

Executive Summary

BFL has been categorized as a Category B project, as the potential adverse environmental and social impacts on population within the Protected Areas or those living around who depend on the PA for their livelihoods or environmentally important areas are site-specific, reversible and can be readily mitigated.

Therefore, to ensure that all BFL funded projects and programs are environmentally and socially sustainable as well as in line with BFL's policies and guidelines, an Environmental and Social Management Plan (ESMP) involving stakeholder participation and timely public disclosure is required.

An Environmental and Social Management Plan (ESMP) for Biological Corridor (BC) 2 Wangdue Phodrang describes mitigation measures/good practices at activity level which are required as per the screening protocol. All the screened activities which has potential risks to environment and social management have to prepare ESMP which include environment management and mitigation plans during pre-activity, activity implementation and closing phases. Hence, it contains description of the detailed actions including communities, roles, communication and reporting and monitoring processes required as part of the implementation.

In order to ensure that the issues of all stakeholders are taken into account, it includes a stakeholder engagement plan. The plan includes identification of stakeholders, method of engagement, timing and logistics. It is a requirement for all parks and biological corridors to keep record, reporting, review, auditing and update ESMP yearly as per the planned activities.

The activities that required ESMPs for the year 2025 under BC2 -Wangdue Phodrang are as follows:

1. Construction of Lobesa Range Office

གྲུག་ལྟུང་ལྟུང་གི་མཐུན་པོ་ལྟུང་ལྟུང་གི་མཐུན་པོ་

འབྲུག་རྒྱལ་ཡོངས་སྤྱི་ལོ་ཚེ་སློག་མ་དངུལ་འདི་མཐའ་འཁོར་གནས་སྤངས་དང་མི་ཕྱེད་འོས་འབབ་ཅན་གྱི་ལས་འགུལ་གྱི་དབྱེ་ཁག་ ཁ་བ་(Category B) རང་ལྟ་ཚུད་དེ་ཡོད་པ་ཡིན། དེ་ཡང་ལས་འགུལ་འདི་ལས་བརྟེན་ཏེ་སྤྱད་སློབ་ས་ཁོངས་ནང་སྤྱད་མེད་མི་མེད་དང་ ཡང་ན་ སྤྱད་སློབ་ས་ཁོངས་ཀྱི་མཐའ་སྐོར་ཏེ་འཛོལ་བ་སྤྱད་སློབ་ས་ཁོངས་ལྟ་བུར་སྤྱད་མེད་མི་མེད་ ཡང་ན་ གཤམ་ཅན་གྱི་མཐའ་སྐོར་གནས་སྤངས་ཀྱི་ས་ཁོངས་ཚུ་ལྟ་གཞི་ན་པ་འབྱུང་ནི་ཉེན་ཁ་ཡོད་པ་དྲ་ གཤམ་སྤྱད་གཞི་ན་པ་འབྱུང་པ་ཅིན་ གཞི་ན་ཉེན་ཚུ་དམིགས་གསལ་ས་གནས་ནང་རྒྱུ་ཅིག་འབྱུང་ནི་དང་ གཞི་ན་ཉེན་མར་ཕབ་རྒྱབ་ནི་དང་ ཚུ་མེད་ཡང་གཏང་ཚུགས་པ་ཡིན།

དེ་འབད་མ་ལས་ འབྲུག་རྒྱལ་ཡོངས་སྤྱི་ལོ་ཚེ་སློག་མ་དངུལ་ཐོག་ལྟ་ རྒྱབ་སྐྱོར་འབད་ཡོད་པའི་ལས་འགུལ་དང་ལས་ལྷན་ཚུ་ མཐའ་འཁོར་གནས་སྤངས་དང་ མི་ཕྱེད་གཉིས་ལྟ་ལྟན་བརྟེན་གྱི་ཕན་པ་ཡོད་པ་བཟོ་བ་གི་མ་ཚད་ འབྲུག་རྒྱལ་ཡོངས་སྤྱི་ལོ་ཚེ་སློག་མ་དངུལ་གྱི་སྤྱད་བྱས་ལམ་སྟོན་དང་འབྲེལ་ཐབས་ལྟ་ མཐའ་འཁོར་གནས་སྤངས་དང་མི་ཕྱེད་འཛོན་སྐྱོང་འཆར་གཞི་འདི་དགོས་དྲ་ མི་དམངས་ཤོས་བསྐྱུན་དང་ ཅུས་དང་ཅུས་སྒྲིལ་མི་དམངས་ལྟ་གསལ་བ་བཤད་ནི་འདི་དགོས་ཡིན།

