samdrup Jongkhar from 2011 - 2020. The hottest months are July and August all across the country, while the cold months are January, February, November, and December. The highest monthly average maximum temperature was noted in the month of August, 2016 (29.98◦C) while the lowest monthly average maximum temperature was noted in January, 2012 (17.60◦C). The highest daily maximum temperature in Samdrup Jongkhar was recorded on 20th July 2018 with 33.5◦C.

Figure 23: Monthly Average Maximum Temperature

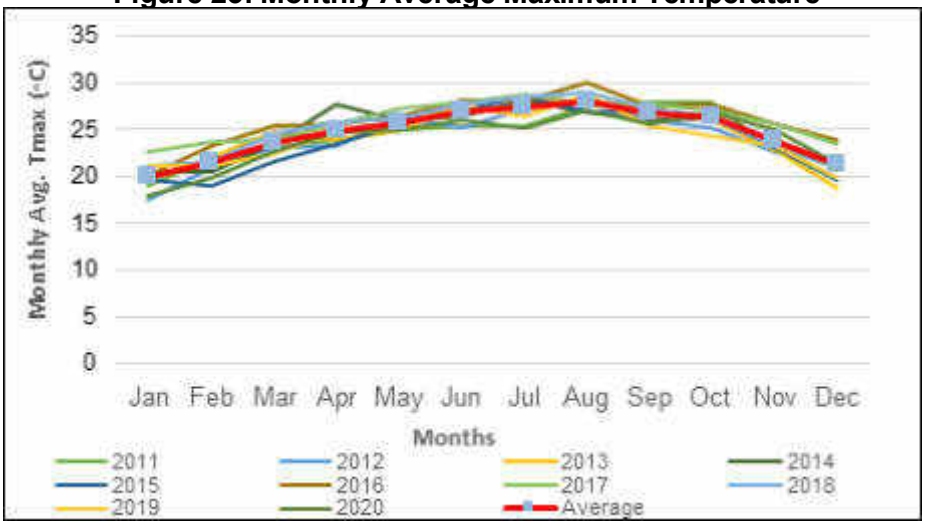
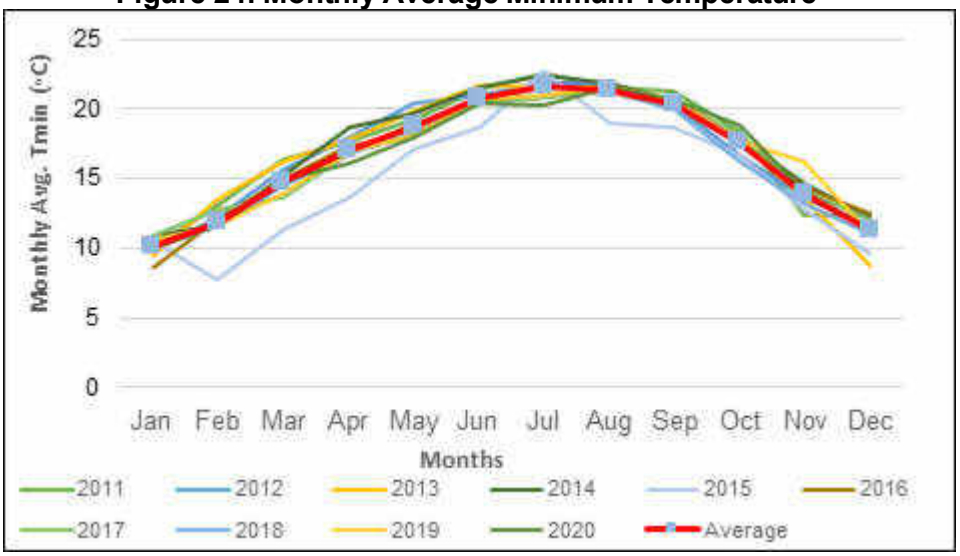


Figure 24: Monthly Average Minimum Temperature



Source:

102. .The monthly average minimum temperature experienced in Samdrup Jongkhar from the year 2011 to 2020 is shown in Figure 24. The monthly average minimum temperature was experienced in January, 2015, a temperature of 7.73◦C while the highest average minimum temperature was experienced in July, 2015, a temperature of 22.74◦C. The lowest daily temperature in Samdrup Jongkhar was recorded on 14th and 15th February 2015 with a temperature of 5◦C

103. **Ambient Air Quality**. The air quality of Samdrup Jongkhar from 2017 – 2019 is shown in Table 19. The total suspended particulate matter PM10 of Samdrup Jongkhar was recorded slightly above the ambient air quality standard set by the NEC for mixed areas. Other air quality parameters such as PM2.5, Sulphur Dioxide and Nitrogen Oxide were not recorded/available for the area.

Table 19. Annual average of the state of air quality (Station: Deothang)

Air quality parameters	Year 2019
Total suspended particulate matter (PM_{10})	63.26 µg/m^3

104. Site-specific ambient air quality will be obtained by the contractor prior to the construction phase to provide baseline data for reference during the monitoring activities.

E. Water Environment

105. Bhutan has an extensive river system that is generally distinguished by main rivers flowing north to south, with tributaries flowing in an east-westerly direction. There are four major river basin management systems: Wangchhu, Punatshangchhu, Mangdechhu, and the Drangmechhu. Samdrup Jongkhar falls under the Drangmechhu basin and Nyera Amari and Jomori sub-basin. The Samdrup Jongkhar Dzongkhag as well as the Thromde are located in the southern part of the Drangmechhu basin.

Figure 25: Hydrological basins of Bhutan, 2016

Source: NEC, 2016. National IWRM Plan 2016

106. The project site is located more than 30m from the Dungsam River. See Figure below.

Figure 26: Location of Receiving Water Bodies

Source: Google Maps.

F. Acoustic Environment

107. Secondary information on noise levels was considered under this study. Information on noise levels is taken from noise level sampling that was carried out using the SOUND LEVEL METER at the site. The average noise level recorded was 51.6 dB(A) during the day.[32]

108. The site is located between Forest, the primary school, the highway and the bitumen/crusher plant. According to the assurance letter received from Thromde, Appendix 15, the lease of the plant expires in December 2022, and since this crusher plant will be relocated elsewhere there will be no issues of noise and air pollution during the construction period or during operation when residents move in. The Thromde had issued a notification to Kuenden Builders, vide letter no. SJT/LSD/Lease/12/22-23/1881 dated 9 March 2023, to vacate the leased land after the expiry of the leased period (see Appendix 16). The Environmental and Social Safeguards focal from PMU accompanied by the Environment Safeguard Specialist and Social, Gender and Community Engagement Specialist from PIAC, visited the subproject site on 16 February 2024 to confirm the status of the bitumen/crusher plant. As shown in Figure 27, it was noted that the defunct plant machinery and pipes were still stored at site even though the existing bitumen/crusher plant is no longer operational at site after its lease expiry. However, as per the letter no. SJT/DRD/12/2023-2024/1476 dated 26 February 2024, Thromde informed NHDCL that the dismantling of the crushing plant has been initiated and will be completed within a week (see Appendix 17).

[32] DOR.2020. Initial Environmental Examination Report, 2020. BHU: South Asia Subregional Economic Cooperation Transport, Trade Facilitation and Logistics Project. Prepared by Department of Roads

Figure 27: Photograph showing the status of bitumen/crusher plant during site visit


Source: NHDCL,2024

G. Ecological Environment

1. Forest cover and biodiversity

109. Broadly speaking, the country can be divided into three distinct Eco floristic zones (alpine zone, temperate zone and subtropical zone). According to the Department of Forest and Park Services, 72%[33] of the district is covered with forest.

110. The project site is an area with residential land use located towards the northern part of the Thromde. Although the site is quite huge (2 acres), there is not much vegetation as it was used for temporary housing in the past and as an access route to the archery ground. Within the site, tree species mainly comprise of Teak (*Tectona grandis), Macaranga denticulata, Albizia* procera, Terminalia bellirica, Bambusa spp. All the trees belong to the government. The ground cover comprises mostly weedy species such Crassocephalum crepidioides, Colocasia esculenta, Bidens spp., Cynodon,Lantana camara dactylon,Saccharum spontaneum,Musa spp.,Mimosa pudica,Athyrium filix-femina,Thysanolaena spp., Ageratum conyzoides, Ageratum adenophora, Clerodendrum infortunatum, Boehmeria spp. and Mikania micrantha. None of these species is considered endangered or critically endangered species per IBAT screening and confirmation from the Divisional Forest Office in Samdrup Jongkhar (see Appendix 5).

2. Protected Areas and Critical Habitats

111. Samdrup Jongkhar Thromde lies outside the Biological corridor #5. The distance of the site to the corridor is about 1 km. The closest Protected area is the Jomotsangkha Wildlife Sanctuary which is about 30 km away. There are no wetlands or critical habitats within the project area of influence.

[33] DOFPS, 2019. Forest Facts and Figures 2019.

Figure 28: Project location in context to the nearest Biological Corridor (red line)

Source: NCD for the PA boundary data

112. **Critical Habitats**. 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 there is one Biological Corridor and one key biodiversity area (KBA) within 1 km from the subproject site, and that 38 IUCN Red List species of concern are identified within the default area of analysis. While these two sensitive areas are 1 km away, the implementation of the subproject will not affect these sites considering the nature and impacts of the subproject (housing development only) to be site-specific only. See Appendix 5 for the complete results. The IUCN Red List species of concern were assessed to determine the likelihood of them being found at the subproject site. Since the subproject site is already within the center of the city, the likelihood of these species being found at the site is very low. Nevertheless, the assessment included necessary written confirmation from the Department of Forest, which confirmed that none of these species are found or sighted at the subproject site. Accordingly, these species are found or dwell in the denser forest.

H. Socio-economic Environment

113. **Demography**. The total population in Dzongkha as of 2017 was 40,766 (20,786 male and 19,980 female). In total there are 4808 households and an area of 1877.94 sq. km[34]. Samdrup Jonkghar Thromde is the smallest Thromde, covering an area of 4.47 sq.km and has a resident population of 8,609 (PHCB, 2017).

114. **Educational and health facilities**. Within the Thromde, there are 3 Primary Schools and 2 Higher Secondary Schools[35]. There is only one hospital within the Thromde about 1 km from the project site and the Royal Bhutan Army Hospital at Deothang 18km away.

115. **Municipal Services and Amenities**. The existing drinking water is tapped from Rekheychu (1.2MLD) that provides water to the LAPs 2,3 and 4 for 6 hours, while underground water supply is provided for LAP 1 for 13 hours. Under the ADB funded Secondary Towns Urban

[34] Samdrup Jongkhar Dzongkhag profile.http://www.samdrupjongkhar.gov.bt/district-profile
[35] Annual Educational Statistics, 2021. Ministry of Education retrieved from http://www.education.gov.bt/

Development Project, water supply improvement facilities are being provided for Samdrup Jongkhar. Through this a 3.4km transmission main from the water treatment to the reservoir, a 17km water distribution system for all 4 LAPs and a reservoir tank (capacity of 410 m^3) is under construction[36].

116. The District has a total road network of 696.36km, of which only 7.32km is urban road (within the Thromde). In addition to this, some parts of the 60km of the primary national highway and Secondary national highway also travers the town area[37]. The Thromde is responsible for waste collection, transportation and disposal and these services vary across the town depending on the number of residents in the area. The collected waste is disposed of at the Matanga Landfill, approximately 3km from the town. The landfill, constructed in 2012 covers an area of 2000 sq.ft has been extended to accommodate the increasing waste disposal requirements of the Thromde[38] to cater to the increase in waste generation from 3.5 MT/day to 5MT/day.[39]

Economic activities

117. Samdrup Jongkhar is not a tourist destination for international travelers. However, it is both a transit route and for weekend visits for Indian visitors from across the border. The town serves as the eastern gateway for five other eastern districts (Trashigang, Lhuentse, Mongar, Trashi Yangtse and Pema Gatshel). The District Headquarters and other corporate offices are also mostly located in the Thromde. Due to its proximity with the Indian State of Assam, the town provides the potential as a business hub and is an important entry and exit point for tourists as well.

118. The Thromde is also well connected to other southern towns of Nganglam, Panbang, Gelephu and Phuentsholing, via the Indian Highway. The nearest domestic airport is in Yongphula about 150m away.

Physical and Cultural Resources

119. Apart from the Dzong, there is a Mani Dungkhor (1.5km), in the town center, towards the south and the Zangtopelri (900m) south east of the site.

G. Natural hazards

120. **Seismic hazard**. Geo-physically, Bhutan is located in the young Himalayan Mountains and considered to be one of most seismically active zones in the world, along the boundary between the Indian and the Eurasian tectonic plates. there is no detailed and comprehensive seismic microzonation of Bhutan, it is assumed that the continent-to-continent collision resulting in a stress build-up in the Himalayan region places the country either in Zone IV or V due to its contiguity and proximity to the north-eastern part of India, which falls under the same seismic zonation according to the Bureau of Indian Standards. Samdrup Jongkhar Thromde lies between Main Frontal Thrust (MFT) and Main Boundary Thrust (MBT) which are 3 km and 5 km away from

[36] ADB, 2018. Initial Examination Report, BHU: Secondary Towns Urban Development Project—Samdrup Jongkhar Water Supply System Improvement Subproject

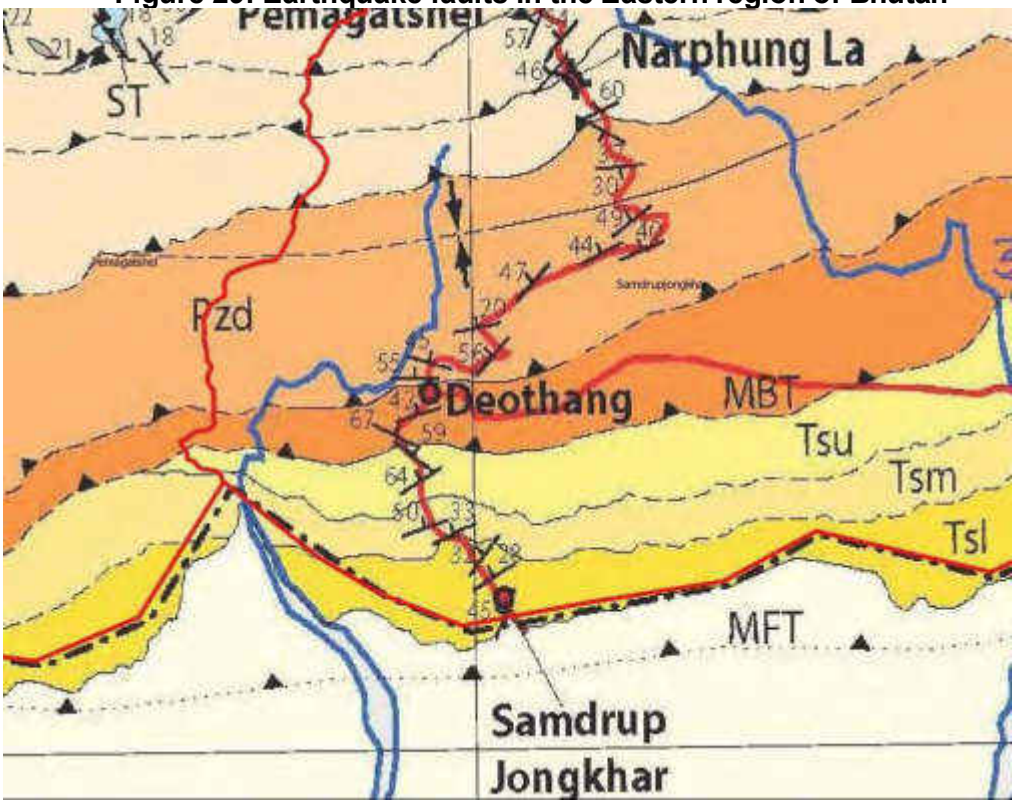
[37] MOWHS, 2021. Annual Information Bulletin, 2021. www. Mowhs.gov.bt

[38] Sharma et al. n.d. Waste Project Report. Jigme Namgyel Engineering College. Dewathang, SJ

[39] GNHC, 2019. Twelfth Five Year Plan (2018-2023), Samdrup Jongkhar Thromde, Gross National Happiness Commission (2019)

the core town respectively. Therefore, the area is highly prone to earthquakes from these two major faults of the Himalayas.

Figure 29: Earthquake faults in the Eastern region of Bhutan



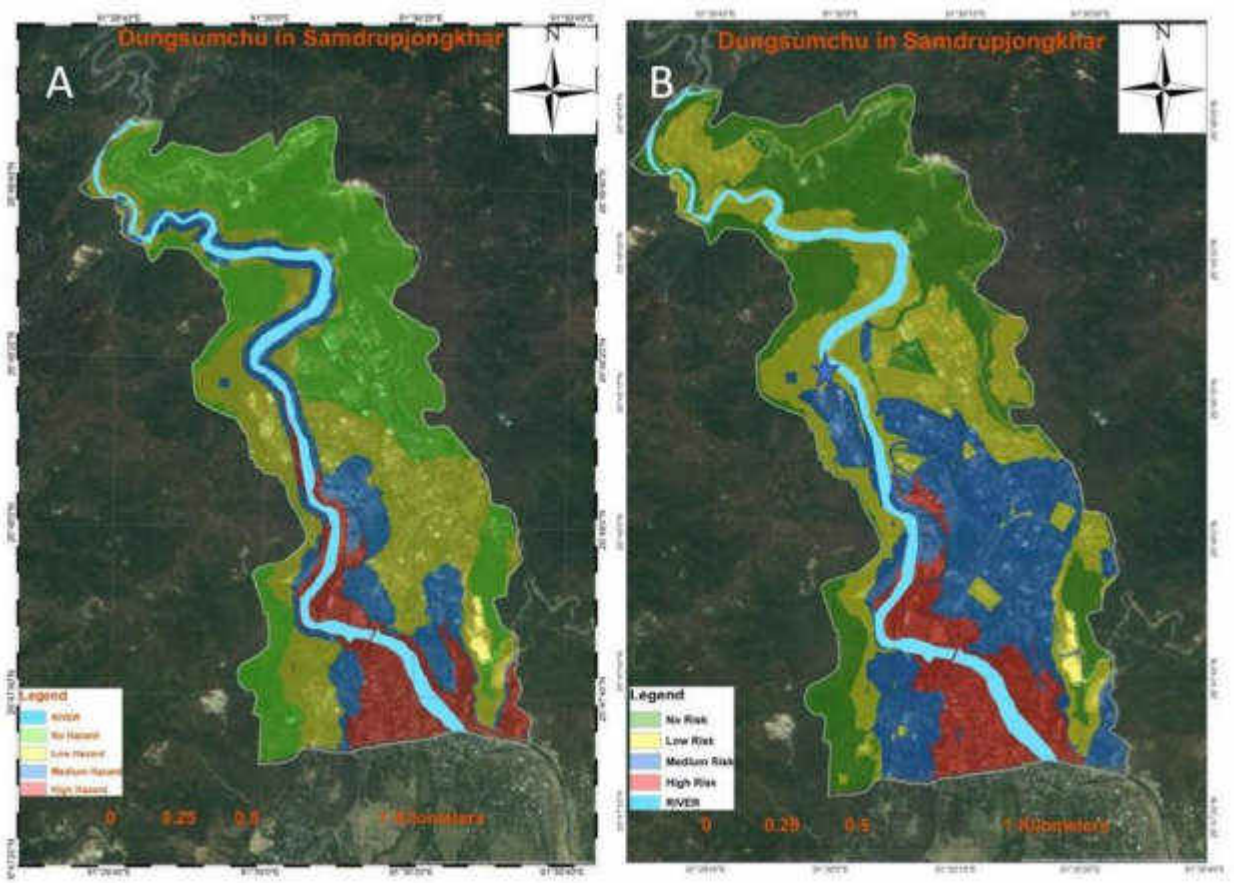
Map Source: MOWHS, 2019 [40]

121. **Flood risks**. Flood hazard is high along the Dungsam river flowing through the Thromde. Floods occurred in 2004, 2012 and 2015, with the last one resulting in significant damage worth more than Nu. 6,089,497.38 (about US$ 94,000). The flood also washed away the suspension bridge connecting the Primary School to the rest of the Thromde leaving it inaccessible for the inhabitants[41]. However, the site is in a low hazard, low risk flood zone considering that the area is about 7 – 10m higher than the elevation of the river, above 30 meters away from the edge of the river. Figure below shows the flood hazard and risk map confirming the low flood hazard/risk at the site (yellow area signifying low hazard/risk). The upper town area is located at higher elevation compared to the lower town and it is not affected by DungsamChhu. As protective measures, the Thromde has also constructed flood protection structures along Dungsumchu (River) to reduce the vulnerability to the people and infrastructure to flooding. During the 11th FYP, the Thromde invested about Nu.7.1 million in restoration of infrastructures damaged by floods and landslides.