རང་བཞིན་གནས་སྤངས་དང་མི་ཕྱེད་འཛོན་སྐྱོང་འཆར་གཞི་འདི་ནང་ སྤྱི་ལོ་དང་སློག་ཆགས་རྒྱན་ལམ་ཚུ་ནང་ལས་ལྷན་ཚུ་འབད་བའི་སྐབས་ ཐབས་ལམ་དང་བཟང་སྤྱད་ཚུ་གསལ་སྟོན་འབད་མ་ཡིན་པ་དྲ་ འདི་ཡང་ལས་ལྷན་གདམ་སེལ་ལམ་ལྟགས་དང་འབྲེལ་ཏེ་ཡིན། གདམ་སེལ་འབད་ཡོད་པའི་ལས་ལྷན་གི་ནང་ལས་ མཐའ་འཁོར་གནས་སྤངས་དང་མི་ཕྱེད་གཞི་ན་ཉེན་ཡོད་པའི་ལས་ལྷན་ཚུ་གི་དོན་ལྟ་ མཐའ་འཁོར་གནས་སྤངས་དང་མི་ཕྱེད་འཛོན་སྐྱོང་འཆར་གཞི་བཟོ་དགོ། འཛོན་སྐྱོང་འཆར་གཞི་འདི་ནང་ ལས་ལྷན་འགོ་མ་བཅུགས་པའི་ཏེ་མ་གཞི་བཅུགས་འབད་བའི་སྐབས་དང་མཚུག་བསྐྱུལ་དྲ་ མཐའ་འཁོར་གནས་སྤངས་འཛོན་སྐྱོང་དང་གཞི་ན་ཉེན་མར་ཕབ་ཀྱི་ཐབས་ལམ་ཚུ་བཅུགས་དགོས་ཡིན།

དེ་འབད་མ་ལས་འཛོན་སྐྱོང་འཆར་གཞི་འདི་ནང་ ལས་ལྷན་ མི་ཕྱེད་ ལྟ་འགན་ བརྟེན་དང་སྤྱད་ལྟ་ དེ་ལས་ལྷན་ཏོག་ལམ་ལྟགས་ཚུ་གི་སྐོར་ལས་འགུལ་བཤད་ཁ་གསལ་ཚུད་དགོས་ཡིན། འཛོན་སྐྱོང་འཆར་གཞི་འདི་ནང་ལྟ་ གཤམ་གཏོགས་འབད་དགོ་པའི་ཁེ་གུང་ཡོད་མི་ཚུ་གི་ཉོག་བཤད་ཚུ་ཚུད་དགོ་པའི་ཁར་ ཁེ་གུང་ཡོད་པའི་མི་ཚུ་གི་དོན་ལྟ་གཤམ་གཏོགས་འཆར་གཞི་དགོ། གཤམ་གཏོགས་འཆར་གཞི་འདི་ནང་ ཁེ་གུང་ཡོད་མི་ངོས་འཛོན་འབད་ནི་དང་གཤམ་གཏོགས་འབད་ནི་འཆར་ལམ་ལྟགས་ དེ་ལས་གཤམ་གཏོགས་ཀྱི་དུས་ཚོད་དང་བཅའ་སྤྱིམ་ཚུ་ཚུད་དགོས་ཡིན། སྤྱི་ལོ་དང་སློག་ཆགས་རྒྱན་ལམ་ཡིན་ཚད་ཚུ་གི་མཆར་གཞི་ལས་ལྷན་དང་འབྲེལ་ཏེ་ དྲན་ཐོ་དང་སྤྱད་ལྟ་ བསྐྱར་ཁེལ་ ཚུས་དབྱུང་འབད་ནི། དེ་ལས་ མཐའ་འཁོར་གནས་སྤངས་དང་མི་ཕྱེད་འཛོན་སྐྱོང་འཆར་གཞི་འདི་ལོ་བསྟར་བཞིན་དུ་ཅུས་མཐུན་བཟོ་དགོས་ཡིན།

ཅུ་མཐུན་པོ་ལྟུང་ལྟུང་གི་མཐུན་པོ་ རང་མཐའ་འཁོར་གནས་སྤངས་དང་མི་ཕྱེད་འཛོན་སྐྱོང་འཆར་གཞི་དགོས་ཡོད་པའི་ལས་ལྷན་ཚུ་ཡང་།

༡༥ ལོ་བེ་ས་ལྟ་ རྒྱལ་ཚལ་ སྤྱི་ལོ་ཚེ་སློག་ཡིག་ཚང་བཟོ་སྤྱད་འབད་ནི།

Bhutan for Life Environmental and Social Management Plan for BC-02 (2025)

1. Introduction

(A) Project Background

The Bhutan for Life (BFL) project aims to ensure a robust network of protected areas and biological corridors that secures human well-being, biodiversity conservation and increase climate resilience in Bhutan. The project provides a 14-year financial bridge that allows for immediate improvement in the management of Bhutan's protected areas for climate resilience, and the prompt delivery of mitigation, adaptation and biodiversity gains, while the country gradually ratchets up its own financing resources.

BFL seeks to achieve the following objectives:

- Help Bhutan remain carbon neutral by increasing forest and vegetative cover within the Protected Area System (PAS).
- Enhance the socio-economic wellbeing of communities in and in the vicinity of the PAS through climate-informed natural resources management.
 - Maintain stable, thriving and diverse populations of key species contributing toward national and global biodiversity goals.
- Strengthen organizational, institutional, and financial capacity for effective management of PAS. BFL includes five components that reflect these goals, divided into 16 milestones (or outputs) and over 80 detailed activities.

(B) Scope of ESMP

The preparation of this Environmental and Social Management Plan (ESMP) was required to manage the environmental and social impacts through and specific mitigation actions required to implement the project in accordance with the requirements of WWF's Social Safeguards Integrated Policies and Procedures (SIPP), the project's Environmental and Social Management Framework (ESMF), and applicable national legislation and regulations. The ESMP provides an overview of the environmental and social baseline conditions on the routes of the proposed second segment of the project, summarizes the potential impacts associated with the proposed activities and sets out the management measures required to mitigate any potential negative impacts. This ESMP will be implemented by BFL focal person in each park authority (PA) and biological corridor (BC), and by the contractor to be commissioned by each PA/BC for the project.

(C) Purpose of ESMP

This Site-Specific ESMP is a project-specific source document detailing the environmental and social protection requirements to mitigate and minimize the adverse impacts. The ESMP's primary purpose is to ensure that the environmental requirements and social commitments associated with the project are carried forward into implementation and operational phases of the project and are effectively managed.

The specific objectives of this ESMP are as hereunder:

- Minimizing any adverse environmental, social and health impacts resulting from the project activities.
- Conducting all project activities in accordance with the relevant RGoB Laws and WWF's safeguard operational policies and guidelines;
- Preventing environmental degradation as a result of either individual subprojects or their cumulative effects.

- Enhancing the positive environmental and social outcomes of project activities;
- Ensuring that the proposed mitigation measures are feasible and cost-efficient.
- Providing an Action Plan to ensure that the project impact mitigation measures are properly implemented and monitored.
- Ensuring that all stakeholders are engaged in the project activities' preparation and implementation, and their concerns are fully addressed.

(D) Applicable law, policies, and regulation

This ESMP is developed by following the guidelines set forth in the BFL's ESMF.