[40] MOWHS, 2019. Technical project report on Climate Smart Human Settlement Planning and Development in Samdrup Jongkhar Thromde carried out under the Strategic Program for Climate Resilience (SPCR) Pilot Program for Climate Resilience (PPCR) Volume I June 2019

[41] Flood Hazard Assessment for Samdrup Jongkhar Dzongkhag, FEMD, DES, MoWHS, 2019

Figure 30: Flood hazard (A) and risk (B) map [42]



122. Although the site is on flat land and is not on a hillside, there is still a low risk of landslide in the area. This risk of landslide (although low or minimal) is attributable to the site's proximity to the Dungsam river (about 40m away) wherein landslide could potentially occur at the slopes bordering the river during extreme or unexpected weather (e.g. strong cyclones and continuous heavy rains that have never been experienced as yet) or seismic events. When this happens, the landslide could worsen with cave-ins to possibly progress towards the subproject site. Hence, mitigation measures are still necessary in the design to ensure this possibility (although very low or minimal) will not impact the subproject in the future.

[42] Flood Hazard Assessment for Samdrup Jongkhar Dzongkhag, FEMD, DES, MoWHS, 2019

V. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

A. Introduction

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

B. Impact assessment

124. The approach for the environmental assessment of this subproject 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 (Appendix 1) and No Mitigation scenario scoping checklist (Appendix 2);
(iii) Consultation with the design team on the proposed infrastructure design and plan;
(iv) Site visit and consultation with project staff; and
(v) Discussions between NHDCL, Thromde and current residents.

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

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

Table 20: Likelihood of Impacts from Occurrence

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

Table 21: Parameters for Determining Magnitude

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

126. **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 22: Parameters for Determining Significance

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

127. **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 in the table below.

Table 23: Significance of Impact Criteria

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

C. Summary of Impacts Rating for the Subproject

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

Table 24: Summary of Rating of Potential Impacts

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	No	Minor	Low	Negligible	Negligible
Disruption of utilities and services	Short term	Local	Yes	No	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]	Major	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	Minor	Mild	Low	Negligible
Construction of site office, worker camps and storage sheds, stockpile areas	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Excavation	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Water supply	Will be provided through municipal water supply							
Electrical connections	Substation will be installed by BPC							
Traffic and congestion from mobilization of construction equipment and materials	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

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

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

129. 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.

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

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

1. Impacts Due to Project Location

(i) Protected areas, critical habitats and endangered species

131. **Impact**. The site is located within the Thromde and is surrounded on three sides by buildings, settlement and roads. The project site is outside the Biological corridor and there are also no wetlands within the project area of influence.

132. As presented in Chapter IV of this IEE, 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 there is one Biological Corridor and one key biodiversity area (KBA) within 1 km from the subproject site, and that 38 IUCN Red List species of concern are identified within the default area of analysis. While these two sensitive areas are 1 km away, the implementation of the subproject will not affect these sites considering the nature and impacts of the subproject (housing development only) to be site-specific only. The IUCN Red List species of concern were assessed to determine the likelihood of them being found at the subproject site. Since the subproject site is already within the center of the city, the likelihood of these species being found at the site is very low. Nevertheless, the assessment included necessary written confirmation from the Department of Forest, which confirmed that none of these species were found or sighted at the subproject site. Accordingly, these species are found or dwell in the dense forest further and further up the slope of the district.

133. **Mitigation.** No mitigation is required.

(ii) Physical Cultural Resources

134. **Impact.** The closest physical cultural resource (PCR) is the Mani Dungkhori which is in the center of the town, about 1.5km away from the subproject site and separated by buildings, roads, and other establishments. Field assessment confirmed that there is no way that the subproject activities will impact the PCR.

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

(iii) Risk of natural hazards such as earthquakes and climate change considerations

136. **Impact.** The project site was assessed in terms of earthquake, flooding and landslide risks. Due to its location (proximity to the north- eastern parts of India, which are in the 'most active' seismic Zone V), the project's site is at high risk for earthquakes. The Dungsam river, which is about 40m from the site, has recorded flooding events in the past. Per flood risk profile (see Figure 27), the Dungsam river and its banks are within medium to high-risk zones. Historically, flooding of the river has damaged several infrastructures along the banks of this river. According to MOWHS,[43] the flooding at Dungsam river in Samdrup Jongkhar on 30th August 2015 damaged and washed away a suspension bridge connecting the Primary School to the rest of the Thromde leaving it inaccessible. However, the subproject site is within the low hazard/low risk zone in terms of flooding along the Dungsam river. This is attributed to the site's distance and higher elevation by 7 - 10 meters from the normal level of the river.

137. **Mitigation for flood and landslide risks.** The Thromde is responsible for ensuring the safety of its inhabitants. Post 2015 flood, the Thromde constructed flood protection structures along the Dungsam river to reduce the vulnerability of the people and infrastructure to flooding. During the 11th FYP, the Thromde invested about Nu.7.1 million in restoration of infrastructure damaged by floods and landslides.

138. For the subproject, any flooding that may occur at the site during rains or sudden downpour is mitigated by the drainage system that is integrated into the design of the housing complex. Further, the natural drains and topography in the area also allows stormwater from drainage canals to immediately flow down the direction of the river. No waterlogging at the site is expected. Furthermore, the design includes the boundary wall with chain-link fence surrounding the whole site and retaining walls towards the areas facing the river. In addition, hazard assessment done on the site provided several design measures to mitigate the risks which will be integrated into the final detailed design.[44] Among these mitigation measures are as follows:

(i) Surface water interception drainage should be provided to divert any water away from the housing colony site. Further marshy area should be drained by construction of internal drainages before any construction could begin;
(ii) As a mitigation measure for construction in soft ground at Toed, either soil replacement or pile foundation is recommended. If the soft soil layer is thin (say less than 5 m) then soil replacement can be adopted. In this method, a soft soil located relatively closer to the surface is replaced with granular cohesionless soil to ensure ground stability and reduce settlement. However, if the soft soil layer is thick, then a pile or raft foundation could be considered to prevent settlement of building foundation up to the bearing stratum. Ideally pile-raft foundation is best for soft ground. In order to confirm the thickness of soft stratum and depth to bedrock, Seismic Refraction Survey is recommended; and
(iii) With regard to flood, already retaining walls had been constructed by Samdrup Jongkhar Thromde. For better safety, these walls could be strengthened and heights increased. Further, dredging activity, which involves the removal of sediment from the bottom and sides of river channels resulting in straightening of channels and deepening of the river bottom, may be necessary from time to time.

[43] Flood Hazard Assessment for Samdrup Jongkhar Dzongkhag, FEMD, DES, MoWHS, 2019
[44] Hazard Assessments and SPT for the Proposed Housing Colony at Samdrup Jongkhar and Nganglam. 30 August 2021. (This is a 128-page document and a copy can be requested from the PMU at NHDCL.)

Figure 31: Elevational profile of the site and the river

Figure 32: Location of project site on the upper slopes of the river

139. **Mitigation for earthquakes and climate change events.** The design process has taken into consideration the requirements of Bhutan Building Regulations 2018 and other relevant rules or regulations as discussed in Chapter II of this IEE. The proposed project will also be guided by the Development Control Regulations 2016. Compliance with these rules, regulations and plans implies that the structural design will have considered and incorporated measures to minimize the risks of earthquakes.

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

141. The NHDCL has accumulated much experience in planning, designing and executing the construction of affordable housing projects around the country. The NHDCL has three primary Divisions: the Design and Planning Services Division that plans and prepares engineering drawings and designs and administers tendering protocols, the Construction Management

Services Division oversees construction works, and the Real Estate Management Services Division is responsible for maintenance of existing housing units across the country.

(iv) Disruption of existing utilities and services

142. **Impact.** There are electrical post, utilities and supply lines passing through the site, which could pose hindrance and safety risk to material transporters.

143. **Mitigation.** In consultation with the BPC and other respective authorities, these lines will be moved/shifted prior to construction. Also, the beneficiaries/users will be given prior information regarding the shift and possible power outage.

2. Consents, Permits and Clearances

144. All developments within the city are controlled by the Municipality, which is responsible for ensuring that development activities are aligned with the local area plan. Without approval of the subproject plan by Thromde, subproject implementation may not be able to proceed.

145. **Mitigation**. Site surveys and preliminary designs have been completed and the detailed design is under process. The construction approval process is standard. The land ownership certificate, official site plan along with the structural, electrical, sewerage, water supply and plumbing drawings certified by the design team will be submitted to the Development Control Division (DCD) of the Thromde. If the designs and drawings meet all the requisite requirements as per the rules, standards and guidelines, construction approval will be granted. If there are any reservations from the DCD, Thromde, this will be communicated back to the design team for rectification and revision of drawings.

3. Tree removal

146. **Impact.** The housing design and layout requires 8 trees to be removed at the site. Also, there is an internet cable that needs to be moved towards the periphery of the plot

147. **Mitigation**. The permit for tree felling and forest clearance has been secured and only the trees marked will be cut (see Appendix 12). All other conditions in the said clearance will be observed and/or complied with.

Figure 33: Vegetation on project site

148. Approximately 8 trees will be removed prior to construction. While the Forest Clearance does not require any compensatory plantation, the subproject will still aim to replant two trees for every tree that is cut. However, there is a limited space in the subproject site to undertake the tree plantation. Hence, the PIU will look for other sites where this plantation could be done, such as in landscaping or slope stabilization works elsewhere in the Thromde.

4. Construction schedule, cost estimation and bidding process

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

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

5. Compliance to ADB Loan Agreements and Safeguard Policies

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

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

153. 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.

154. 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.[45] Inclusion of the Cost of OHS is the minimum mandatory requirement 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.

6. Project Disclosure and Community Awareness

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

E. Anticipated Impacts and Mitigation Measures during Construction Phase

1. Socio-economic impacts

156. **Impact.** The project will generate employment and business opportunities for local suppliers of construction materials as well as material transporters and machine operators. The

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

socio-economic benefits of obtaining temporary employment in construction workforces can be significant for low-income people. There is currently an access road to the Archery ground that passes through the site, which will be blocked off once the project is completed.

157. **Mitigation**. The matter was discussed with Thromde on 16 May, 2022 and Thromde has informed that a separate alternative access for the archery ground is planned, so this will not cause any inconvenience to the archers.

2. Site preparation and Construction of site office, worker camps and material storage sheds

158. **Impact.** Once the contract is awarded, the site will be handed over to the contractor by the PIU. Additional space will be required to park machinery, build worker camps, storage sheds or for other purposes.

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

3. Recruitment and management of workers

160. **Impact.** 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.

161. **Mitigation**. The contractor will be required to follow the rules and regulations for foreign and local worker recruitment 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.

162. 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".*

163. 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.

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

4. Occupational Health and Safety

165. **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.

166. **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;[46] and by Regulation on Occupational Health, Safety and Welfare, 2012, and nominate a Health and Safety Focal Person (or equivalent) who will have the overall responsibility to ensure safe working conditions and environment for all workers. The contractor will provide required and appropriate PPE (e.g., safety boots, helmets, gloves, protective clothes, dust mask, goggles, and ear plugs), at no cost to the workers, maintain a PPE issue register, and enforce its use with sanctions for non-compliance. Contractor will institute protocols to deal with accidents (including evacuation of injured persons 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 be carried out during toolbox talks. To prevent accidents during electrical installation, only trained and competent electrical workers must be hired. The site will be provisioned with first aid kits and safety signage at critical and risky/precarious areas. Records of all accidents will be maintained including measures taken and workers will be compensated for work injuries and fatalities. The subproject site is located about 2-3km from the hospital, so easy access to health facilities is not a concern but the contractor must provide transportation during emergencies for workers.

167. The contractor will be required to institute minimum COVID 19 measures (if required) 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.

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

5. Excavation work

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

169. **Mitigation**. Most of the excavated material will be reused for filling in the building foundations and for leveling the parking and recreational areas. The remaining soil, if any, will be disposed at the Thromde-approved site. Also, dry sediment areas will be sprinkled with water to minimize dust.

6. Raw Materials Sourcing and Storage

170. **Impact.** Building materials to be used include (i) RCC for footing, columns, beams and slab; (ii) Random Rubble Masonry (RRM) wall for foundation; (iii) hard stones for stone filling; (iv) cement, sand, and graded crushed rock for concrete works; (v) Aerated Autoclaved Concrete blocks (AAC) for walls; (vi) WPC for door frames; (vii) FRP for window frames; (viii) tiles for flooring; ix) Unplasticized Polyvinyl Chloride (UPVC) for window shutters; (x) mild steel for railings; (xi) steel tubular truss; and (xii) Pre-Painted Galvalume Steel (PPGL) sheet for roofing. For toilets and drainage, materials to be used include (i) Chlorinated Polyvinyl Chloride (CPVC) pipes; (ii) HDPE Pipe; (iii) Indian-type vitreous water closet squatting pan; and (iv) European-type vitreous water closet pedestal for plumbing and sanitary works. All these materials will come from different suppliers and locations. Storage of all these materials will also be an issue at the subproject site. Without proper planning on sourcing and materials may lead to implementation delays and loss of materials.

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

172. Aggregate, sand and stone will be sourced from local authorized suppliers from within or from neighboring Districts. 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 requirements and delivery as required during each phase of the construction.

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

7. Water requirements

174. **Impact.** The construction work and the influx of many 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).

175. **Mitigation**. The Contractor will be required to ensure adequate water for domestic (drinking, cooking, washing and sanitation) and construction purposes. The existing water supply line will be utilized for this project so there is no need to install new water pipelines. 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

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

177. **Mitigation.** Within the municipality, the Thromde is responsible for the provision of such services. During the construction period, the required electrical supply will be utilized from the existing power line, with the approval of the BPC.

178. 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 are occupied in the future.

9. Sewerage Requirement

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

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

10. Mobilization of Construction Equipment

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

182. **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 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

183. **Impact.** The monsoon months are the periods of heavy rainfall between June and September. If excavation work is carried out during the summer months, the heavy downpour will wash away the exposed parts of the site.

184. **Mitigation.** All excavation work should be mostly completed before the onset of the incessant rain or after the rains, to reduce the runoff. If this plan is not completely possible, any excavation work during the rainy or monsoon season should be minimized. The site drainage will be planned to ensure that rainwater from excavated areas, worker camps and material storage areas do not cause erosion and sedimentation. The Contractor must construct temporary drains with silt traps to divert clean stormwater away from areas where loose excavated soil is exposed.

12. Ambient Air Quality

185. **Impact.** The infrastructure works will further diminish the air quality due to the cumulative increase in air emissions from operation of machinery and vehicles that will contribute to the air pollutant load (primarily particulate matter (PM), NO_x, SOx,, CO etc.). However, much of the impacts on air quality will occur during the construction period. The project site already has a bitumen plant towards the north of the site, a source of air pollution.

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

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

13. Dust Generation

188. **Impact**. Dust will be generated mostly during excavation, transportation and unloading of sand and other construction materials especially on windy days. Dust generated will potentially elevate the level of air pollution in the area in terms of particulate matter.

189. **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 to the Neighboring Community

190. **Impact.** The main sources of noise will be from construction activities such as use of welding machines, sawing of wood, concrete mixing, batching plant operation, excavators and movement of vehicles and trucks. The construction site is away from any residential building but has a primary school towards the southern border and although the classrooms are further away, during the construction period, construction work could cause noise disturbance especially from loud equipment that is constantly used during school hours.

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

192. **Mitigation**. The Principal of the Primary School who shared the southern border of the colony was consulted to inquire about any concerns he had once the construction commenced. The key concern expressed was the risk of heavy traffic of trucks plying along the Primary School transporting construction materials. As suggested, the NHDCL in consultation with the Thromde must install signage on the road to reduce speed of load trucks while approaching and driving along the school. Other measures are included under congestion and traffic management.

193. Measures to minimize disturbance to the school include restricting loud construction work between 8AM and 3PM and restricting workers from mingling with students. 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.

15. Solid Waste Generation and Management

194. **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.

195. **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, and maintain cleanliness of the respective premises or surroundings.

196. The contractor will ensure that workers are briefed on proper waste management and good housekeeping at worker camps is enforced. Separate bins for “biodegradable” 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 of with the guidance of Thromde.

197. During the consultation between NHDCL and Thromde on May 16, 2022, Thromde has informed the meeting that to accommodate the requirements for waste disposal, the Environment Officer will identify specific sites within the thromde to dispose a) Excavation waste and b) Construction waste, and the area and capacity of the sites will be communicated to NHDCL. In the meantime, the NHDCL will share with the Thromde the estimated quantities of waste and soil to be disposed of.

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

199. Just across the site, there is a scrap dealer

16. Community Health and Safety

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

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

17. Congestion and Traffic Management

202. **Impact.** The risk to human safety is the risk of accidents during material transportation especially if drivers are not careful and if construction material is stored along the access road.

203. **Mitigation**. The material transporters will be briefed to adhere to speed limits to reduce the risk of accidents. To reduce congestion, the contractor will coordinate with material transporters to schedule materials drop times and avoid peak school pick up and drop off times (e.g., 7.30-8AM and 3-4.30PM) in consultation with the school administration.

18. Aesthetic Impacts

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

205. **Mitigation**. The design team will consider requisite development controls (such as building height, ground coverage and minimum setbacks from roads and adjacent plots), as per the allowable local area plan. A major part of the land will be retained as parking and as green space. The building designs will also utilize the Bhutanese Architecture Guidelines[47] as a reference to ensure that the buildings blend in with the surrounding while maintaining certain elements of traditional Bhutanese architectural designs.

19. Chance Finds

206. **Impact.** Given that the locations and areas where earthmoving works will be required are known, chance finds may be remote as the existing buildings on the site have been there for many years now. Nevertheless, there is still a possibility that underground assets or archaeological artifacts may be discovered at the site, requiring precautionary measures and procedures to be followed.

207. **Mitigation**. Contractor(s) needs to be made aware of a chance find procedure. In case underground assets or archaeological artifacts are encountered during excavation, construction activities within a 30-meter radius in the area will be stopped immediately by the Contractor and the discovery will be reported by the site engineer or representative of Contractor to PIU. In particular, the following chance finds procedure should be strictly observed:

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

20. Natural Hazards and Accidents

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

208. **Impact.** The risk of earthquakes is high for the district. While the site is at low hazard and low risk zone in terms of flood, any extreme flooding along the Dungsam river may result into occurrence of landslides along the slopes near the subproject site. Over time, landslides in the area could put at risk the integrity of the subproject site.

209. **Mitigation.** The site is located 40m from the river and separated by the highway in between. The housing design will incorporate a retaining wall along the boundary of the housing complex to at least reduce the impact of potential landslides due to flooding along the Dungsam river. The Contractor will be required to follow the Thromde protocols for disaster management to ensure the safety of his workers. The Contractor will develop an emergency action plan to handle emergencies such as earthquakes, fires, breakdown in machinery, collapse of structures, electrical mishaps etc. These include identifying procedures to follow during emergencies, briefing workers on these protocols, displaying emergency numbers at conspicuous places in Dzongkha and English and identifying a meeting point for all workers in case of emergencies. Also, the contractor will provide transportation to the nearest hospital in case of accidents and emergencies.

21. Completion of construction work

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

211. **Mitigation**. Once the construction is over, the contractor will be responsible for ensuring decommissioning of all temporary worker camps. All temporary structures will be dismantled/demolished, temporary septic tanks (if not connected to the central sewer) will be emptied out and covered with an adequate amount of soil. All construction materials and debris will be removed before handing the site to the PIU. Any damaged property (government or private) will be repaired and/compensated before finally leaving the site. The site will then be replanted with appropriate species during landscaping and creation of green spaces.

212. 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.[48]

F. Anticipated Impacts and Mitigation Measures During Operation Phase

1. Impacts

213. 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.

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

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

2. Mitigation Measures

215. **Maintenance and delivery of services**. The NHDCL has a Real Estate Management Services Division/Unit (REMSD) that is responsible for managing and carrying out maintenance work on its buildings. The Liaison Office for Samdrup Jongkhar has a pool of trained and certified electricians, plumbers and masons in case repairs are urgently required. Other maintenance requirements are regular cleaning of the complex either by the residents or hired sweepers.

216. **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.

217. The Liaison Office must immediately intimate the Thromde Disaster Management Committee and follow their instructions in case of a disaster.

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

219. **Liquid and solid waste generation.** This is not a significant concern as the site is serviced by the municipal waste disposal service providers. NHDCL will promote waste segregation, storage, and disposal as per Thromde collection requirements and procedures and ensure that garbage is not allowed to accumulate on the premises. The new buildings will be connected to the centralized sewer network of the municipality.