Applicable RGoB laws and policies include the Constitution of the Kingdom of Bhutan, 2008; legislation on land and moveable property (Land Act of Bhutan 2007; Land Rules, 2007; The Moveable Cultural Property act of Bhutan, 2005); legislation and regulations on forests and protected areas (National Environment Protection Act, 2007; Forest and Nature Conservation Act of Bhutan, 1995; Forest and Nature Conservation Rules and Regulations of Bhutan, 2017; National Forest Policy, 2011); legislation on water and waste prevention (Water Act of Bhutan, 2011; Waste Prevention and Management Act, 2009); legislative requirements on environmental assessment (Environmental Assessment Act, 2000 and Regulations on the Environmental Clearance of Projects, 2001); and other relevant laws (The Local Government Act of Bhutan, 2009; Livestock Act of Bhutan, 2001; The Biodiversity Act of Bhutan, 2003; The Pesticides Act of Bhutan, 2000; The Penal Code of Bhutan, 2004; National Access and Benefit Sharing (ABS) Policy (Draft), 2014). WWF's safeguards policies that are relevant to this project are as follows: Policy on Environment and Social Risk Management; Policy on Protection of Natural Habitats; Policy on Involuntary Resettlement; Policy on Indigenous Peoples; Standard on Pest Management; Policy on Accountability and Grievance System; Standard on Physical Cultural Resources; as well as general standards on occupational and community health and safety and on energy efficiency. In general, RGoB's laws, policies, and guidelines are in line with the WWF's environmental and social safeguards requirements. However, there are a few differences between the two systems. With regard to environmental impacts, there are no direct contradictions between the RGoB laws and regulations and the WWF's SIPP, but the requirements of the latter are more extensive. All project activities should fully comply both with the RGoB's Regulations on the Environmental Clearance of Projects, and with the procedures and mitigation measures prescribed in this ESMF. In case that the WWF's SIPP requirements are more extensive, strict, or detailed than the RGoB legislation and policies, the former will apply to all project activities. Regarding social impacts, the primary discrepancies between the RGoB laws and regulations and the WWF's SIPP refer to the status of non-title holders and informal land use, and the commitment to participatory decision-making processes. First, according to the WWF's SIPP, all users of land and natural resources (including people that lack any formal legal ownership title or usage rights) are eligible to some form of assistance or compensation if the project adversely affects their livelihoods. The RGoB laws only recognize the eligibility of landowners or formal users to receive compensation in such cases. Second, WWF's SIPP requires extensive community consultations as part of the development of various safeguards documents and during project activities. RGoB legislation does not include similar requirements. For the purposes of the BFL project, the provisions of the WWF's SIPP shall prevail over the RGoB legislation in all cases of discrepancy.

The occupational health and safety of workers in construction will comply with Labour and Employment Act-2007, Regulation on Occupational Health, Safety and Welfare, 2012 and any other national documents. The list of the OHS requirements shall be attached along with the Bill of Quantities (BoQ) along with an appropriate item description to allow the bidder to quote reasonably against the item, and to enable strict compliance and ease the monitoring during the project implementation time

1. Environmental and Socio-Economic Conditions:

- a. **Background.**

BC 02 was conceptualized concurrently as a landscape that connects Jigme Singye Wangchuck National Park and Royal Botanical Park. BC 02 covers part of Daga, Gasetshowom, Gasetshogom, Nahi and Athang Gewogs under Wangdue Dzongkhag and part of Tseza Gewog under Dagana Dzongkhag. There are communities living inside and along the buffer zones of BC 02 including the nomadic herders. The BC 02 encompasses 291.76 km² of area ranging from subtropical to temperate climates, offers safe havens for rare, fascinating, and endangered animals including tiger, red panda, musk deer, clouded leopard, and rufous-necked hornbill. The Biological Corridor has 27 species of mammals, 186 species of birds, 246 species of plants, 111 orchid species and 122 butterfly species based on the first rapid biodiversity assessment (RBA), opportunistic listing, National Forest Inventory (NFI), National Tiger Survey (NTS) and socio-economic survey (SES).