220. Thromde during the consultative meeting informed that the housing designers refer to the sewerage network plan so that the complex can be connected accordingly and that there would be no need for septic tanks.

G. Cumulative Impacts and Mitigation

221. Due to its strategic location as a border town between Bhutan and India, the town is the Easternmost entry point into Bhutan. Although not as high as other tourist destinations, in 2017, Samdrup Jongkhar received 3,582 Indian tourists and 847 international tourists[49] but this stopped due to the COVID 19 restrictions on tourist entry. Due to geographical limitations, there is little room to expand due to the steep slopes. There is not much development within the Thromde apart from ongoing drainage construction works. The housing project will require resources such as water, timber, construction material and extension of existing municipal services such as waste management.

222. The construction impacts will be visible and have social and environmental impacts during the construction period of 24 months but most of these will be limited to the construction period and it is unlikely that any of the project impacts will go beyond 200m around each site. As the area is not a heavy development area and with all the mitigation measures to be in place, the construction activities will not result to any cumulative negative effects to the environment. The housing facility design also includes components and measures to avoid or minimize pollution to the environment. Thus, no cumulative negative impacts to the environment is likewise expected during the operation phase or when the housing facility is already in use or occupied.

[49] GNHC 2019, 12 FYP, Samdrup Jongkhar

H. Environmental Benefits and Enhancement Measures

223. Despite the transient negative environmental and social impacts, the project will generate substantial environmental benefits and enhancements. The project will significantly alleviate the housing crunch being faced by Thromde. Overall, the subproject will provide about 88 decent affordable accommodations for low-income government and corporate staff.

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

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

I. Summary of Impacts and Mitigation

226. This subproject involves the construction of 11 blocks of 8 units each totaling 88 units housing apartments within 2 acres of land, with internal access road, parking, service centre, Mani Dungkhor and green space.

1. Design and Pre-construction

227. Given that all the site is located within the core area and within a designated Local Area Plans, the project activities will have no impact on any protected area, critical habitats or endangered, rare or vulnerable species.

228. Approximately 8 trees will be removed prior to construction. While the Forest Clearance does not require any compensatory plantation, the subproject will still aim to replant two trees for every tree that is cut. However, there is a limited space in the subproject site to undertake the tree plantation. Hence, the PIU will look for other sites where this plantation could be done, such as in landscaping or slope stabilization works elsewhere in the Thromde.

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

230. The receptors that lie within the zone of influence (within 200m of the proposed infrastructure development work) are the residential buildings, shops, offices, and businesses (including ongoing construction work). Measures to minimize impacts from air, dust, noise and health and safety risks to the public and the resident communities have been incorporated during the construction phase.

231. The only disaster risk with the site is the risk of landslide due to scouring along the Dungsam river, which has been taken into consideration during the layout of the housing complex, keeping the buildings away from the riverside.

232. The project has no impacts on private land so there is no need for land acquisition. Also, the site is easily accessible from the highway. Also, drinking water supply schemes and electricity are already available at the existing house, which will be utilized during construction.

2. Construction phase

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

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

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

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

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

238. The construction team will comprise small teams of 30-40 workers at any given time. Also, work will be staged so that, as one team completes a task, the next team can be brought to the site, (e.g., stoneworkers, masons, tilers, woodwork, painters, electricians, plumbers etc.).

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

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

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

3. Post construction

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

243. All in all, the key areas of concern with this site are dust, noise and waste generation and disturbance to the community during construction.

244. On the social front, the Grievance Redress Mechanism will be instituted and required processes followed to ensure that there are no outstanding grievances due to the project. Any public or private property that is damaged during construction will be promptly repaired and

reported. Regular Environmental and Social Monitoring Reports will be submitted to the PMU and ADB on the status of the work and compliance with ADB safeguards, National Regulations, and the EMP.

VI. ANALYSIS OF ALTERNATIVES

A. Alternatives relating to Site Location

245. There is an acute shortage of government land within Thromde, and yet there is an urgent need to meet the immediate housing demand. This leaves very little room for alternatives. Since the project is geared for urban low-income staff and wage workers, the site location is ideal as it reduces transportation cost as most of the government offices, schools and businesses are located within a radius of 1km from the site.

B. Alternatives relating to Design and Technology

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

C. Environmental Implications of Alternatives

247. There are many positive implications of the selected alternative. Firstly, the building footprint utilizes only 55% of the 2 acres, while 45.2% will be maintained as green space in addition to the space that will be retained as parking.

D. Implication of No-Project Alternative

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

Table 25: Comparison of “With Project” and “No Project” Options

Description	No Project	With Project
Social impacts	Maintain status quo	The Project will assist the Royal Government of Bhutan (RGoB) establish housing infrastructures for those families that really need it the most- the low-income earners.
Physical impacts	None	The planned housing complex will be designed based on what is allowable within the local area plan.
Potential impacts due to seismic risks, environmentally friendly and climate resilience	There is an existing single-storey structure which is over four decades old at the site.	Design of buildings are as per Bhutan Building Regulations 2018, Bhutan Building Code of Bhutan 2018, Bhutanese Architectural Guidelines, 2014 and the Bhutan Green Building Guidelines, 2013; Development Control Regulation 2016; Bhutan building color code- 2014; The project will integrate innovative approaches to enhance resilience to geophysical events with suitable materials. The design includes parking, rainwater harvesting and installation of storage tanks. 11.5% will be left as green space.

Description	No Project	With Project
Environmental impacts Potential impacts to ecologically sensitive areas, critical habitats, biodiversity, and physical cultural structures	No impact as the site is located within city boundaries	Same as 'no project' scenario
Social impacts Potential impacts to indigenous people	There are no indigenous communities at or near the project site	Same as 'no project' scenario
Disruption to residents during construction	None	There will be some disturbance to residents living in close proximity to the construction site during the construction period especially due to construction noise There is a potential for traffic congestion to occur with increase in material transporting vehicles
Employment opportunities for locals	None	The project will provide employment opportunities for able, skilled, and non- skilled workers (both foreign and local)

249. **"No Project" option**: The no project option means that the existing housing crunch, a chronic issue being faced by low-income government and corporate employees will continue.

250. The lack of affordable housing further aggravates already existing urbanization woes such as increasing temporary huts, overcrowding in existing apartments resulting in unhealthy living conditions. The unaffordable housing also undermines a wage earner's ability to save money further widening the gap between the rich and the poor. This situation particularly impacts the low income and vulnerable population the most, as they continue to reside in housing complexes ill-suited to withstand the seismic risks and natural hazards.

251. **"With Project" option**: The new housing complex will be designed to suit the topography and surrounding land use. It will incorporate universal design features with sufficient parking, pedestrian footpaths, and efficient drainage systems. It will be designed for disaster resilience and fitted with fire extinguishers. Environmentally friendly/green features such as use of locally produced materials, improved window designs, waste management units, provision of adequate water storage tanks, open green spaces, and parking. Above all, it will provide opportunities for low-income families to save money while living in a healthy, spacious environment, near all amenities. The project will also generate employment opportunities for both skilled and unskilled workers during the construction phase.

VII. INFORMATION, DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Consultation and Participation

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

B. Approach and Methodology

253. Key stakeholders were identified and consulted during the project planning process. Copies of minutes of consultation meetings are in Appendix 6. The key stakeholders consulted are as follows.

(i) Thrompon and Thromde Staff at the Thromde office- 16 May 2022
(ii) Future potential residents- Current residents of NHDC housing colony, those in waiting for NHDC housing allotment and private company employees' -17 May 2022
(iii) Landlady of the neighboring building– 16 May 2022

C. Preliminary and follow up Consultations

1. Consultation and project disclosure with relevant stakeholders

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

255. Consultations were carried out with Thromde to discuss the proposed sites and related social (access, affected persons) and environmental concerns (water supply, waste and disaster risks) for each site.

2. Summary of key queries and clarifications regarding the subproject with the Thromde

256. The Objective of the consultation was to inform Thromde about the proposed housing project, to discuss critical project requirements such as water supply, waste collection, sewage, riverbank protection and disaster management. Clarification was sought on whether provisions will be made to increase the waste pick up services for Site #2 (Toed), as this area is serviced only once a week. Thromde clarified that so far, the waste services are being shared between Thromde and Deothang and services were limited to the limited number of waste collection trucks. However, recently, the Thromde has received 2 additional waste collection trucks so services can be adequately provided now. Also, it was clarified that the frequency of services is based on population, so as the population of Site #2 increases, the frequency of waste collection will also be increased by the Thromde accordingly.

257. Thromde was requested to identify waste disposal sites for disposal of excavated soil and construction waste that will be generated during the construction period (including post

construction camp closure) and in turn NHDCL will share the quantities of waste to be disposed during the construction period.

258. Thromde also shared its plans for sewage connection, water supply and a footpath along the river for the public.

259. The NHDCL also requested Thromde for an assurance letter to provide the required services during and after construction. The assurance letter is attached in Appendix 6 along with the minutes of the meeting.

3. Meeting with stakeholders on site

260. On 16 May 2022, owner of two buildings adjacent the subproject site was consulted with regard to the suproject. During the discussions, the owner conveyed the message that she had no objection as to the construction of the housing colony. Howwever, he expressed several concerns that the subproject should observe during the implementation phase, as follows:

(i) Avoid spilling construction materials and debris on to her plot;
(ii) Build a wall along the boundary with her plot to avoid trespassing to her plot and vice versa;
(iii) She be given the proper access through the existing approach road to her plot since the entry point was too narrow and trucks cannot come into her parking. In this regard, she was advised to write to Sammdrup Jongkhar Thromde to properly convey her request, and thereby review such request.

4. Meeting with potential beneficiaries

261. On 17 May 2022, a public consultation was conducted with the potential beneficiaries of the subproject. The consultation was attended by 14 participants (7 males and 7 females), which include the facilitators/organizers of the meeting. During the meeting, the NHDCL Liaison Officer presented the proposed housing sites, buildings, class of apartments, designs and layout. Feedback was also sought from participants on presentation of housing details, experiences living in private and corporate housing, current management of NHDCL housing and suggestions for future. The participant views and suggestions on design compatibility with the place and climate of Samdrup Jongkhar, water supply and waste disposal issues were discussed. Summary of the discussions is as follows:

(i) Participants were encouraged that low-cost housing will provide alternatives to existing high rentals they pay in private housing in Samdrup Jongkhar and also that corporate and private sector are also included as eligible for housing. Concern that minimum wage workers may be left out of this scheme as even subsidized housing may not be affordable;
(ii) Small size of apartments designed to make them more affordable for especially low-income staff working in government, SOEs and private companies and industries;
(iii) Tenancy contracts not widely drawn up by private owners with tenants living in private housing and rental increase often do not follow rules (max 10% rental increase after two years of lease). New owners invariably raise rent even if previous contract has not expired and tenants are helpless;

(iv) NHDC can institute management measures to improve tenancy and O&M management of facilities such as retaining 15 days for making ready the housing unit for carrying out repairs before new tenant can occupy the unit; ensuring there is a network map of all services (water, telephone, electricity, etc.) to ease future maintenance. Electrical and water fittings of good quality, functional and locally available better for future replacement;

(v) On the environment side water issues to be solved e.g. through providing storage tanks and rain water harvesting which this project will incorporate in designs to supply water during times the man water supply fails to provide water to housing residents. Sewerage network being developed under another project will resolve issues of sewerage disposal for the housing colony;

(vi) Waste collection is being done but disposal in communal waste bins have not worked in the past. frequency to be enhanced in housing colony;

(vii) BPC will be installing a sub-station so no issues are expected with regard to power supply;

(viii) For emergencies, the Thromde will be requested for the disaster management plan to which the NHC would comply with the SOPs in the event of emergencies occurring;

(ix) In adapting to the hot and humid climatic conditions, participants suggested that window frames etc should be made of steel rather than wood which can decay due to effects of rain in summer; and

(x) Clarified on service delivery from the Service Centre to be established at the housing colony. The Centre would be operated by RENEW. The Centre will contain an early childhood care centre as well as shelter home for women facing domestic violence as well as other services for women's development.

262. On 18 May 2022, a virtual consultation was also conducted with the principal of the Primary School nearby the subproject site. The principal was informed about the project, and accordingly, had no objection as to the construction of housing facility in the area. However, the principal raised the following concerns that should be considered by the project, especially with regard to safety of school childred during the construction phase, such as the installation of signages on the road for reducing speed of load trucks while approaching and driving near the school since students would be at risk of being hit and since the children are too young to properly cross over the road.

263. The Minutes of the meetings are attached in Appendix 6.

D. Information Disclosure

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

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

VIII. GRIEVANCE REDRESS MECHANISM

266. The project adopts 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.

267. 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.

268. **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.

269. **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.

270. **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.

271. **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, the concerned officer of PIU will direct the contractor to resolve the complaint and ensure that it is resolved. If the grievance is not under the contractor's scope, the Project Implementation Assistance Consultant (PIAC) will resolve this issue with the support of respective PIU. Efforts will be made to resolve all grievances within two days from the date of receipt of a complaint / grievance. Relevant government representatives from the respective districts and sub-districts, where the subproject will be implemented, can be consulted as and when required.

(ii) **2nd Level Grievance (PIU)**: Grievances that cannot be redressed at first level within two days will be brought to the notice of the Complaint Cell at PIU level. The Project Engineer will try to resolve the grievance/ complaint within a timeframe of 14 days of receiving the complaint from the first level. The PIU may consult/seek the assistance of the Environment and Social Safeguard Officers at the PMU level. Government representatives from the respective districts and sub-districts where the subproject will be implemented can be consulted as and when required. Any unresolved complaint at the second level will be taken up to the third level.

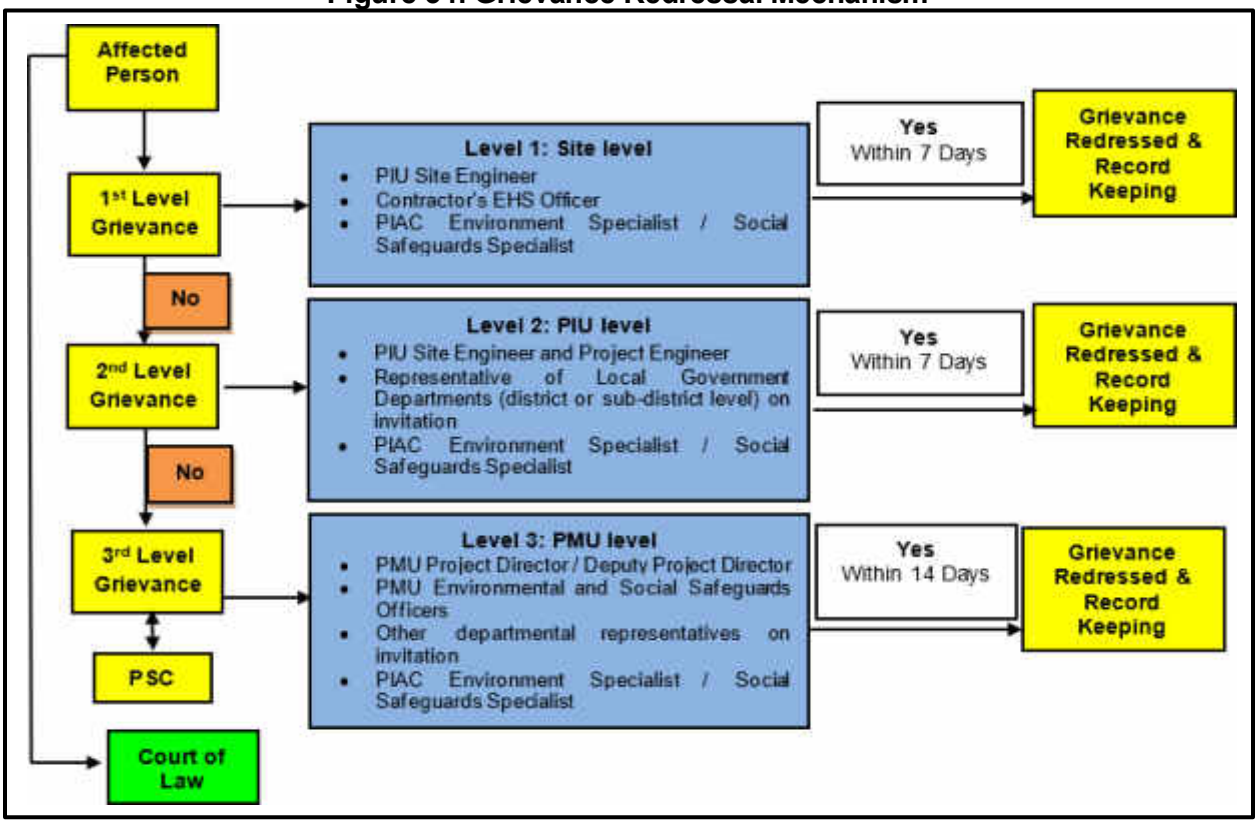
(iii) **3rd Level Grievance (PMU):** All the grievances that are not addressed at 2nd level by PIU will be brought to the third level. The third level will meet once a month and determine the merit of each grievance/s brought to the committee. The third level grievance redress committee will resolve the grievance within 14 days of receiving the complaint from the second level. The Environmental Safeguards Officer or Social Safeguards Officer, PMU will provide feedback to the complainant. Any critical or unresolved matter may be taken to the Project Steering Committee (PSC) for solution.

272. 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.

273. 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.

274. The process of the project GRM is given in **Figure 34**.

Figure 34: 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

275. 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.

276. **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.

277. **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.

278. **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.

279. **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.

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

281. **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 a 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 may approach the Accountability Mechanism. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Arrangement

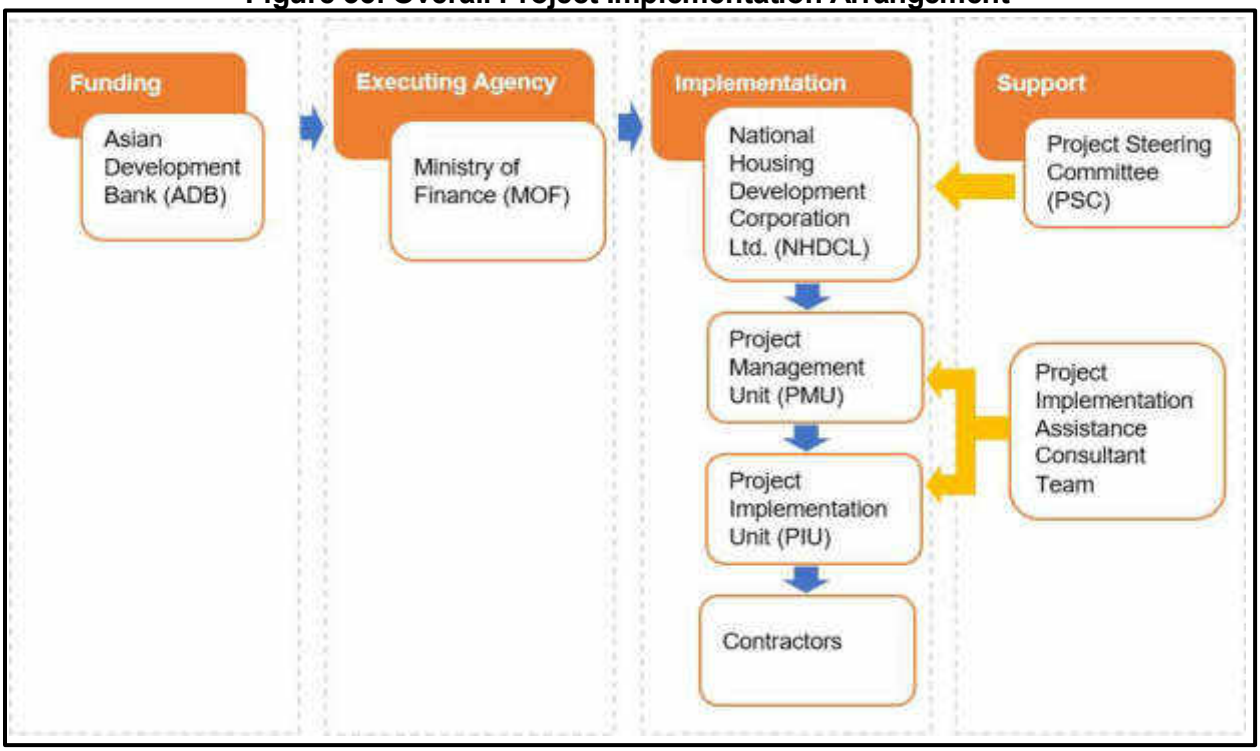
282. **Overall Project Institutional Arrangement**. The Ministry of Finance (MOF) is the executing agency and the National Housing Development Corporation Limited (NHDCL) is the implementing agency of all outputs of the proposed Bhutan Affordable Housing Development Sector Project. MOF and NHDCL will engage relevant government agencies[50] and NGOs in designing and operationalizing the project. International and national consultants will be recruited to provide expert assistance. A central project steering committee (PSC) set up under the project will facilitate and ensure adequate coordination among relevant stakeholders and provide guidance for PMU and PIUs for this proposed project. In particular, the PSC will: (i) meet at least semi-annually or more frequently if required; (ii) provide guidance for and ensure the implementation of government and ADB policies for the proposed Project; (iii) assist in resolving any interagency implementation problems; (iv) review relevant reports and audit statements from PMU and PIUs, as and when required; and (v) ensure that conditions of the Loan Agreement with ADB are met.

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

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

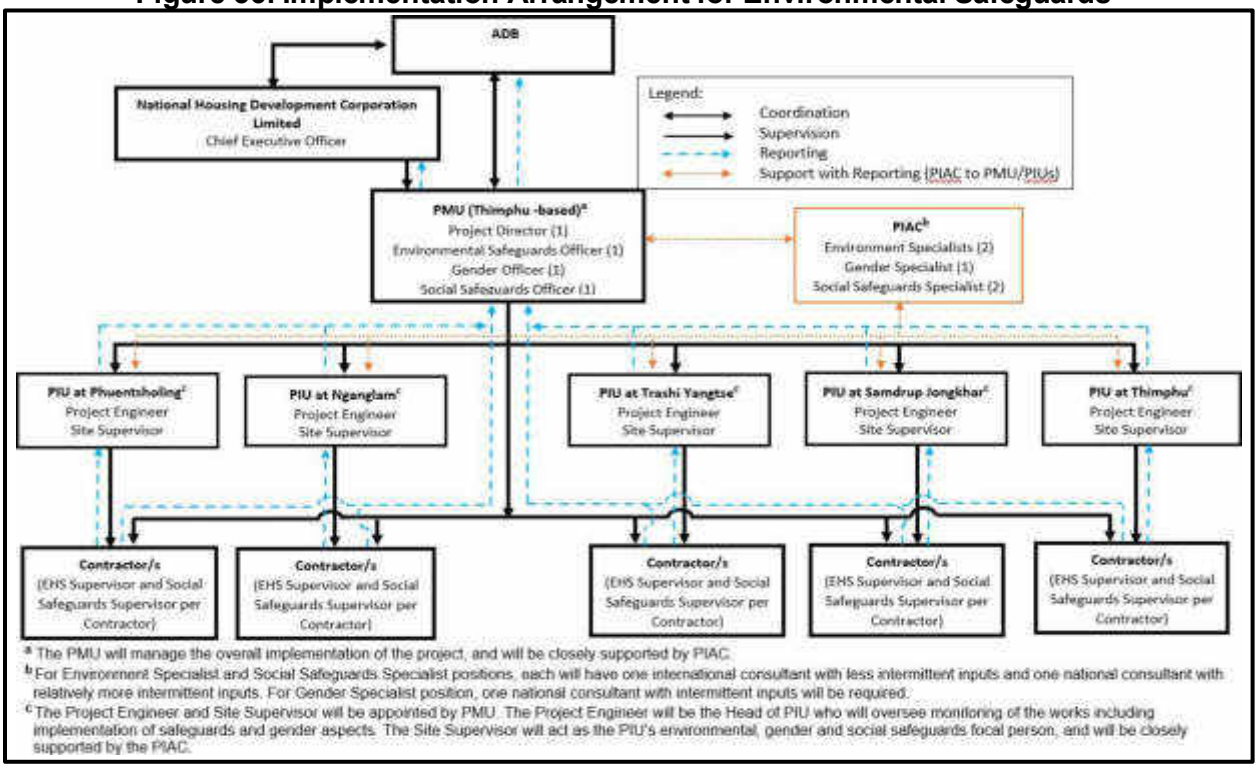
[50] Department of Disaster Management (Ministry of Home and Cultural Affairs); Department of Engineering Services; Department of Geology and Mines; etc.

Figure 35: Overall Project Implementation Arrangement



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

Figure 36: 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.

286. **Project Management Unit.** The PMU works closely with the PIUs in implementing the environmental safeguards requirements of the project. The PMU is staffed with at least one (1) environmental safeguard officer who leads the efficient overall implementation of environmental safeguards. With support from the PIUs and PIAC, the PMU has 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 the 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.

287. **Project Implementation Unit (PIU)**. The PIU is responsible for the day-to-day activities of project implementation in the field and has direct supervision to the contractors at subproject sites. The PIU is headed by a Project Engineer who oversees the overall implementation of the project including safeguards. The PIU has a Site Engineer who oversees and monitors the day-to-day progress and implementation of the environmental provisions in the EMP. With support from PIAC, the Site Engineer needs to:

(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.

288. **Environment Specialist Consultant**. The PIAC has been constituted and includes an Environment Specialist Consultant who assists 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. 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 prepare the environmental assessment.
(iii) Undertake environmental categorization for the proposed future subprojects.
(iv) Carry out IEE for the proposed future subprojects and formulate 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 the 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 the 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.

289. **Civil Works Contract and Contractor.** The IEE with EMP will form part of bidding and contract documents and verified by PMU. The Contractor will be required to designate an environment, health, and safety officer (or equivalent) to ensure implementation of EMP during civil works. Contractor is to carry out all environmental mitigation and monitoring measures outlined in their contract. The Contractor will be required to submit to PMU, for review and approval, a SEMP including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program per EMP; and (iv) budget for SEMP and EMP implementation. No works can commence until SEMP is approved by PMU.

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

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

291. A copy of the EMP/approved SEMP will be always kept on-site during the construction period. 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.

292. 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 26: 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 a checklist available from ADB. Based on the REA, categorize the project based on ADB SPS. Submit all categorization forms to ADB.	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 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.	ADB to review the REA checklists and reconfirm the categorization.
Based on its review, PMU will approve the IEE and send it 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 will 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 the 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 regarding the 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. The 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 ensures that the total budget for implementing the EMP	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	

Project Management Unit	Environment Specialist Consultant	ADB
is included in the bid and contract documents.	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. Corrective actions to be undertaken if needed.	Contractor to conduct environmental monitoring and implement SEMPs/EMPs. The Environment Specialist Consultant will assist the PMU environmental officer in (i) review and approval of contractor's implementation plans such as EMPs/SEMPs, and (ii) monitor the implementation of mitigation measures in the EMPs/SEMPs by contractors. The Environment Specialist Consultant will also prepare monthly progress reports including a section on implementation of the mitigation measures and submit them to PMU for review.	ADB to review the reports and provide necessary advice/guidance needed to the PMU.
Operation Stage		
PMU to conduct monitoring, as specified in the environmental monitoring plan of EMP. NHDCL to monitor the performance, if required and as specified in the monitoring plan of EMP.		ADB to review semi-annual environmental monitoring reports and disclose them on its website. ADB to prepare Project Completion Report
PMU to continue submission of semi-annual environmental monitoring reports to ADB until Project Completion.		

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

293. The 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.

294. 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 27: Environmental Management Plan

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
Design / Pre- construction phase					
Subproject Location	Impact on protected area, and other environmentally sensitive areas.	The subproject site is located within the towny limit, so no mitigation measure is required with regard to impact on protected areas or other environmentally sensitive areas.	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 the Mani Dungkhor at the center of the town, which is about 1.17km 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. • Integrate into the final detailed design all recommendations made as a result of the hazard assessment on the site. See pages 14-15 of the report.[51]	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 Thromde. • Consult with the Thromde to confirm the level of the highway as planned in the LAP, to keep the ground level of the site in line with the designed level of the new township. • Seek approval for environmental clearance from NEC.	PMU Operating cost	PIU	PMU
Removal of existing structures	There are electrical lines that pass through the site that could pose a risk during construction period	• The project will request the BPC to remove the electrical lines from the site and ensure this is carried out before construction period.	PMU Operating cost	PIU	PMU
Removal of trees	8 trees were required to be removed	• The Forest Clearance for cutting the trees has been sought and included in Appendix	PMU Operating cost	PIU (permit)	PMU

[51] Hazard Assessments and SPT for the Proposed Housing Colony at Samdrup Jongkhar and Nganglam. 30 August 2021. (This is a 128-page document and a copy can be requested from the PMU at NHDCL.)

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		12. • Replant the area with at least double the number of trees cut during landscaping as compensatory measure in consultation with Thromde and local Forest Office			
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[52] 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 a contractor is selected, conduct awareness for contractors on their	PMU Operating cost	PIU / PMU	PMU

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

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		responsibilities in EMP implementation, compliance with ADB and RGOB 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"[53] with respect to screening recruitment, worker permits, road passes, management, and repatriation	Contractor's cost	Contractor	PIU

[53]RGOB. Regulations on Working Conditions, 2012

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• Process for worker permits and entry as per prevailing health restrictions and screening requirements. • Follow restrictions on employment of children below 18 years. • Employ trained and skilled national workers wherever possible. • If a 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 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

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
Occupational health and safety	Health and safety risks for construction workers	• Prepare a site-specific health and safety management plan including COVID 19 H&S measures (if COVID still prevails) and follow COVID 19 protocols as per the prevailing requirements of the Ministry of Health and the COVID Taskforce. • 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;[54] • Screen workers at their point of origin for both virulent and contagious diseases, including COVID-19. • Identify 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 training/ 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	Contractor's cost	Contractor	PIU

[54] 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
		for treatment and recovery, loss of ability to work, and loss of life • Provide medical assistance for cases of workplace related injury. • Provide adequate payment and facilities (lighting) for overtime work. • Post/Display emergency contact numbers of the staff as well as Police/Hospital/Fire at a visible location. • Provide workers with Personal Protective Equipment (PPE) such as safety helmets, 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 an 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) • 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.			

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
Excavation work	Mismanaged spoils and debris from loose excavated soils and demolished structures.	• Reuse excavated soil for filling in the building foundations and for leveling the parking and recreational areas • Remove excess excavated soil within 2 weeks of excavation and dispose of it at an approved/ designated site. • Seek approval/permit for disposal of soil/spoil from the Thromde and remove unwanted soil / debris from the site within 2 weeks of excavation and dispose of at pre-approved disposal site.	Contractor's cost	Contractor	PIU
	Dust generation on windy days	• Enclose excavated areas to contain dust. • Spray water over loose soil piles and debris 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 a material storage shed, maintain inventory, and keep valuable items locked. • Appoint security guard if necessary • Stack material in a safe and orderly manner	Contractor's cost	Contractor	PIU
Water Requirements	Water supply shortage due to additional demand for drinking, cooking, washing as well as construction and its associated activities (sprinkling/spraying and cleaning).	• Ensure adequate water for domestic (drinking, cooking, washing and sanitation) and construction purposes. • Install adequate water tanks or mobilize water tankers during periods of shortage. • To conserve water, check, repair and maintain all water supply pipes to prevent leakages or blockages.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
Electrical requirements	Delay in project implementation at the site due to lack of electrical power supply.	• Request from Bhutan Power Corporation for service on the handling of electricity connection before, during and after the construction works.	Contractor's cost	Contractor	PIU
Sewerage requirement	Without any adequate sewerage system at the site, discharge of greywater and blackwater from the site and workers' camp could pollute the receiving bodies of water in the area.	• Connect the workers' camp temporary toilets to a septic tank which will be used until the end of the construction period, after which the septic tank will be decommissioned and cleared out • Coordinate with Thromde for desludging / vacuum cleaning of tanks annually, if required • Repair and maintain sanitation facilities.	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 to 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 the receiving body of water and canals in the area, resulting in 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 are connected to the 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	• 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.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
	and vehicles will contribute to the air pollutant load (primarily particulate matter (PM), NOx, SOx, CO etc.) in the ambient air Dust from excavation and other construction activities.	• 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. • Remove excess excavated soil from the site within 2 weeks of excavation and dispose at the designated disposal site. • Seek approval/permit for disposal of construction waste from Thromde and remove debris as soon as possible			
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 loud construction work between 8AM- 3PM • Brief workers on their obligations regarding proper management of work and behavior with sanctions for inappropriate behavior or repeated complaints from the school or community • Implement a preventive maintenance schedule for all heavy construction equipment and machinery to minimize noise and vibration. • Do not allow woodwork such as the use of sawing machines at the site. Doors and windows must be fabricated off site or outsourced.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
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. • Allocate waste storage areas where wastes can be stored and then collected by the municipal trucks and ensure that waste does not pile up at site by follow waste collection schedule • Ensure that workers are briefed on proper waste management and good housekeeping at worker camps and • Conduct weekly cleanliness checks of the worker camps and construction site	Contractor's cost	Contractor	PIU
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 the public from the site and control access to the site. • Install signboards to notify passers-by of ongoing work, install warning signs near access road to reduce speed of load trucks while approaching and driving along the school • Impose speed limits for trucks near the construction site and Instruct drivers to be mindful while driving past the school to reduce the risk of students being hit and allow them to properly cross over the road. • Restrict unloading or storing of construction material along access roads, on top of drains and footpaths.	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.	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		• 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. • Remove excess excavated soil from the site within 2 weeks of excavation and dispose at the designated disposal site.			
	Congestion and blockages/obstructions	• Brief drivers on restriction of spillage or storing of construction material along access roads, 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 the 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	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		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 emergencies • Brief workers on protocols to follow during earthquakes and floods • 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 collapsing. • 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			

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
Post construction – camp closure	• Positive impact resulting in 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 • 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	Contractor's cost	Contractor	PIU
Post-construction – greening and landscaping	• Positive impact resulting from enhancement of the surrounding environment.	• Improve aesthetic view by landscaping • Develop green belt around the housing complex by planting suitable plants	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

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
	Accidents and emergencies and natural disaster	• Follow instructions from the 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 • Maintain the phone number of the tenants so that they can be warned in case of a pending flood risk.	Housing Management Cost	PIU	PIU / PMU
	Buildup of sewage that could impact surface water and groundwater	• Coordinate with Thromde to ensure maintenance of sewage lines	Housing Management Cost	PIU	PIU / PMU
	Solid waste generation that could impact the environment	• Follow Thromde waste management guidelines and garbage collection and disposal times and ensure that garbage is not allowed to accumulate on the premises.	Housing Management Cost	PIU	PIU / PMU

C. Environmental Performance

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

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

X. MONITORING AND REPORTING

296. 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.

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

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

298. 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.

299. 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) daily. A sample daily monitoring sheet which can be used by the contractor is in Appendix 9. This monitoring sheet is indicative which can be further enhanced depending on the actual situations at the subproject construction site.

300. The PIU will submit quarterly environmental monitoring reports to PMU, which will include a summary of daily monitoring activities of the contractor and results of any independent monitoring or inspection activities of the PIU. A sample inspection checklist is in Appendix 10. This checklist is indicative which can be further enhanced depending on the actual situations at the subproject construction site.

301. PMU shall consolidate quarterly reports from the PIUs, which include reports from the PIU for this subproject, and results of its independent monitoring or inspection activities. PMU shall accomplish a 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 project completion. The template for the SEMR is attached as Appendix 11.

302. 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 28: 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	Project design and approvals	• Infrastructure design and construction 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 NHCDL website, • Project contact number on signboards • Minutes of Meeting/Consultation with Affected people, potential beneficiaries, and community	One time	NHDCL	PMU
8	Baseline data gathering	• Baseline ambient air quality • Baseline noise level measurement	One time	PMU/PIU[a]	PMU
Construction phase					
9	Consents and Permits	• Tree removal • Waste disposal	One time	PIU and contractor	PIU
10	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
11	Worker's welfare (health and safety)	• No. of worker camps • Availability of safe drinking water, electricity, and	Monthly	Contractor	PIU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
		sanitation facilities (with separate toilets for males and females) • PPE distribution list/records • Ocular inspection of the cleanliness of worker camps • safety structure installed • Overtime facilities provided • Emergency Contact numbers displayed • Assembly points identified • Emergency protocols • First aid kid • Warning signs at risky/hazardous areas • Records in accidents register with incidents and actions taken. • No of fire extinguishers installed at site • Type and no. of trainings (training record)			
12	Temporary land requirement for worker camps and storage	• Land lease agreement between contractor and landowner/government	One time	Contractor	PIU
13	Air pollution control	• Use of electrical appliances • Ocular observation of vehicles and site conditions • Use of reconditioned machines and vehicles. • Maintenance of machines	Monthly	Contractor	PIU
14	Dust pollution/ minimization	• Ocular observation of dust and dust suppression measures undertaken as per EMP	Monthly or as necessary (ocular)	Contractor	PIU
15	Ambient air quality monitoring	• Ambient air quality sampling - Within site boundary - Primary School compound - Nearest receptor in downwind direction, if there is any.	At least semi-annually	Contractor	PIU
16	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
17	Waste management of worker camps, construction sites	• No. and types of waste bins installed • No. of truckloads of construction waste disposed • Ocular inspection of camps and construction site • Segregation, storage of hazardous waste	Monthly or as necessary	Contractor	PIU
18	Generation of excavated soil	• % soil reused for construction • % soil disposed • Ocular observation of soil pileup at site	One time	Contractor	PIU
19	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
20	Noise pollution and disturbance	• No. of complaints received from neighboring residents/community	Monthly or as necessary (monitoring of complaints)	Contractor	PIU
21	Noise level monitoring	• Noise level measurement - Within site boundary - Primary School compound • Nearest residential structure, if any that is likely impacted	At least semi-annually	Contractor	PIU
22	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
23	Material storage	• No. of material storage sheds • Ocular observation on material storage at site • Material inventory	Monthly	Contractor	PIU
24	Community health and safety	• Consultation with community (minutes of meeting, participant list) • No. of safety signs • Installation of barricades	Monthly	Contractor	PIU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
		• Obstruction of access routes/paths • No. of accidents occurred • No. of complaints received			
25	Camp closure	• Ocular observation of site conditions and compliance to EMP	One time	Contractor	PIU
Operation phase					
26	Operation phase	• Maintenance records	Every quarter	NHDCL estate management	PMU
27	Fire hazard	• No. of fire extinguishers, and maintenance record	Once a year	NHDCL estate management	PMU
28	Sewage and sanitation	• Maintenance record	Once a year	NHDCL estate management	PMU
29	Waste management	• Maintenance record	Monthly	NHDCL estate management	PMU

[a] Should baseline data gathering is not done prior to award of contract, PMU shall require contractor to undertake this baseline data gathering prior to any construction work. Budget for this baseline data gathering could be drawn from the contingency amount for EMP implementation.

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

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

304. ADB's monitoring and supervision activities must be carried out on an on-going basis until project completion.

A. Capacity Building

305. 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.

306. 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.

307. 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 29: 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 format 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

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

Table 30: 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 a 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 on site. (With information to submit posters samples 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 intervals (type of tests and checkups that should be done to be mentioned to Contractor and records to be submitted to	person	50 X 2	25.00	2,500.00

	Activities or Items	Unit of Measure	No. of Units	Unit Cost ($)	Total ($)
	client).				
A.5	Training 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 equipment, first aid kits, fire extinguishers. (PPE extra stock of minimum 10% of total workers should be available with stock and the 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.	months	18	2,000.00	36,000.00
B	EMP MONITORING (Air quality monitoring, set intervals for monitoring. Reports should be submitted along with the signature of a witness from the consultant).				
B.1	Baseline Data Collection of Air quality and Noise Level	Samples	1	250.00	250.00
B.2	Monitoring of Air Quality at downwind location.	Samples	4 (1 location x 4)	250.00	1,000.00
B.3	Monitoring of Noise Level at site	Site	4 (1 location x 4)	20.00	80.00
C.	Enhancement Measures				
C. 1	Landscaping after the construction period	Sqm	Cost included in Contractor's BOQ cost.		
D.	COVID-19 HEALTH AND SAFETY PLAN (if required)				
D. 1	Thermal scanners. All persons at the worksite should have their temperature screened with Infrared Thermometer (handheld non-contact). [Dr. Trust(USA) Non-Contact Forehead Temporal Artery Infrared Thermometer]	scanner	2	60.00	120.00
D. 2	Contactless attendance system. (This is a biometric attendance system unit. Prices for contactless system are not available)	unit	1	110.00	110.00
D. 3	Liquid Soap & Hand washing arrangement at site	L.S.			100.00

	Activities or Items	Unit of Measure	No. of Units	Unit Cost ($)	Total ($)
D.4	Contactless, sensor-based/ pedal operated sanitizer [Metal foot sanitizer dispenser]	unit	3	30.00	90.00
D.5	Additional rest areas at sites and dining spaces in camp site	L.S.	Cost included in Contractor's BOQ cost.		
D.6	Ensure availability (even tie-up) of Ambulance equipped with all necessary items like nose masks, first aid kits, aprons, disinfect solutions etc.	No additional cost required but should be monitored.			
D.7	First aid kits with hand sanitizers and hand wash liquids shall be mandatory available in all the vehicles without any lapses.	L.S.			200.00
D.8	Regular notification by local government, district authority should be adhered to, and all the staff should be compulsorily made aware of such notification.	No additional cost required but should be monitored.			
D.9	Job protection of workers during the crisis period of COVID 19 pandemic needs to be ensured.	No additional cost required but should be monitored.			
F.	Contingency (10%)[a]				4,765.00
	Total				52,415.00

[a] Should baseline data gathering is not done prior to award of contract, contractor shall undertake this baseline data gathering prior to any construction work. Budget for this baseline data gathering could be drawn from this contingency amount.