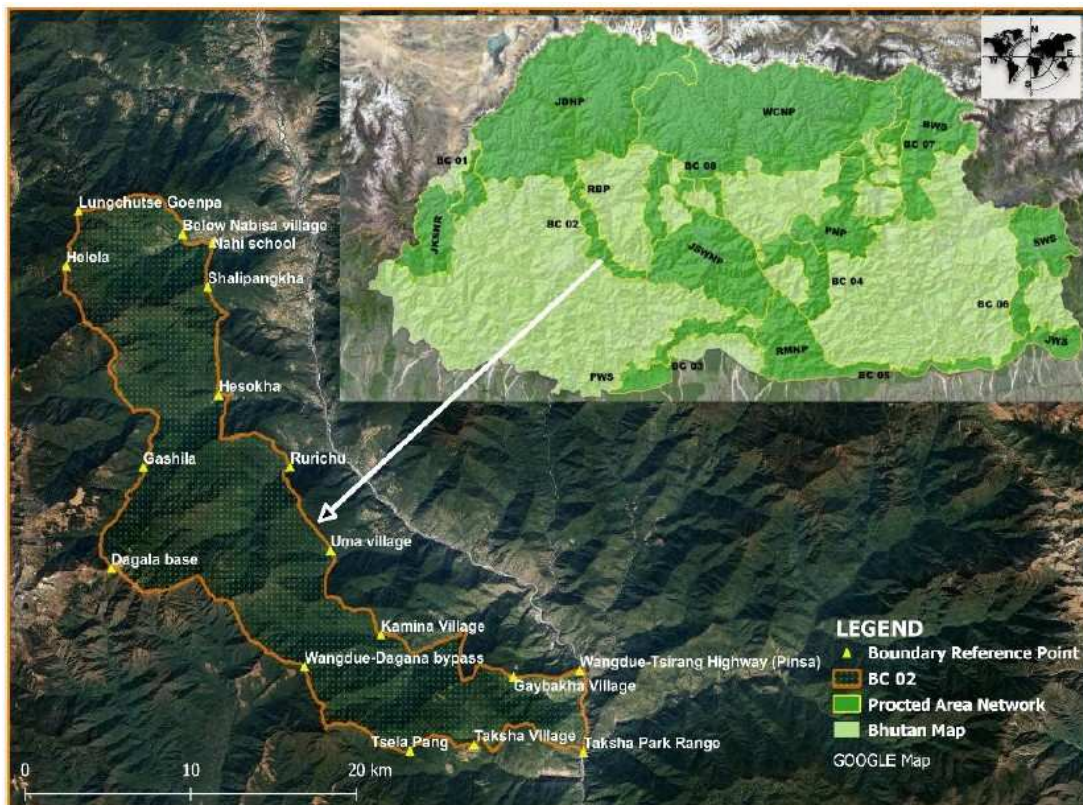
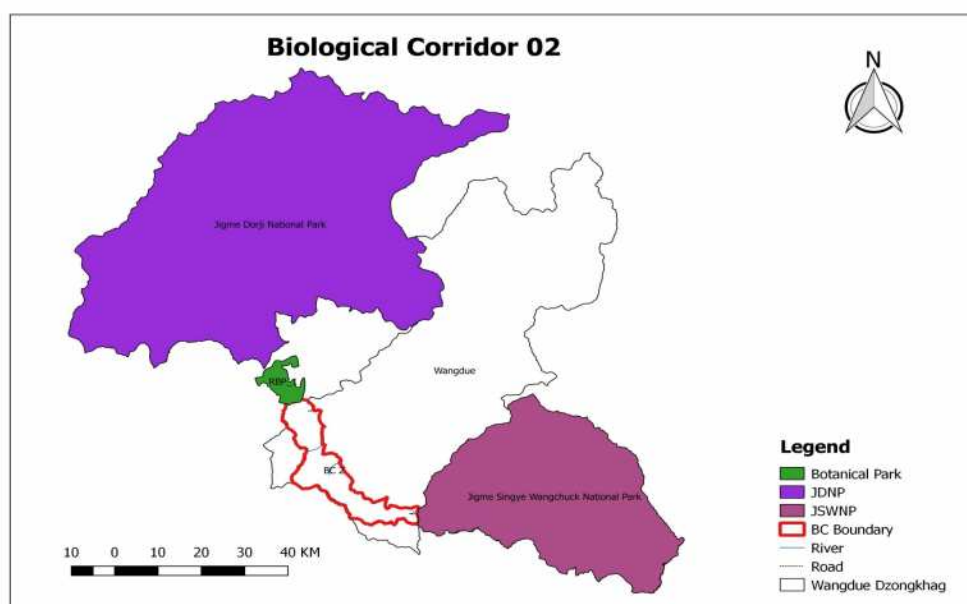