XI. RECOMMENDATION AND CONCLUSION

309. 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.

310. The NHDCL will construct 11 residential buildings on 2 acres of land in the town area. The land user certificate has been processed from the National Land Commission.

311. There is no need for land acquisition and there are no impacts on ecological habitats and wildlife species in the vicinity. The project design will take into consideration required building design regulations and guidelines to ensure earthquake resilience, flood risks, climatic conditions and Bhutanese architectural designs.

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

to the conditions of the loan agreement, ADB safeguard policies, National regulations and the EMP.

313. Based on the findings of the IEE, impacts mainly due to construction activities are found to be site-specific, short-term and manageable through the measures specified in the EMP. The overall conclusion of this process is that provided the mitigation, compensation and enhancement measures are implemented in full, there should be no significant negative environmental or social impacts because of location, design, construction or operation of the subproject. No further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or national regulations.

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

Appendix 1: Rapid Environmental Assessment Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (SDSS) for endorsement by the Director, SDSS and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: Proposed Affordable Housing Developing Project

Sector Division: Urban Development

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area			
▪ Densely populated?		✓	The site is located within the city core. Samdrup Jongkhar Town has a population of 10,545 with an area of 4.47 square kilometers
▪ Heavy with development activities?		✓	As the smallest Thromde in the country and as the farthest eastern District, it is mostly a transit town for travelers. There is limited infrastructure in terms of hotels and limited economic activity.
▪ Adjacent to or within any environmentally sensitive areas?			No, the site is located at the city center
● Cultural heritage site		✓	The closest religious site is the open park in the city center where the Mani Dungkhor is located, which is about 1.5km away from the site.
● Protected Area		✓	The closest protected area is the Biological Corridor that is about 1 km away
● Wetland		✓	There is no wetland in and around the area.
● Mangrove		✓	There are no coastal areas in Bhutan.
● Estuarine		✓	There are no coastal areas in Bhutan.
● Buffer zone of protected area		✓	The closest protected area (Jomotsangkha wildlife sanctuary) is more than 30km away.
● Special area for protecting biodiversity		✓	There is no special area for protecting biodiversity in and around the area.
● Bay		✓	There are no coastal areas in Bhutan.
B. Potential Environmental Impacts Will the Project cause…			

Screening Questions	Yes	No	Remarks
▪ impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.			Construction of 11 blocks of 8 units each totaling 88 units housing apartments with a service center block and a Mani Dungkor on government land. 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 to reach the subproject area.
▪ deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		✓	The activity is within the permissible development activity and the local area plan.
▪ degradation of land and ecosystems (e.g., loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	The project site is far from these types of ecosystems.
▪ dislocation or involuntary resettlement of people?		✓	There are no affected families
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or another vulnerable group?		✓	Not anticipated as per social safeguards report. The project is a pro-poor and gender-inclusive undertaking as it aims to provide affordable housing to the less privileged (low-income) population
▪ degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	The site was and will continue to be used for housing purposes. The project site is not within or near (at distances that could not impact or influence) any of the environmentally sensitive areas and cultural properties. The land use in the area is for residential purposes and will not conflict with tourism activities in the city.
▪ 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 was previously used as a storage area
▪ water resource problems (e.g., depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?		✓	The site is already connected by the municipal water supply line. There is an existing stormwater drain towards the east.
▪ air pollution due to urban emissions?	✓		This is anticipated during the 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.

Screening Questions	Yes	No	Remarks
▪ 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 the construction phase. Occupational health and safety hazards from construction works will be mitigated through the OHS measures, many of which are mandatory by regulation. The environmental management plan (EMP) of the project will provide measures to mitigate this impact.
▪ road blocking and temporary flooding due to land excavation during rainy season?		✓	Excavation works are limited to foundation works within the site boundary, so it is not expected to cause any roadblock. Site drainage will connect to the municipal drain.
▪ noise and dust from construction activities?	✓		Anticipated but will be temporary during construction phase and limited to the project site. The EMP of the project will provide measures to mitigate this impact.
▪ traffic disturbances due to construction material transport and wastes?	✓		The access along the alternative highway to Trashigang. The impact on traffic disturbance will be temporary during the construction phase only. The EMP of the project will provide measures to mitigate this impact, such as, for example, scheduling of the transport of materials and wastes during non-peak hours of the day.
▪ temporary silt runoff due to construction?	✓		This is anticipated if excavation works are undertaken during the rainy season. The EMP of the project will provide measures to avoid or minimize runoff, such as, for example, avoiding or minimizing heavy excavation works during monsoon season, providing silt traps or canals around the site, etc.
▪ hazards to public health due to ambient, household, and occupational pollution, thermal inversion, and smog formation?		✓	Not anticipated for a housing development project. The construction activities will be carried out within the site boundaries only.
▪ water depletion and/or degradation?		✓	During the construction phase, there will be an increase in demand for water use for construction activities as well as for domestic purposes, but this will be temporary. Once the project is in operation (or when the housing units are already occupied and used), there should be no issue with water supply depletion as the same existing residents within the Thromde will move to the new facility (no net increase in residents). Besides, the design includes rainwater harvesting that will reduce water dependence from the city's piped water services.
▪ overpaying of groundwater, leading to land subsidence, lowered ground water table, and salinization?		✓	Underground water will not be extracted at all. Water will be taken from the piped water supply facility in the area.
▪ contamination of surface and ground waters due to improper waste disposal?		✓	Mitigation measures for waste disposal are outlined in the EMP. Also, the area is serviced by the waste disposal trucks.

Screening Questions	Yes	No	Remarks
▪ pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	The site is at 40 m from the river (east) and will be connected to the stormwater drainage on the eastern side
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	At the most, it is anticipated that about 30-40 workers will be at the site at any given time. This will cause a significant population influx. Also, measures are included in the EMP to ensure social integration and provision of adequate accommodation with water supply and sanitation facilities.
▪ social conflicts if workers from other regions or countries are hired?		✓	So far there are no incidents of worker conflict within the Thromde, so this is not anticipated. However, mitigation measures to brief and warn workers against social conflicts is reflected in the EMP
▪ 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 the construction phase, but not explosives. The EMP of the project will provide measures to avoid potential impact of fuel or chemical spills during the 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 the 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 : Affordable Housing Development Sector Project (Site: Toed, Samdrup Jongkhar)
Sector : Water and Other Urban Infrastructure and Services
Subsector : Urban Housing

Division/Department : SAUW

Screening Questions		Score	Remarks[55]
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?	1	The site is vulnerable to landslide due to proximity to ridge bordering the nearby Dungsam river that is about 40 m away.
	Would the project design (e.g., the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	1	The buildings will be designed to withstand all weather and climate conditions and will comply with building construction regulations. Building foundations and elevation will be designed such that no flood water during sudden heavy downpour could reach the ground floor level of the building. Further, the drainage system will be design to ensure it can convey stormwater without flooding the housing complex even during heavy rains.
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	All materials for construction will be selected based on the requirements of the engineering design.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	1	There are chances that extreme rainy conditions would cause flooding. However, drainage system that will be integrated into the design will avoid the risk of flooding.
Performance of project	Would weather/climate conditions, and related extreme events likely affect the performance (e.g.,	1	The buildings will be designed to withstand all

[55] 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.

outputs	annual power production) of project output(s) (e.g., hydro-power generation facilities) throughout their design life time?		weather and climate conditions, and will comply with building construction regulations. Through time, strength of materials may decline, but proper maintenance will be implemented.
	Cumulative score	5	

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

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

Other Comments: Exposure of the site to climate change related hazard is likely

Prepared by: NHDCL

Appendix 2: No Mitigation Measures Scenario Checklist

SAUW No Mitigation Scenario (Scoping Checklist)

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

PART 1: Project Characteristics

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? *(See last page for Questions to Guide Assessing Significance of Impacts)*
1. Will construction, operation or decommissioning of the Project 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 vegetation.	Not significant because the clearance of vegetation and buildings will not cause large changes in environmental conditions. The trees cut will be mitigated through compensatory afforestation
1.3	Creation of new land uses?	No		The area has been approved 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		
1.7	Temporary sites used for construction works or housing of construction	No		There is ample land within and adjacent to the project site, and if additional land

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)*
	workers?			is required for temporary housing, this will be leased from Thromde or a private party.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations?	Yes	Ambient air quality and noise level due to potential dust generation and elevated noise level during construction works.	Not significant because the activity is temporary, and any impacts are short-term and can be readily mitigated through standard measures. As the land is flat, there is not much excavation to be carried out. Much of the excavated soil will be reused for filling and leveling works for internal access road and parking
1.9	Underground works including mining or tunnelling?	N/A		
1.10	Reclamation works?	N/A		
1.11	Dredging?	N/A		
1.12	Coastal structures e.g., seawalls, piers?	N/A		
1.13	Offshore structures?	N/A		
1.14	Production and manufacturing processes?	N/A		
1.15	Facilities for storage of goods or materials?	Yes	None.	Construction materials that will be used are to be delivered to the site on a programmed and scheduled basis. Materials that are needed day-to-day during the construction period will be stored at a dedicated storage area at the 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 and indiscriminate disposal of solid wastes	Not significant because the impact can be mitigated through efficient functioning of the facilities as per design. For effluents, the site will be connected to the municipal sewerage system when the Thromde sewerage network is complete for the area.

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)*
1.17	Facilities for long term housing of operational workers?	N/A		
1.18	New road, rail or sea traffic during construction or operation?	No		The project site is already adjacent to the highway
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 to the highway
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 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 a stream towards the western boundary. This has been channeled by the Thromde with Hume Pipes to flow into the river
1.24	Abstraction or transfers of water from ground or surface waters?	No		The site is already connected to the local municipal water supply
1.25	Changes in water bodies or the land surface affecting drainage or run-off?	Yes	Drainage structures, due to siltation	Not significant because the site will be connected to the existing stormwater drainage system
1.26	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Noise, due to potential elevated noise during delivery of construction materials at the site.	Not significant because the activity is temporary, and any impacts are short term and can be readily mitigated through standard measures.

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 will be transported from neighboring towns and districts, depending on availability.
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 due to workforce at the site during the construction phase.	Not significant because the activity is temporary, and any impacts are short-term and can be readily mitigated through standard measures. Both foreign and national workers will be recruited by the contractor for the construction work temporarily (until the duration of the construction period)
1.30	Introduction of alien species?	No		Landscaping will be carried out with local species
1.31	Loss of native species or genetic diversity?	No		No because the trees found at the site are commonly found throughout the Thromde area
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 acres of developed land considered as 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 within the area Water will be used from existing water supply
2.3	Minerals?	Yes	Land cover and stability, due to	Not significant. Although minerals such as fuel 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)*
			potential quarrying or mining activities relative to the production of raw materials to be used for construction.	other earth-based resources (sand, stones, marble) will be required during construction, the amount will not be high to cause significant impact to natural resources.
2.4	Aggregates?	Yes	Land cover and stability, due to 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 within the thromde
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, and 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	Yes	Human health, groundwater quality; ambient air quality,	Not significant because standard measures are available to mitigate the

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)*
	vectors (e.g., insect or water borne diseases)?		including odor. Sanitation quality at the site (including Contractor's camp) could affect the hygiene or aesthetic of the immediate vicinity due to wastewater releases, solid waste generation. These are potential sources of disease vectors.	impacts.
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.	Positively significant. The subproject will provide affordable housing for lower income staff. It will improve their living conditions as they are living in temporary shelters, sharing accommodation, or living in hotels at the moment.
3.4	Are there especially vulnerable groups of people who could be affected by the project e.g., hospital patients, the elderly?	No		There are no affected people at the site
3.5	Any other causes?	No		
4. Will the Project produce solid wastes during construction or operation or decommissioning?				
4.1	Spoil, overburden or mine wastes?	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.
4.2	Municipal waste (household and or commercial wastes)?	Yes	Aesthetics and odor; due to potential dumping and mismanagement of solid wastes that could pollute the environment.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
4.3	Hazardous or toxic wastes (including radioactive wastes)?	Yes	Surface water quality; Ambient air quality, including Odor; due to potential releases	Not significant because the impacts are short term and localized. Standard measures are available 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)*
			(from solvents, primers, paints, adhesives, etc.) that could pollute the environment.	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 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 wastes?	Yes	Aesthetics, community safety, due to potential unmanaged bulky construction waste	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts. Adequate arrangements with the approval by the Thromde will be made to segregate and dispose of construction waste.
4.8	Redundant machinery or equipment?	No		
4.9	Contaminated soils or other material?	No		
4.10	Agricultural wastes?	No		
4.11	Any other solid wastes?	No		
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?				
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources (vehicles and/or heavy equipment)?	Yes	Ambient air quality, due to emissions from heavy equipment, service vehicles, generator sets, and other vehicles, such as those transporting materials at construction sites.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.2	Emissions from production processes?	N/A		
5.3	Emissions from materials handling including storage or transport?	Yes	Ambient air quality, due to emissions from stored materials at site.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.4	Emissions from construction	Yes	Ambient air quality,	Not significant because the

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)*
	activities including plant and equipment?		due to emissions from heavy equipment, service vehicles, generator sets, and other vehicles, such as those transporting materials at construction sites.	impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.5	Dust or odors from handling of materials including construction materials, sewage and waste?	Yes		Dust will be generated during material transportation, loading and unloading and sewage will be generated in the worker camps. OHS requirements and maintenance of workers camps will be followed
5.6	Emissions from incineration of waste?	No		
5.7	Emissions from burning of waste in open air (e.g., slash material, construction debris)?	No		This is not permitted and will be restricted
5.8	Emissions from any other sources?	No		
6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?				
6.1	From operation of equipment e.g., engines, ventilation plant, crushers?	Yes	Noise level, due to noisy operation of heavy equipment (including drills, concrete mixers, tile cutters, chain saw during tree cutting), excavation work, and other construction activities at the site.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
6.2	From industrial or similar processes?	N/A		
6.3	From construction or demolition?	Yes	Noise level, due to noisy operation of heavy equipment (including drills, concrete mixers, tile cutters, chain saw during tree cutting), excavation work, and other construction	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)*
			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 as people)?	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	Land and ground water quality, due to potential unwanted release of fuels, solvents, primers, adhesives, paint.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
7.2	From discharge of sewage or other effluents (whether treated or untreated) to water or the land?	Yes	Land and ground water quality, due to potential unwanted release of untreated wastewater.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
7.3	By deposition of pollutants emitted to air, onto the land or into water?	Yes.	Land quality and surface water quality, due to deposition of emissions from heavy equipment and other machines used during construction activities.	Not significant. The deposition, if any, is very negligible to affect the quality of surface water or land/soil in the area.
7.4	From any other sources?	No		
7.5	Is there a risk of long term	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)*
	build-up of pollutants in the environment from these sources?			
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.	The site is at risk of landslide due to the site's proximity to the downslope terrain bordering the river (40m away). The suproject will need to incorporate retaining walls in the design. The site is in a High Seismic zone and could be affected by earthquakes. The buildings are designed for seismic performance (IS 1893:2016, Zone V, Z=0.36, I=1.37, R=5, Damping=5%).
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 subproject will not increase the local population because the new occupants of the housing facility will be moving into the new facilities from the

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)*
				same area
9.2	By resettlement of people or demolition of homes or communities or community facilities e.g., schools, hospitals, social facilities?	No		
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 facilities resulting in new dynamics within the community.	Not significant. A new community will be created at the site. However, no in-migration is expected since residents of the housing units will be selected from within the area.
9.4	By placing increased demands on local facilities or services e.g., housing, education, health?	Yes	Humans/people, due to increased demand from workers during the construction phase. These workers will increase the demand for these services in the locality resulting in stress on availability to accommodate such demand.	Not significant. This impact is temporary during the construction phase only. During the operation phase, everything will be back to normal since the future residents of the housing units are existing residents who are already being served by the various services.
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 subproject will generate employment for foreign workers and nationals (skilled and unskilled) during the 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 if it is within the Local Area Plan.
10.2	Will the project lead to development of supporting facilities, ancillary development or development	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)*
	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		
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, the housing complex could be a model for all future housing complexes 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.
  o Wetlands,
  o Watercourses or other waterbodies,
  o the coastal zone,
  o mountains,
  o 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?
	The project lies outside the Biological Corridor and is about 1 km from it.
	The closest river lies towards the east of the site and is separated from the site by the highway. .
	The Thromde has constructed river protection walls on both sides of the river
	The area is within the city center and in the designated urban village, where the existing land use is residential housing.

Question	Remarks
• 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?	
Is the Project in a location where it is likely to be highly visible to many people?	The project will be visible to its immediate neighbors (other residents living in the adjacent buildings. But the entire area itself has numerous similar structures/buildings in the area
Is the Project located in a previously undeveloped area where there will be loss of greenfield land?	No, the site was previously used for storage of construction materials
Are there existing land uses on or around the Project location which could be affected by the Project? For example: • homes, gardens, other private property, • industry, • commerce, • recreation, • public open space, • community facilities, • agriculture, • forestry, • tourism, • mining or quarrying	No.
Are there any plans for future land uses on or around the location which could be affected by the Project?	No
Are there any areas on or around the location which are densely populated or built-up, which could be affected by the Project?	The only effect on the residents in the buildings surrounding the site is from dust and noise during construction
Are there any areas on or around the location which are occupied by sensitive land uses which could be affected by the Project? • hospitals, • schools, • places of worship, • community facilities	No. The closest religious site is 1.5 km from the site.
Are there any areas on or around the location which contain important, high quality or scarce resources which could be affected by the Project? For example: • groundwater resources, • surface waters, • forestry, • agriculture, • fisheries, • tourism, • minerals.	No

Question	Remarks
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 town in general fall in High earthquake and flood risk area. However, the site itself is within a low hazard, low risk area in terms of flooding. Nevertheless, all measures will be considered during design phase.
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	Yes, Increase in dust levels during excavation and air emissions from use of heavy machines. Effects will be temporary and restricted to the construction period
Is the Project likely to affect the availability or scarcity of any resources either locally or globally? • fossil fuels • water • minerals and aggregates • timber • other non-renewable resources • infrastructure capacity in the locality - water, sewerage, power generation and transmission, telecommunications • waste disposal roads, rail	Water is becoming scarce in the Thromde due to increasing demand from construction activities. Mitigation measures include installation of water storage tanks and provision for rainwater harvesting Also, the Thromde is currently implementing a water supply project to enhance the water supply for the town
Is the Project likely to affect human or community health or welfare?	No. The project will not affect human or community health. It is expected to provide relief

Question	Remarks
• 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?	to the residents living in hotels, shared apartments or in temporary houses.

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: Sample COVID 19 Health and Safety Guidance for Contractors

CONTRACTOR GUIDELINES ON RESPONDING TO THREAT OF CORONAVIRUS DISEASE (COVID-19)

1. This set of guidelines has been formulated based on common practices in many countries worldwide on the fight against COVID-19, and in consonance with WHO guidance on COVID-19,[56] the ILO Workplace Response to the Coronavirus Disease outbreak,[57] and the IFC-WB Environmental, Health, and Safety (EHS) General Guidelines (April 2007). It aims to assist Contractors during construction works in response to the COVID-19 pandemic.

2. The Contractor will be required to comply with the requirements and recommendations from the national policies and guidelines on COVID-19, which may change from time to time.

3. The Contractor will employ an EHS Engineer/Officer who shall oversee compliance to the occupational health and safety (OHS) requirements particularly on prevention of COVID-19 transmission in the workplace. This shall include but not limited to the following:

(i) Orientation of workers on OHS, disaster and emergency response procedures, and COVID-19;
(ii) Provision and use of personal protective equipment (PPE), fire suppression system and appropriate medical emergency response logistics.
(iii) Placement of safety signs, posters (e.g., WHO posters on COVID-19), information and warning signs within the worksite and adjacent areas.
(iv) Implementation and maintenance of good housekeeping.
(v) Monitoring of occupational health and environmental controls (e.g., airborne contaminants, noise, illumination, ventilation, temperature, and humidity); and
(vi) Conduct of regular safety inspection and incident reporting/ recording.

4. The Contractor will provide all subcontractors, if any, with compulsory site induction on COVID-19 response prior to start of any works. The EHS Officer will keep a record of the contact details of all workers and staff: mobile telephone number, alternate telephone, email, and address where they are staying.

5. The Contractor will maintain regular housekeeping practices, including routine cleaning and disinfecting of surfaces, equipment, and other elements of the work environment. Make sure workplaces are clean and hygienic. Surfaces (e.g., desks and tables) and objects (e.g., telephones, keyboards) need to be wiped with disinfectant regularly.

6. The Contractor will ensure that all persons reporting to work are healthy and in a fit state. Any person showing signs of cough and colds will not be allowed to enter the work sites and will be advised to stay at home, or follow the isolation procedure, if any, by the government.

7. The Contractor will ensure that staff, subcontractors (if any), and workers have access to places where they can wash their hands with soap and water. Wash stations at strategic locations within

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

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

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

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

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

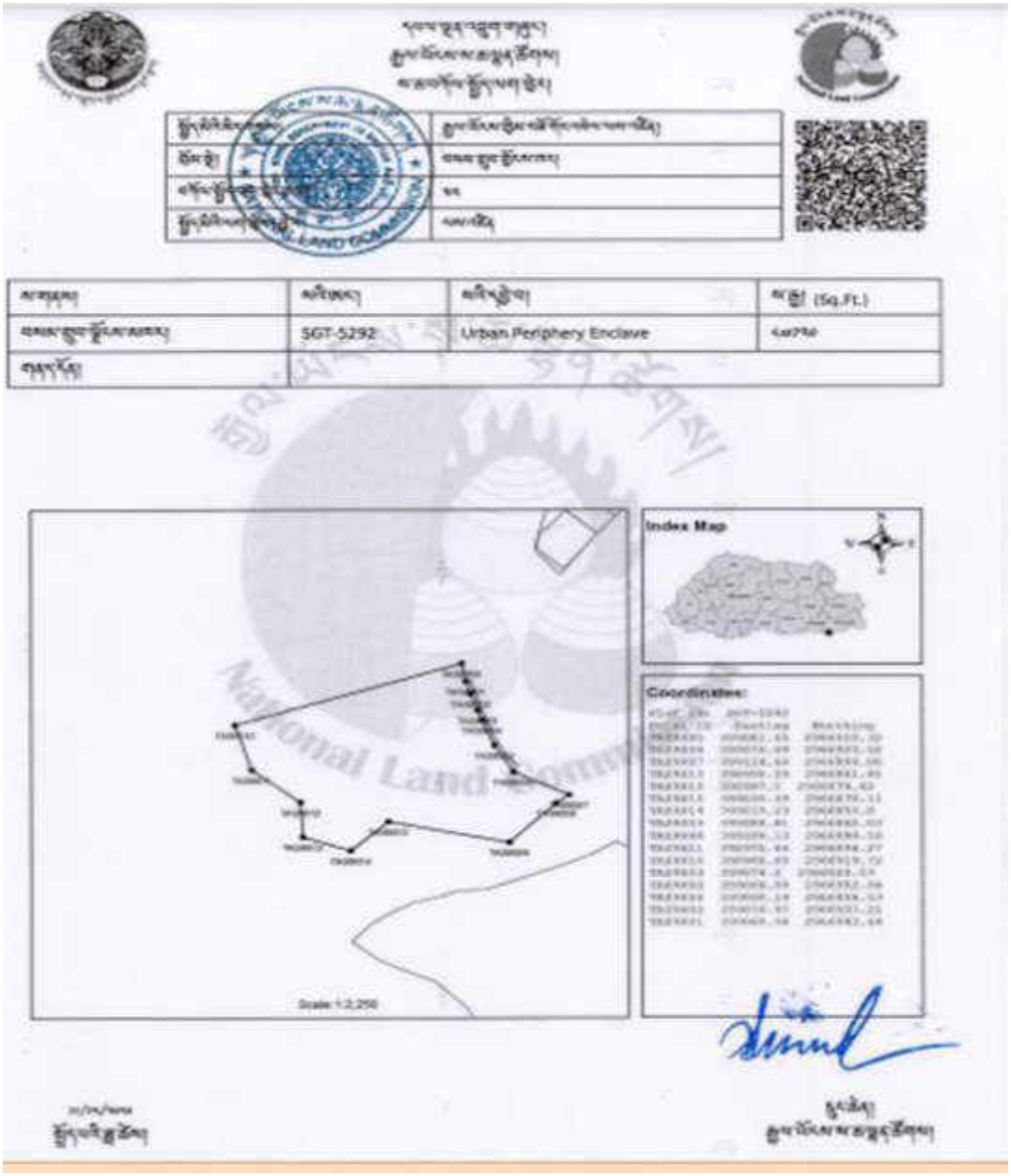
10. The Contractor and all subcontractors, if any, will provide the appropriate PPE for all its workers. All tools and PPE must be in good condition, fit for purpose, and receive all the mandatory and statutory inspections, checks and calibrations, as and when required. Proof that they are in good condition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

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

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

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

Appendix 4: Land User Certificate



			(Sq.Ft.)
	SGT-5292	Urban Periphery Enclave	

Index Map

Coordinates:

Scale 1:2,250

Appendix 5: Confirmation from Divisional Forest Office and Result of IBAT Screening

Royal Government of Bhutan
Ministry of Agriculture and Forests
Department of Forests and Park Services
Divisional Forest Office
Samdrup Jongkhar

No.SJD/NCS-11/2020-2021/ 259 Date 11/2/2021

The Chief Executive Officer
National Housing Developmental Corporation Limited
Thimphu

Sub: **Validation of Flora and Fauna Species in the Housing project area**

Sir

Divisional Forest Office, Samdrup Jongkhar is pleased to validate the information on presence and absence of forest species list submitted by your office vide letter No.NHDCL/ADB/2021/77 Dated 04/02/2021. The field officials from this Division and NHDCL Samdrupjongkhar have jointly carried out validation survey. During the survey, the team didn't encounter any species of flora and fauna listed by your office in the propose NHDCL housing development area as there are already some old structures in site 1 and some developmental activity carried out near site 2.

Therefore, this is submitted for favor of your honors kind information and necessary action.

Thanking you

Attached- Field validation checklist duly signed by forestry official and NDCL official.

Yours sincerely

(Sangay Dorjee)
Chief Forestry Officer

Copy
1. Honorable Director, DoFPS Thimphu for honors kind information.
2. Liaison officer, NHDCL Samdrup Jongkhar for kind information.
3. Office file (NCS-11)

"Let us walk an extra mile and make a difference for our farmers"
Samdrup Jongkhar, Bhutan: Telephone # 00975 (0) 251038(Gen), 251203(CFO), 251673(Accounts) Fax: # 251206, Post Box # 112

Species list for Samdrup Jongkhar

	Species Name	Common Name	Taxonomic Group	IUCN Category	Site 1	Site 2
1	*Haematopinus oliveri*	Pygmy Hog Sucking Louse	INSECTA	Critically endangered	Absent	Absent
2	*Indotestudo elongata*	Elongated Tortoise	REPTILIA	Critically endangered	Absent	Absent
3	*Batagur dhongoka*	Three-striped Roofed Turtle	REPTILIA	Critically endangered	Absent	Absent
4	*Manispentadactyla*	Chinese Pangolin	MAMMALIA	Critically endangered	Absent	Absent
5	*Aythya baeri*	Baer's Pochard	AVES	Critically endangered	Absent	Absent
6	*Houbaropsis bengalensis*	Bengal Florican	AVES	Critically endangered	Absent	Absent
7	*Gyps bengalensis*	White- rumped Vulture	AVES	Critically endangered	Absent	Absent
8	*Sarcogyps calvus*	Red-headed Vulture	AVES	Critically endangered	Absent	Absent
9	*Ardea insignis*	White-bellied Heron	AVES	Critically endangered	Absent	Absent
10	*Emberiza aureola*	Yellow- breasted Bunting	AVES	Critically endangered	Absent	Absent
11	*Gyps tenuirostris*	Slender- billed Vulture	AVES	Critically endangered	Absent	Absent
12	*Cheirotonia sherriffi*		ULIOPSIDA	Critically endangered	Absent	Absent
13	*Ailurus fulgens*	Red Panda	MAMMALIA	Critically endangered	Absent	Absent
14	*Bhutanitis ludlowi*	Ludlow's Bhutan Glory	INSECTA	Endangered	Absent	Absent
15	*Bubalus arnee*	Wild Water Buffalo	MAMMALIA	Endangered	Absent	Absent
16	*Caprolagus hispidus*	Hispid Hare	MAMMALIA	Endangered	Absent	Absent
17	*Cuon alpinus*	Dhole	MAMMALIA	Endangered	Absent	Absent
18	*Cuora aorbonensis*	Southeast Asian Box Turtle	REPTILIA	Endangered	Absent	Absent
19	*Elephas maximus*	Asian Elephant	MAMMALIA	Endangered	Absent	Absent
20	*Geoclemys hamiltonii*	Spotted Pond Turtle	REPTILIA	Endangered	Absent	Absent
21	*Manis crassicaudata*	Indian Pangolin	REPTILIA	Endangered	Absent	Absent
22	*Melanochelys tricarinata*	Tricarinate Hill Turtle	REPTILIA	Endangered	Absent	Absent
23	*Panthera tigris*	Tiger	MAMMALIA	Endangered	Absent	Absent
24	*Porcula salvania*	Pygmy Hog	MAMMALIA	Endangered	Absent	Absent
25	*Nycticebus bengalensis*	Bengal Slow Loris	MAMMALIA	Endangered	Absent	Absent

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26	*Platanista gangetica*	South Asian River Dolphin	MAMMALIA	Endangered	Absent ✓	Absent ✓
27	*Axis porcinus*	Hog Deer	MAMMALIA	Endangered	Absent ✓	Absent ✓
28	*Cuoramouhotii*	Keeled Box Turtle	REPTILIA	Endangered	Absent ✓	Absent ✓
29	*Amblyceps arunchalensis*		ACTINOPTERYGII	Endangered	Absent ✓	Absent ✓
30	*Perdicula manipurensis*	Manipur Bush- quail	AVES	Endangered	Absent ✓	Absent ✓
31	*Sterna acuticauda*	Black-bellied Tern	AVES	Endangered	Absent ✓	Absent ✓
32	*Haliaeetus leucoryphus*	Pallas's Fish- eagle	AVES	Endangered	Absent ✓	Absent ✓
33	*Aquila nipalensis*	Steppe Eagle	AVES	Endangered	Absent ✓	Absent ✓
34	*Falco cherrug*	Saker Falcon	AVES	Endangered	Absent ✓	Absent ✓
35	*Leptoptilosdubius*	Greater Adjutant	AVES	Endangered	Absent ✓	Absent ✓
36	*Laticillaemerascens*	Swamp Grass-babbler	AVES	Endangered	Absent ✓	Absent ✓
37	*Hypericum sherriffii*		MAGNOLIOPSIDA	Endangered	Absent ✓	Absent ✓
38	*Tor putitora*		ACTINOPTERYGII	Endangered	Absent ✓	Absent ✓
39	*Bubalus arnee*	Wild Water Buffalo	MAMMALIA	Endangered	Absent ✓	Absent ✓
40	*Porcula salvania*	Pygmy Hog	MAMMALIA	Endangered	Absent ✓	Absent ✓
41	*Trachypithecusgeei*	Gee's Golden Langur	MAMMALIA	Endangered	Absent ✓	Absent ✓
42	*Rhinoceros unicornis*	Greater One-horned Rhino	MAMMALIA	Vulnerable	Absent ✓	Absent ✓
43	*Tragopan blythii*	Blyth's Tragopan	AVES	Vulnerable	Absent ✓	Absent ✓
44	*Apus acuticauda*	Dark-rumped Swift	AVES	Vulnerable	Absent ✓	Absent ✓
45	*Prinia cinereocapilla*	Grey-crowned Prinia	AVES	Vulnerable	Absent ✓	Absent ✓
46	*Chrysomma altirostre*	Jerdon's Babbler	AVES	Vulnerable	Absent ✓	Absent ✓
47	*Chatarrhaeolongirostris*	Slender-billed Babbler	AVES	Vulnerable	Absent ✓	Absent ✓
48	*Paradoxornisnipalensis*	Black-breasted Parrotbill	AVES	Vulnerable	Absent ✓	Absent ✓
49	*Chiromantisassimilis*	Assam Asian Treefrog	AMPHIBIA	Least Concern	Absent ✓	Absent ✓
50	*Kaloulapassamensis*	Assamese Balloon Frog	AMPHIBIA	Least Concern	Absent ✓	Absent ✓
51	*Fulvettaludlowi*	Brown-throated Fulvetta	AVES	Least Concern	Absent ✓	Absent ✓
52	*Trochalopteron nimbricetum*	Bhutan Laughingthrush	AVES	Least Concern	Absent ✓	Absent ✓

57	Zootherapsilmalli	Himalayan Forest Thrush	AVES	Least Concern	Absent ✓	Absent ✓
58	Amolopsiassamensis	Assamese Cascade Frog	AMPHIBIA	Data deficient	Absent ✓	Absent ✓

Tshering Dendup
FO

Buddhan Rai
LO, NMDCL

Dhendup Wangchuk
Sr. Fr.

IBAT

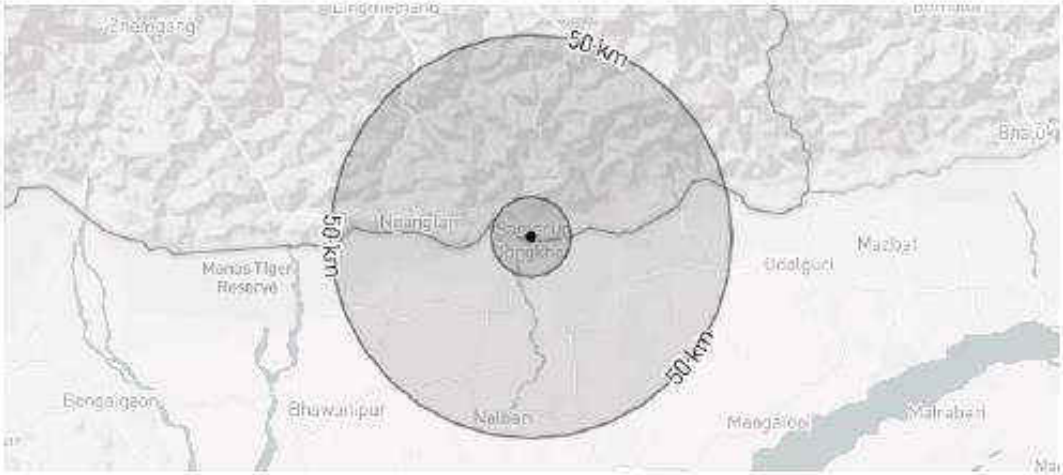
World Bank Group Biodiversity Risk Screen

BHU-AHDP_SAMDRUP_JONGKHAR

- **Country:** [redacted]
- **Location:** [26.8, 91.5]
- **Created by:** [redacted]

Overlaps with:

Protected Areas	50 km: 6	10 km: 1	1 km: 1	8
World Heritage (WH)	50 km: 1	10 km: 0	1 km: 0	1
Key Biodiversity Areas	50 km: 4	10 km: 0	1 km: 1	5
Alliance for Zero Extinction (AZE)	50 km: 1	10 km: 0	1 km: 0	1
IUCN Red List				38
Critical Habitat				Likely



Displaying project location and buffers: 1 km, 10 km, 50 km

WORLD BANK GROUP

This report is based on IFC Performance Standard 6 (PS6) but applies to World Bank Environmental and Social Standard 6 (ESS6)

About this report

IBAT provides initial screening for critical habitat values. Performance Standard 6 (PS6) defines these values for critical habitat (PS6: para. 16) and legally protected and internationally recognized areas (PS6: para. 20). PS6 will be triggered when IFC client activities are located in modified habitats containing "significant biodiversity value," natural habitats, critical habitats, legally protected areas, or areas that are internationally recognized for biodiversity. References to PS6 and Guidance Note 6 (GN6) are provided to guide further assessment and detailed definitions where necessary. Please see https://www.ifc.org/ps6 for full details on PS6 and GN6.

The report screens for known risks within a standard 50km buffer of the coordinates used for analysis. This buffer is not intended to indicate the area of impact. The report can be used to:

- Scope risks to include within an assessment of risks and impacts
- Identify gaps within an existing assessment of risks and impacts
- Prioritize between sites in a portfolio for further assessment of risks and impacts
- Inform a preliminary determination of critical habitat
- Assess the need for engaging a biodiversity specialist
- Identify additional conservation experts or organizations to inform further assessment or planning

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment as described in PS6 and GN6. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

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Priority Species

Habitat of significant importance to priority species will trigger critical habitat status (See PS6: para 16). IBAT provides a preliminary list of priority species that could occur within the 50km buffer. This list is drawn from the IUCN Red List of Threatened Species (IUCN RL). This list should be used to guide any further assessment, with the aim of confirming knownor likely occurrence of these species within the project area. It is also possible that further assessment may confirm occurrence of additional priority species not listed here. It is strongly encouraged that any new species information collected by the project be shared with species experts and/or IUCN wherever possible in order to improve IUCN datasets.

IUCN Red List of Threatened Species - CR & EN

The following species are potentially found within 50km of the area of interest.
For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Haematopinus oliveri	Pygmy Hog Sucking Louse	INSECTA	CR	Unknown	Terrestrial
Indotestudo elongata	Elongated Tortoise	REPTILIA	CR	Decreasing	Terrestrial
Batagur dhongoka	Three-striped Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Manis pentadactyla	Chinese Pangolin	MAMMALIA	CR	Decreasing	Terrestrial
Aythya baeri	Baer's Pochard	AVES	CR	Decreasing	Freshwater
Houbaropsis bengalensis	Bengal Florican	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Sarcogyps calvus	Red-headed Vulture	AVES	CR	Decreasing	Terrestrial

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ardea insignis	White-bellied Heron	AVES	CR	Decreasing	Terrestrial, Freshwater
Emberiza aureola	Yellow-breasted Bunting	AVES	CR	Decreasing	Terrestrial, Freshwater
Gyps tenuirostris	Slender-billed Vulture	AVES	CR	Decreasing	Terrestrial
Cheirostylis sherriffii		LILIOPSIDA	CR	Unknown	Terrestrial
Ailurus fulgens	Red Panda	MAMMALIA	EN	Decreasing	Terrestrial
Bhutanitis ludlowi	Ludlow's Bhutan Glory	INSECTA	EN	Unknown	Terrestrial
Bubalus arnee	Wild Water Buffalo	MAMMALIA	EN	Decreasing	Terrestrial, Freshwater
Caprolagus hispidus	Hispid Hare	MAMMALIA	EN	Decreasing	Terrestrial
Cuon alpinus	Dhole	MAMMALIA	EN	Decreasing	Terrestrial
Cuora amboinensis	Southeast Asian Box Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Elephas maximus	Asian Elephant	MAMMALIA	EN	Decreasing	Terrestrial
Geoclemys hamiltonii	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Melanochelys tricarinata	Tricarinate Hill Turtle	REPTILIA	EN	Decreasing	Terrestrial
Panthera tigris	Tiger	MAMMALIA	EN	Decreasing	Terrestrial
Porcula salvania	Pygmy Hog	MAMMALIA	EN	Unknown	Terrestrial
Nycticebus bengalensis	Bengal Slow Loris	MAMMALIA	EN	Decreasing	Terrestrial
Platanista gangetica	South Asian River Dolphin	MAMMALIA	EN	Unknown	Freshwater
Axis porcinus	Hog Deer	MAMMALIA	EN	Decreasing	Terrestrial, Freshwater
Cuora mouhotii	Keeled Box Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Amblyceps arunchalensis		ACTINOPTERYGII	EN	Unknown	Freshwater
Perdicula manipurensis	Manipur Bush-quail	AVES	EN	Decreasing	Terrestrial, Freshwater
Sterna acuticauda	Black-bellied Tern	AVES	EN	Decreasing	Terrestrial, Freshwater
Haliaeetus leucoryphus	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
Falco cherrug	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Leptoptilos dubius	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
Laticilla cinerascens	Swamp Grass-babbler	AVES	EN	Decreasing	Terrestrial, Freshwater
Hypericum sherriffii		MAGNOLIOPSIDA	EN	Unknown	Terrestrial
Tor putitora		ACTINOPTERYGII	EN	Decreasing	Freshwater

Restricted Range Species

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Bubalus arnee	Wild Water Buffalo	MAMMALIA	EN	Decreasing	Terrestrial, Freshwater
Porcula salvania	Pygmy Hog	MAMMALIA	EN	Unknown	Terrestrial
Rhinoceros unicornis	Greater One-horned Rhino	MAMMALIA	VU	Increasing	Terrestrial, Freshwater
Tragopan blythii	Blyth's Tragopan	AVES	VU	Decreasing	Terrestrial
Apus acuticauda	Dark-rumped Swift	AVES	VU	Stable	Terrestrial
Prinia cinereocapilla	Grey-crowned Prinia	AVES	VU	Decreasing	Terrestrial
Chrysomma altirostre	Jerdon's Babbler	AVES	VU	Decreasing	Terrestrial, Freshwater

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Chatarrhaea longirostris	Slender-billed Babbler	AVES	VU	Decreasing	Terrestrial
Paradoxornis flavirostris	Black-breasted Parrotbill	AVES	VU	Decreasing	Terrestrial, Freshwater
Chiromantis simus	Assam Asian Treefrog	AMPHIBIA	LC OR LR/LC	Decreasing	Terrestrial, Freshwater
Kaloula assamensis	Assamese Balloon Frog	AMPHIBIA	LC OR LR/LC	Unknown	Terrestrial, Freshwater
Fulvetta ludlowi	Brown-throated Fulvetta	AVES	LC OR LR/LC	Decreasing	Terrestrial
Trochalopteron imbricatum	Bhutan Laughingthrush	AVES	LC OR LR/LC	Stable	Terrestrial
Zoothera salimalii	Himalayan Forest Thrush	AVES	LC OR LR/LC	Stable	Terrestrial
Amolops assamensis	Assamese Cascade Frog	AMPHIBIA	DD	Unknown	Terrestrial, Freshwater

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Biodiversity features which are likely to trigger Critical Habitat

Protected Areas

The following protected areas are found within 1 km and 10 km and 50 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Distance	IUCN Category	Status	Designation	Recommendation
Biological Corridor 5	1 km	VI	Designated	Biological Corridor	Assess for biodiversity risk
Barnadi	10 km	IV	Designated	Sanctuary	Assess for biodiversity risk
Biological Corridor 6	50 km	VI	Designated	Biological Corridor	Assess for biodiversity risk
Khaling	50 km	IV	Designated	Wildlife Sanctuary	Assess for biodiversity risk
Manas	50 km	II	Designated	National Park	Assess for critical habitat
Manas	50 km	IV	Designated	Sanctuary	Assess for biodiversity risk
Manas Wildlife Sanctuary	50 km	Not Applicable	Inscribed	World Heritage Site (natural or mixed)	Highest risk. Seek expert help

Area name	Distance	IUCN Category	Status	Designation	Recommendation
Royal Manas	50 km	II	Designated	National Park	Assess for critical habitat

Key Biodiversity Areas

The following key biodiversity areas are found within 1 km and 10 km and 50 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Distance	IBA	AZE	Recommendation
Deothang / Narphang / Samdrup Jongkhar	1 km	Yes	No	Assess for critical habitat
Bamadi Wildlife Sanctuary	50 km	Yes	No	Assess for critical habitat
Khaling / Neoli Wildlife Sanctuary	50 km	Yes	No	Assess for critical habitat
Manas National Park	50 km	Yes	Yes	Highest risk. Seek expert help
Royal Manas National Park	50 km	Yes	No	Assess for critical habitat

Species with potential to occur

Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
INSECTA	114	2	1	1	0	1	107	4
REPTILIA	41	9	2	4	3	0	30	2

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Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
MAMMALIA	129	27	1	11	15	9	91	2
AVES	703	39	7	7	25	36	628	0
LILIOPSIDA	69	3	1	0	2	0	64	2
ACTINOPTERYGII	77	5	0	2	3	8	57	7
MAGNOLIOPSIDA	56	2	0	1	1	1	50	3
AMPHIBIA	32	1	0	0	1	1	29	1
MALACOSTRACA	19	0	0	0	0	2	12	5
GASTROPODA	52	0	0	0	0	0	46	6
BIVALVIA	33	0	0	0	0	0	29	4
POLYPODIOPSIDA	3	0	0	0	0	0	3	0
AGARICOMYCETES	2	0	0	0	0	0	2	0
ARACHNIDA	3	0	0	0	0	0	3	0

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Recommended citation

IBAT PS6 & ESS6 Report. Generated under licence 159-11746 from the Integrated Biodiversity Assessment Tool on 14 October 2020 (GMT). www.ibat-alliance.org

Recommended Experts and Organizations

For projects located in critical habitat, clients must ensure that external experts with regional expertise are involved in further assessment (GN6: GN22). Clients are encouraged to develop partnerships with recognized and credible conservation organizations and/or academic institutes, especially with respect to potential developments in natural or critical habitat (GN6: GN23). Where critical habitats are triggered by priority species, species specialists must be involved. IBAT provides data originally collected by a large network of national partners, while species information is sourced via the IUCN Red List and affiliated Species Specialist Groups. These experts and organizations are listed below. **Please note that this is not intended as a comprehensive list of organizations and experts. These organizations and experts are under no obligation to support any further assessment and do so entirely at their discretion and under their terms. Any views expressed or recommendations made by these stakeholders should not be attributed to the IFC or IBAT for IFC partners.**

Birdlife Partners

URL: https://www.birdlife.org/worldwide/partnership/birdlife-partners

Directory for Species Survival Commission (SSC) Specialist Groups and Red List Authorities

URL: https://www.iucn.org/commissions/ssc-groups

Appendix 6: Minutes of the Consultations conducted with NHDC housing tenants and staff living in housing provided by corporations employed with and those living in private housing, photographs and participant list

17/05/2022)

Location:	***NHDC Office***	***Samdrup Jongkhar***
Date:	*17.05.2022*	
Public Consultation Agenda		
2.30 PM	Registration	NHDC
2.30 – 2.40	Welcome Address	Mr. Buddham Rai, LO, NHDC
2.40 - 3.00	Purpose of meeting & presentation of Samdrup Jongkhar proposed housing sites, buildings, class of apartments, designs and layout	Mr. Buddham Rai, LO, NHDC
3.15 – 4.00	Feedback from participants on presentation of housing details Experiences living in private and corporate housing Current management of NHDC housing and suggestions for future Views and suggestions on designs compatibility with place and climate of Samdrup Jongkhar Water supply, waste disposal	Mr. Saroj K. Nepal, ADB Consultant (Social Safeguards) Ms. Deki P. Yonten, ADB Consultant (Environmental Safeguards)
4.00 – 4.15 PM	Closing Remarks	Mr. Buddham Rai, LO, NHDC
Refreshments served		

Details of Public Consultation	
Bhutan Affordable Housing Project, Samdrup Jongkhar	Date: 17.05.2022
Meeting Location: NHDC Office, Samdrup Jongkhar	Thromde: Samdrup Jongkhar, Dzongkhag: Samdrup Jongkhar
Group description: 7 females, 7 males (Current residents of NHDC housing colony, those in waiting for NHDC housing allotment and private company employees and facilitators of the meeting.	
Total number of people: 14	

OVERALL DISCUSSIONS AND CONCLUSIONS

1. Participants were encouraged that low-cost housing will provide alternatives to existing high rentals they pay in private housing in Samdrup Jongkhar and also that corporate and private sector are also included as eligible for housing. Concern that minimum wage workers may be left out of this scheme as even subsidized housing may not be affordable.
2. Small size of apartments designed to make them more affordable for especially low-income staff working in government, SOEs and private companies and industries
3. Tenancy contracts not widely drawn up by private owners with tenants living in private housing and rental increase often do not follow rules (max 10% rental increase after two years of lease). New owners invariably raise rent even if previous contract has not expired and tenants are helpless.
4. NHDC can institute management measures to improve tenancy and O&M management of facilities such as retaining 15 days for making ready the housing unit for carrying out repairs before new tenant can occupy the unit; ensuring there is a network map of all services (water, telephone, electricity, etc.) to ease future maintenance. Electrical and water fittings of good quality, functional and locally available better for future replacement
5. On the environment side water issues to be solved e.g. through providing storage tanks and rain water harvesting which this project will incorporate in designs to supply water during times the man water supply fails to provide water to housing residents. Sewerage network being developed under another project will resolve issues of sewerage disposal for the housing colony.
6. Waste collection is being done but disposal in communal waste bins have not worked in the past. frequency to be enhanced in housing colony
7. BPC will be installing a sub-station so no issues are expected with regard to power supply.
8. For emergencies, the Thromde will be requested for the disaster management plan to which the NHC would comply with the SOPs in the event of emergencies occurring
9. In adapting to the hot and humid climatic conditions, participants suggested that window frames etc should be made of steel rather than wood which can decay due to effects of rain in summer.
10. Clarified on service delivery from the Service Centre to be established at the housing colony. The Centre would be operated by RENEW. The Centre will contain an early childhood care centre as well as shelter home for women facing domestic violence as well as other services for women's development.

SAMDRUP JONGKHAR

LIST OF PARTICIPANTS FOR CONSULTATIONS, BAHP, ~~PHUNTSHOLING~~

FOCUS GROUP DISCUSSIONS (NHDC RESIDENTS, WAITING LIST & CORPORATE EMPLOYEES

No	Name	CID No.	Male/Female	Designation	Organization	Contact No.
1	Sonam Choden	11509004488	F	Sales Tax Inspector	RRCO	17436975
2	Yangdon	11606000713	F	"	"	17590512
3	Tenzin Choephel	11107005312	M	Karma T/chk	-	17729702
4	Karma Wangchuk	10716002150	M	U. planner	SJ Thromde	77217616
5	Dorji Gyeltshen	10602000596	M	AMCO	SJ Thromde	17628328
6	Dorji Wangmo	11603002487	F	JE	NHDCL	17804682
7	Seema Uraon	11213002346	F	OA	NHDCL	17696526
8	Yonten Tshering	11603004041	M	Mason	NHDCL	17737030
9	Karma Wangdi	11211001914	M	Driver	NHDCL	17760072
10	Kinzang Wangmo	11102007040	F		-	17902881
11	Rinchen Zangmo	10707001521	F	Sweeper	NHDCL	17738204
12	Buddham Rai	11309001847	M	Liaison Officer	NHDCL	17893760
13	Saroj K. Nepal	11311003622	M	Consultant	ADB	17624568
14	Deki P Yonten	10811000570	F	Consultant	ADB	77711028

Date:

Place: SAMDRUP JONGKHAR NHDCL OFFICE

Location:	*Housing Site (Dradulthang and Toed)*	*Samdrup Jongkhar*
Date:	16.05.2022	
Details of Consultation		
Bhutan Affordable Housing Project, Samdrup Jongkhar		Date: 16.05.2022
Meeting Location: Housing Site, Samdrup Jongkhar		Thromde: Samdrup Jongkhar, Dzongkhag: Samdrup Jongkhar
Group description: 1 Female.		
Total number of people: 2		
Purpose: To understand if the land owner who shared boundary with the housing site had any concerns with regard to the construction activities which would commence soon.		
OVERALL DISCUSSIONS AND CONCLUSIONS 1. The Owner of the two buildings sharing border on one side with the housing site was consulted to inquire about any concerns she had once the construction commenced. 2. The owner indicated that she had no objection to the construction of the housing colony since it was being done on NHDC's own land. 3. She expressed that once construction starts, construction materials may spill-over to her plot and the site management staff may look into avoiding such spillage to her plot. 4. She also requested that once the construction is complete that a wall be built by NHDC along the boundary with her plot to avoid trespassing to her plot and vice versa. 5. She requested if she could be proper access through the existing approach to her plot since the entry point was too narrow and trucks cannot come into her parking. She was advised to write to Sammdrup Jongkhar Thromde who would be informed of her request by NHDC and who would review her request.		

Location:	*Housing Site*	*Samdrup Jongkhar*
Date:	18.05.2022	
Details of Consultation		
Bhutan Affordable Housing Project, Samdrup Jongkhar		Date: 17.05.2022
Meeting Location: Samdrup Jongkhar Housing Site, Samdrup Jongkhar		Thromde: Samdrup Jongkhar, Dzongkhag: Samdrup Jongkhar
Group description: 1 Male		
Total number of people: 2		
Purpose: To understand if the Primary School which is located near the housing site would have any concerns with regard to the construction activities which would commence soon. Note: The discussion was held telephonically since the Principal was not available during the site visit as he was busy with a workshop at Dewathang.		
OVERALL DISCUSSIONS AND CONCLUSIONS		

1. The Principal of the Primary School who shared border on one side with the housing site was consulted to inquire about any concerns he had once the construction commenced.
2. The owner indicated that he had no objection to the construction of the housing colony
3. However, he expressed that the school mainly had young students who would be at risk especially with the heavy traffic of trucks plying along the Primary School transporting construction materials etc. He advised if the project could put up signages on the road for reducing speed of load trucks while approaching and driving along the school since students would be at risk of being hit and since the children are too young to properly cross over the road.
4. Besides this, the school had no other concerns. The Consultant agreed to put forward the concerns expressed in favour of the safety of children.

Consultation with Thromde

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Consultation with Samdrup Jongkhar Thromde

Date: 16 May, 2022
Time: 2:15 PM
Venue: Thromde Office

Officials present:

1. Thinley Namgay, Thrompon, SJ Thromde
2. Buddhum Rai, Liaison Officer, NHDCL
3. Saroj Nepal, Social Consultant, ADB
4. Deki P Yonten, Environment Consultant, ADB

Minutes of Meeting

S. No	Agenda Items	Clarification/ Response from Thromde
1	Introduction of meeting participants	The Liaison Officer briefed Thrompon on the purpose of the visit and consultants introduced themselves and briefed the meeting on the TOR, purpose of the site visit and reports to be prepared for ADB and NOC approval.
2	Social safeguard: Site 01 Deadulthang The consultant was informed by the landlady of the building next to the site that she would like to widen her access.	The building owner already has access to her site/building. As the access road area does not fall in NHDCL land, the building owner can submit an application to Thromde for consideration.
3	Site #1: As the site is in close proximity to the river, the consultant recommended considering a wall as a safeguard for children during the operation phase.	Clarification from Thromde: Thromde has plans to construct a footpath along the river for the general public. The NHDCL design will incorporate retaining wall and railing for security purposes
4	Site #2 Toed (near School): The proposed NHDCL housing complex will restrict the current access to the archery ground so this access must be resolved prior to the construction as it might cause hindrance to the contractor.	Clarification from Thromde: The current access is a temporary access route to the archery ground and the Thromde already has plans to construct an alternative route to the site (towards the northern boundary of the plot). The current road is not the permanent road so there will be no issues of obstructing access to the archery ground in the future.
5 *	Environmental aspects Due to the proximity to the river, it is clear that the buildings are located more than 30m from the river in terms of safety.	The Thromde is responsible for the Urban Planning, so the required buffer will be maintained. However, thromde will consider less than 30m distance between river and structure if found passing. Soil tests for both sites have been completed and there are no issues with Site 1.

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		For site 2, the building structure will take into consideration the result of the study.
6	Water supply With an additional of 120 units clustered in one location, the concern regarding water supply to the two sites was raised; as the Thromde is already facing water shortage at the moment. Clarification was sought on the plans for water supply for the Thromde	In summer, the key issue with water shortage is due to the blockage due to heavy rains and flooding during the rainy season. Thromde informed that most of the required infrastructure for the water supply has already been constructed as ADB project and alternative source is being identified. Although the thromde is facing water supply issues at the moment, these issues will be resolved once the water supply project has been completed There is no issue with water source and a reservoir is being constructed under the Water Flagship Project funded by ADB. The Thromde assured that water supply will be available by the time the housing complex is completed in 2 years as there is adequate water at the source.
7	Location of construction worker camps	The NHDCL clarified that the current practice is that NHDCL will put up a letter to Thromde for construction of temporary structure for project office and worker camp. The structure will be located on the area where the green space or parking has been identified within the project site. The built up area is less than 50% so the circulation area will be processed for approval as camp area with the Project Site.
8	Waste management While the waste truck provides services to Site #1 4 times a week (2 for general waste and 2 for organic waste), currently services to Site #2 is only provided once a week. Clarification was sought on whether provisions will be made to increase the waste pick up services for Site #2, given the huge increase in population there in 2 years.	Thromde clarified that so far the waste services are being shared between Samdrup Jongkhar Town area and Deothang and services were limited to the limited number of waste collection trucks. However, recently, the Thromde has received 2 additional waste collection trucks so services can be adequate now. Also, it was clarified that the frequency of services is based on population, so as the population of Site #2 increases, the frequency of waste collection will also be increased by the Thromde accordingly.
9*	Thromde was requested to identify waste disposal sites for disposal of excavated soil and construction waste that will be generated during the	So far, to date, the excavated soil is used for leveling the site and no specific site has been identified for waste disposal.

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	construction period (including post construction camp closure)	The current waste disposal site is located at ..... where all types of waste is disposed, and not specific site has yet been identified for excavated soil or construction waste. The Thromde informed the meeting that to accommodate the requirements for waste disposal, the Environment Officer will identify specific sites within the thromde to dispose a) Excavation waste and b) Construction waste, and the area and capacity of the sites will be communicated to NHDCL. In the meantime, the NHDCL will share with the Thromde, the estimate quantities of waste to be disposed and excavated soil to be disposed, so that appropriate sites can be identified
10	Is there storm water drainage for the Thromde that the sites can be connected?	The Thromde clarified that there is no stormwater drainage specifically for Site #2 as there are not many buildings in the area apart from the Primary School. Site #2 has a drain alongside the highway, and the water from the site can be connected to the gully on the west side For site #1, there is a drain running along the access road towards the eastern part of the sites.
11	Sewerage	There is an ongoing ADB funded Sewerage Project so there will be no need for septic tanks at Site #1. Thromde has recommended that the NHDCL architects refer to the sewerage network plan so that septic tanks can be removed for the operation phase. Thromde has agreed to share the sewerage plan with NHDCL Site 1 is close to the sewerage treatment plant and can be connected to the STP. For Site #2, the septic tanks will be still required for the time being until the sewerage network is connected in the future. However, during the construction phase, both sites will require septic tanks, as this site will not have been connected yet, although the contract for the sewerage has already been contracted out and is expected to be completed by 2026?
12	Electricity	NHDCL will outsource the construction of the sub-station to the BPC who will prepare the IEE and submit this to the NEC for approval

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13	Disaster process- Are there any received protocols for Disaster	The Disaster management plan categorizes the type of disaster. The Thromde has trained officials and focal persons to cover 15 different areas within the Thromde. NHDCL will work with the Focal persons and follow the protocols. Thromde was requested to share the norms and protocols with NHDCL
14	Religious sites	The most popular religious site is the Dzong. The most popular is the Mani Dungkor area in the center of town. Thromde is having plans to come up with other monuments in LAP 4 to reduce the pressure on the town center
15	Samdrup Jongkhar Thromde Plan	The Thromde was requested to share the thromde plan (jurisdiction boundary) with the NHDCL
16	Assurance letter	ADB consultants and NHDCL requested Thromde for an assurance letter for a) To ensure that adequate water supply for the housing complexes (source, quantity and availability to the two sites, given the number of units at each site (32units at Site #1, and 88units and a Service center at Site #2) b) That sewerage facilities are being provided under a separate ADB project and therefore Site #1 can be connected to the sewerage line by the time the site has completed construction c) Waste disposal facilities will be identified by the thromde to dispose all excavated soil, construction waste and post construction waste (increase in pick up services for Site #2)
17	Thromde's concerns about the project	Thromde acknowledges that there is a housing constraints and the housing project will definitely address the necessary housing. NHDCL clarified with Thromde on the allotment procedures and processes. 30% of the housing will be provided for the private sector under this project and allotment will be done first come first basis.
	Approval of the	Thromde informed NHDCL that to minimize delays in the approval of the project, the architects must follow the required Thromde's structural plan requirements as per Site #1- RI- Residential one (Thromde to confirm) - G+3 Site #2 - CPE (Urban Periphery Enclave)- earmarked for NHDCL - G+3

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		The Thrombe informed that the site plan is a valid documents that is approved and issued to NHDCL. Therefore the designs must be based on the site plan. NHDCL clarified that currently, based on the soil test for Site #2 there are few minor details to be finalized. Once the decision is been made NHDCL will discuss the design with Thrombe before formally putting up for approval. Thrombe requested NHDCL to follow up and discuss with Thrombe before formally submitting it for approval.

Signed

C.O. S.S NHDCL

Appendix 7: Sample Grievance Redress Form

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

<table>
<tr><td colspan="2">

- E-mail
- Verbal/Telephonic

</td></tr>
<tr><td colspan="2">Reviewed by: (Names/Positions of Official(s) reviewing grievance)</td></tr>
<tr><td colspan="2">Action Taken:</td></tr>
<tr><td>Whether Action Taken Disclosed:</td><td>

- Yes
- No

</td></tr>
<tr><td colspan="2">Means of Disclosure:</td></tr>
</table>

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

AFFORDABLE HOUSING DEVELOPMENT 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		

Monitoring Item	Status	Remarks
- 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		
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		

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

INSPECTION CHECKLIST FOR PMU AND PIUs

AFFORDABLE HOUSING DEVELOPMENT 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?				

Monitoring/Inspection Questions		Findings			Comments / Clarifications
	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?				
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?				

Monitoring/Inspection Questions		Findings			Comments / Clarifications
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, weekdays?				
	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?				

Monitoring/Inspection Questions		Findings			Comments / Clarifications
	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?				
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 11: 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	Status of Implementation (Preliminary Design/Detailed Design/On-going	If On-going Construction	
				%Physical	Expected Completion

r		awarded)	Construction/Completed/O&M)[58]	Progress	Date

II. COMPLIANCE STATUS WITH NATIONAL / STATE / LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS[59]

Package No.	Subproject Name	Statutory Environmental Requirements [60]	Status of Compliance[61]	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish[62]

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

[59] 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.

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

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

[62] *Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.*

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)		

- 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)[63]

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						

[63] Attach Laboratory Results and Sampling Map/Locations

Operational Phase						

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	Conductivi	BOD mg/	TSS mg/	TN mg/	TP

				ty µS/cm	L	L	L	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
Position

Name
Position

Appendix 12: Forest Clearance

[illegible]

Royal Government of Bhutan
Ministry of Agriculture and Forests
Department of Forests and Park Services
Divisional Forest Office
Samdrup Jongkhar

No.SJD/FPES/FCC-2(B)/2021-2022/ 532

Date: 10/05/2022

Forestry clearance (Developmental activities)

The Divisional Forest Office, Department of Forest and Park Services, Ministry of Agriculture and Forests, Samdrup Jongkhar is pleased to issue a forestry clearance in favor of M/s. NHDCL, S/Jongkhar for construction of housing colony as detailed below:

S/ No	Name of activities	Location	Length/ breath or average (KM)	Quantity		Remarks
				Trees	Poles	
1	Construction of building for housing colony	Samdrup Jongkhar Thrower	2 acres	1 teak 4 MHW	3 teak	

This clearance is issued as per the field report and recommendation of the forest Range Officer, Samdrup Jongkhar, S/Jongkhar vide no. SJR/FPEU/LR-07/2021-2022/478 dated 06/05/2022 on the following conditions:

1. This clearance is limited to forestry perspective as per the detailed field report;
2. This clearance is not transferable,
3. The validation of this clearance shall be subject to obtaining other relevant clearances;
4. Additional clearance should be sought prior to any deviation in location/size the alignment;
5. This Clearance shall not be liable for any dispute arising during the implementation of activity;
6. Any damage caused to public/private property shall be borne by the holder of this clearance;
7. Disposal of any forest produce shall be as per existing rules and regulations
8. Only those trees/poles which are marked shall be removed;
9. Any waste generated from the activity should be properly disposed as per Waste Prevention & Management Regulation 2012; ***(The applicant should identify site for disposal of muck soil and aggregates).***
10. The legal status of the land shall remain unchanged & on any occasion the land shall not be converted to private ownership;
11. This clearance shall not restrict easement;
12. This clearance will not replace/substitute any other clearance required by any other laws;
13. The clearance shall be revoked without any liability on part of the Government if the holder of this clearance violated any of the above terms & conditions;
14. The applicant must ensure that the approach road does not permit illegal activities.
15. ***The payment of royalty and permit is required for collection of sand and stone outside 50 feet radius of the construction site.***
16. This clearance is valid till the compilation of project.
17. Date of issue: *15/04/2022*

(Sangay Dorji)

Chief Forest Officer

CC:

- The Range Officer, Samdrup Jongkhar for information and monitoring
- The FRMS, CFO office, S/Jongkhar for allotment of resources
- The Applicant for information

"Let us walk an extra mile and make a difference for our farmers"

Samdrup Jongkhar, Bhutan. Telephone # 00975 (07) 251038(O); 251250(CFO) 251075(Accounts) CPS/RATS/RMS/ 251211 Fax

Appendix 13: Thromde Assurance Letter on Provision of Water Supply and Sewerage Connections/Facility

བསམ་གྲུབ་ལྗོངས་མཁར་ཁྲོམ་སྡེ།

THROMDE ADMINISTRATION
SAMDRUP JONGKHAR

SJT/DDO/08/2021-2022/ 2334 09/06/2022

The Liaison Officer
NHDCL Samdrup Jongkhar
Mail address: boddhan.rai@nhdcl.bt

Subject: Assurance letter

Sir,

In response to your letter no.NHDCL-SJ/GEN(04)/2022/103 dated 30/05/2022 regarding the assurance letter, Thromde administration would like to inform your good office as follows:

1. Water supply to the upcoming housing shall be provided from 2.5 MLD WTP through storage tank.
2. In Regard to the debris accumulated from the construction activities, your good office may use the area between archery range and natural gully.
3. Sewerage line can be connected to the Thromde sewerage network.

Thanking you.

Yours sincerely

(Nima Dorji)
Offtg.Executive Secretary
Samdrup Jongkhar Thromde.

Cc:

1. Dasho Thrompon, SJT for kind information.
2. Water supply section for information.
3. Assistant environmental officer, Thromde Administration for information.
4. Office copy

PABX: +975 7 251618, 251619, 251629 **Fax:** +975 7 251305 **Website:** www.sjthromde.gov.bt

Appendix 14: Environmental Clearance

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རྒྱལ་ཡོངས་མཐའ་འཛོམ་གནས་སྐྱོང་ལྷན་ཚོགས།
དཔལ་ལྡན་འབྲུག་གཞུང་།
National Environment Commission
Royal Government of Bhutan

NECS/EACD/SJongkhar-Thromde/4125/2022/1564 **August 29, 2022**

ENVIRONMENTAL CLEARANCE

In accordance with Section 34.1 of the Environmental Assessment Act 2000, this Environmental Clearance (EC) is hereby issued to **National Housing Development Corporation Limited (NHDCL)** for **construction of Affordable Housing Development Sector Project** measuring an area of 2 acres along with the **construction of 11/0.415 kV substation and 11 kV powerline measuring 200 meters** at Samdrup Jongkhar Toed under Samdrup Jongkhar Thromde with the following terms and conditions:

I. General

The holder shall:

1. comply with provisions of the National Environment Protection Act 2007, Environmental Assessment (EA) Act 2000 and Regulation for Environmental Clearance of Projects (RECOP) 2016, Waste Prevention & Management Act of Bhutan 2009 and its Regulation 2012 (Amendment 2016), The Water Act of Bhutan 2011 and its Regulation 2014 and Revised Regulation on the Substances that Deplete the Ozone Layer and HFCs 2021;
2. ensure that the activity is in line with Initial Environmental Examination (IEE) report submitted for EC;
3. ensure that local communities, properties and any religious, cultural, historic and ecologically important sites are not adversely affected by the activity;
4. restore the damage of any public or private properties caused by the activity;
5. inform NECS and any other relevant authorities of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious, archeological, and/or ecological importance;
6. erect a signboard at the take-off point of the proposed activity stating the name of the project, contact address, and details of the implementing agency;
7. ensure that safety sign boards are posted at strategic locations including sign boards indicating areas where specific gadgets are required;
8. ensure that general housekeeping, cleanliness and hygiene are maintained at all times in the labour camps and site offices; and
9. ensure that the copy of the environmental clearance is framed and displayed at the site office and a copy of project documents are available at the site at all times.

II. Environmental standards

The holder shall comply with the Environmental Standards 2020.

NEC, PO Box 466, Thimphu, Bhutan
Tel: (975-2) 323384/325856/324323/326993 Fax: (975-2) 323385
www.nec.gov.bt

III. Import and use of ODS

The holder shall import and use Ozone Depleting Substances and the Hydrofluorocarbons (HFCs) as per the Revised Regulation on the Substances that Deplete the Ozone Layer and HFCs 2021.

IV. Protection and management of water resources

The holder shall:

1. ensure that the activity does not disrupt the water flow and pollute the water bodies; and
2. ensure that 30 meter or 100 feet buffer is maintained from the water resources at all times.

V. Waste prevention and management

The holder shall:

1. manage wastes generated from the activity (project site, labour camps, offices, etc.) with the application of 4R (Reduce, Reuse, Recycle, Responsibility) principle and other environmentally friendly methods of waste management;
2. ensure that construction wastes from the proposed activity are managed and disposed of as stated in the EMP for EC;
3. ensure that septic tanks and soak pits are constructed during project construction phase and post project completion phase for management of greywater and sewage as stated in the EMP for EC; and
4. ensure that import and use of hazardous wastes are strictly prohibited.

VI. Management of excavated materials and run-off

The holder shall:

1. manage and dispose excess excavated materials generated from proposed activity as stated in the EMP for EC;
2. ensure that all vehicles transporting excavated materials are properly covered to avoid spillages and fugitive emissions;
3. ensure that storm water drains and silt traps are constructed as stated in the EMP for EC;
4. ensure that the storm water drains are constructed in accordance with Environmental Codes of Practice (ECOP) for storm water drainage systems 2004; and
5. put appropriate measures to avoid erosion and landslides.

VII. Management of raw materials

The holder shall:

1. ensure appropriate measures are put in place for handling and storage of construction materials to avoid fugitive emissions; and

2. ensure that all vehicles transporting construction materials are properly covered to avoid spillages and fugitive emissions.

VIII. Others

The holder shall:

1. ensure that adequate green space/area is maintained within the project area;
2. ensure the project site is barricaded/cordoned off as stated in the EMP for EC;
3. ensure adequate measures are undertaken to reduce noise generated from the proposed activity;
4. ensure that the power lines are installed in accordance with Environmental Codes of Practice (ECOP) for installation of underground and overhead utilities 2004; and
5. ensure that the dust generated during construction is adequately suppressed by spraying water.

IX. Monitoring and reporting

The holder shall:

1. ensure that the effective day-to-day monitoring of the EC terms and conditions are carried out by the environmental unit or designated environment focal person;
2. maintain proper records on wastes generated and its management – stating types (hazardous and general wastes), quantities and characteristic and submit to NECS annually; and
3. maintain records of water used in the activity (separately for dust suppression and domestic purposes) and submit it to NECS annually.

X. Implementation plan

The holder shall prepare a detailed implementation plan focusing on the implementation of terms and conditions of this EC and submit to NECS within three (03) months from the date of issue of this EC as per the reporting format attached herewith.

XI. Renewal and modification

The holder shall:

1. ensure that renewal of this EC is processed at least three (3) months prior to its expiry along with a copy of EC and a report on the implementation of its terms and conditions as per the format attached and payment of prescribed renewal application fee failing to which the applicant shall be liable for penalty as per the RECOP 2016; and,
2. obtain prior approval from NECS for any modification to the existing proposal/application including, but not limited to, increase in production capacity, change in location of a project, change in ownership, etc.

Reservation

1. The NECS may stop the activity or impose additional terms and conditions, as may be deemed necessary; and,
2. The EC shall be subject to periodic review and modifications as per Article 25 of the EA Act 2000, without any liability on the part of the Royal Government.

The holder may adopt best practices in executing these terms and conditions to avoid adverse environmental impacts.

Failure to comply with any of the above terms and conditions shall constitute an offence and the proponent shall be liable in accordance with the EA Act 2000 and/or existing environmental laws.

Validity:

This EC is issued with validity from **August 29, 2022** until **August 28, 2027** only for **construction of Affordable Housing Development Sector Project** along with the **construction of 11/0.415 kV substation and installation of 11 kV powerline measuring 200 meters.**

This EC is issued solely pursuant to the EA Act, 2000 and its Regulations and in no way intends to overrule or alter the provisions of any law or rules in force. The Holder of this EC shall be responsible to adhere to the requirements under other laws and the issuing authority assumes no liability resulting from non-compliance or omission of any laws or rules.

(Sonam P. Wangdi)
SECRETARY

To
Chief Executive Officer
National Housing Development Corporation Limited
Post box # 1439
Thimphu.

Copy to:

1. Executive Secretary, Thromde Administration, Samdrup Jongkhar for kind information and to instruct the Environment Officer to conduct necessary compliance monitoring.
2. Guard file (Dzo/SJongkhar-Thromde/4125/2022/), EACD, NECS for record.

Appendix 15: Letter from Thromde on Relocation of Bitumen/Crusher Plant and Realignment of an Existing Access Road.

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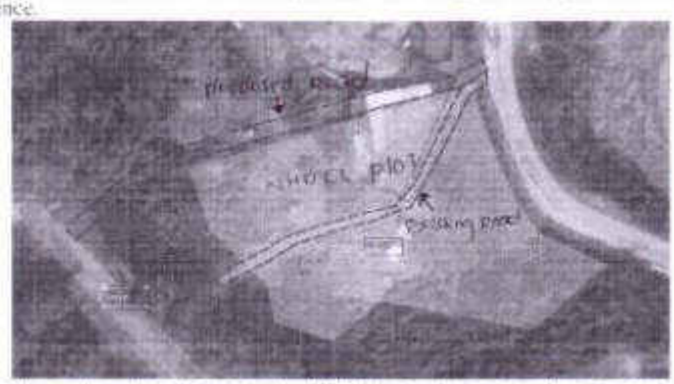
THROMDE ADMINISTRATION
SAMDRUP JONGKHAR

SJT/UPDD/04/LAP03/2022-23/391   Date: 21/11/2022

The Liaison officer
Samdrup Jongkhar Thromde
Sub: Plans to relocate existing approach road to archery range and relocation of crusher plant near NHDCL plot

Sir/Madam,
Thromde Administration is pleased to clarify following points:

1. Regarding the approach road connecting archery ground via NHDCL plot, it will be realigned as soon as NHDCL starts site development. New realignment map is sent for your kind reference.



2. As for the crusher plant adjacent to the NHDCL site, it was given for a short term lease. So it will be relocated by December 31st 2022.

Yours sincerely

Lek[illegible]
Offtg. Executive secretary
SJ Thromde

Copy to:
1. Dasho Thrompon, for kind information please.
2. Division heads, for information
3. Office copy

PABX: +975 7 251616, 251619, 251629 Fax: +975 7 251305 Website: www.sjthromde.gov.bt

Appendix 16: Notification from Thromde to Kuenden Builders to Vacate the leased land.

བསམ་གྲུབ་ལྗོངས་མཁར་ཁྲོམ་སྡེ།

THROMDE ADMINISTRATION
SAMDRUP JONGKHAR

SJT/LSD/Lease/12/22-23/[illegible]

Date:9/3/2023

The Kuenden Builders

Samdrup Jongkhar Thromde

Samdrup Jongkhar

Sub: Final notification

Sir/Madam,

This is to inform that the lease period of your leased land has already been expired. As such you are requested to vacate the leased land within 1 week from the issuance of this letter. Also to quote the clause of Land Lease Rules and Regulation, 2018:

"184. Any structures abandoned for six months from the date of expiry shall be taken over by the local authority without any compensation."

Therefore, any structures that is yours must be clearly vacated from the state land and therefore, leave the lease property of Thromde in original condition. Also a final reminder, that from next time Thromde administration will not notify the proponent again and again for the above mentioned request.

This letter is issued for strict compliance and failure to comply with this letter will be dealt as per the Lease Rules and Regulations/other government rules and regulations that shall be implemented by law enforcement committee of Thromde on the ground as per Act henceforth.

Yours sincerely,

Nima Dorji

Offtg. Executive Secretary

Copy to:

1. Dasho Thrompon, for kind information
2. Offtg. ES, for kind information
3. Land Committee members, for kind information and strict monitoring
4. Land and Survey Division staffs, for information and strict actions
5. Office copy

PABX: +975 7 251616, 251619, 251629 **Fax:** +975 7 251395 **Website:** www.sjthromde.gov.bt

Appendix 17: Letter from Thromde on dismantling of crushing plant on the leased land.

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བསམ་གྲུབ་ལྗོངས་མཁར་ཁྲོམ་སྡེ།

THROMDE ADMINISTRATION
SAMDRUP JONGKHAR

SJT/DRD/12/2023-2024/1476 Date:26/02/2024

To
The Project Engineer
NHDCL-Toed

Sub: information regarding the dismantling of crusher plant

Dear Madam

I am writing to bring to your attention regarding the dismantling of the crushing plant at near your project area. The owner has initiated the dismantling process since last week following communication from our office and we are informed by owner that they will vacant the site within the week. To provide a visual update on the progress, I have attached few photos that showcase the current status of the dismantling process.

Thanking you

Sincerely

Namgay
Engineer, DRD
S/Jongkhar Thromde

Copy to:
1. Dasho Thrompon for kind information
2. Executive secretary for kind information
3. Chief, UPD for information
4. Office copy

PABX: *+975 7 251616, 251619, 251629* **Fax:** *+975 7 251305* **Website:** *www.sjthromde.gov.bt*

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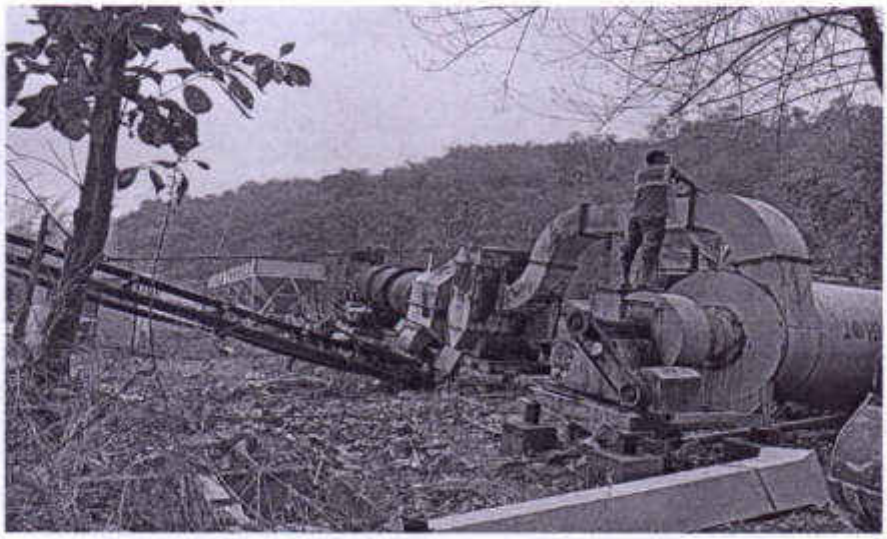
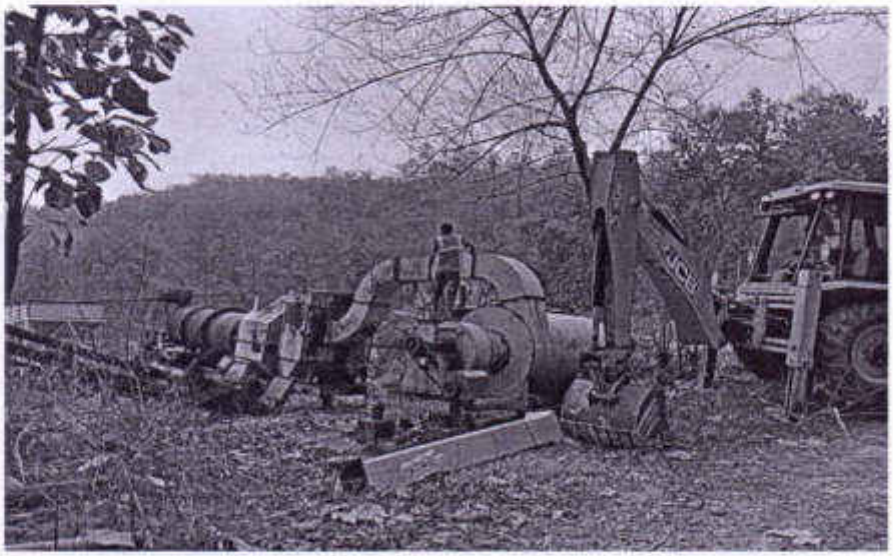
བསམ་གྲུབ་ཐོད་མས་ཁང་ཚོམ་སྡེ།
THROMDE ADMINISTRATION
SAMDRUP JONGKHAR





PABX: +975 7 251616, 251619, 251629 Fax: +975 7 251305 Website: www.sjthromde.gov.bt