Figure 3: Boundary map of BC 02

BC 02 in the central landscape function as the connecting landscape between Jigme Singye Wangchuck National Park and Royal Botanical Park, Lampelri providing connectivity to the different habitats while:

- Providing a secured migratory habitat to facilitate movement (dispersal or migration) of several threatened wildlife species including Royal Bengal Tiger
- Maintaining genetic diversity of species and
- Providing a supplementary feeding habitat for animals



Geological and topographical condition of Biological Corridor 02

BC 02, encompassing an area of 291.75 square kilometers, is situated within a geographically diverse region characterized by varying topographical aspects. The predominant orientation of the landscape within BC 02 aligns with the broader Himalayan topography, primarily facing east and south. In contrast, only a small portion of the terrain exhibits north and west-facing slopes.

The orientation of these slopes or aspects is crucial in shaping the microclimatic conditions that influence biodiversity within BC 02. South and east-facing slopes receive more solar radiation, leading to warmer and often drier conditions. In contrast, north and west-facing slopes tend to be cooler and more humid. This variation in solar exposure significantly affects the thermal and moisture regimes of both soil and air, ultimately impacting the growth patterns, distribution, and diversity of plant and animal species in the area.

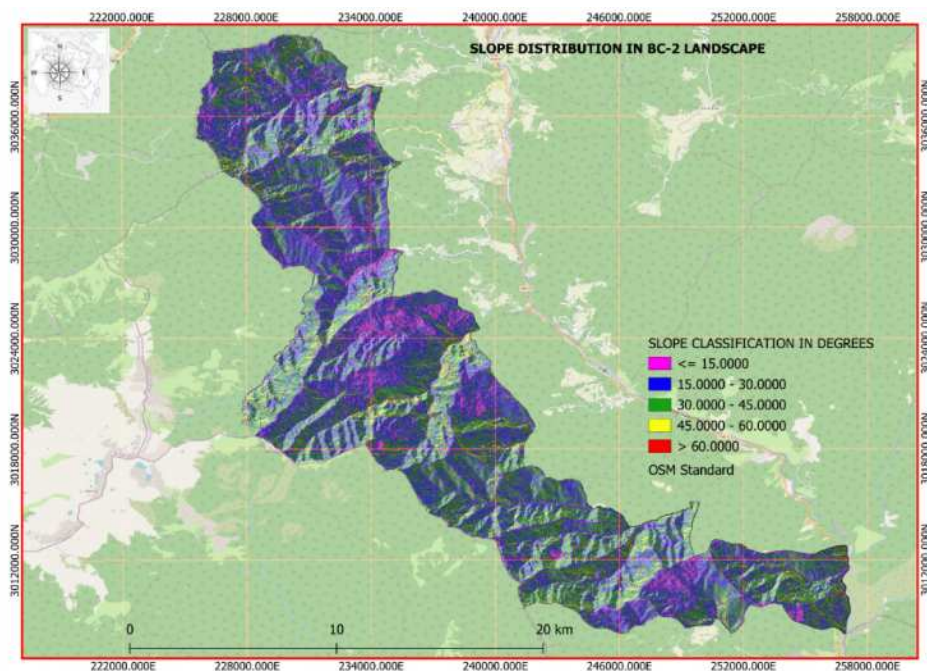
The diverse aspects of the BC 02 landscape create a mosaic of microhabitats, each supporting distinct communities of flora and fauna. This heterogeneity, driven by the varying orientations of the landscape, is a crucial factor in determining the overall biodiversity within BC 02, highlighting the significance of its topographical features.

The BC 02 landscape is defined by its diverse altitude, which spans from 450 meters above sea level (masl) to 4050 masl. This dramatic elevation gradient fosters a variety of microclimates and habitats, each supporting distinct types of vegetation and wildlife. The lowest elevation in the BC 02 region is found in the Harachuu area, at approximately 450 masl and the highest elevations are recorded at Dagala, Heleyla, and Lungchuzey areas, reaching around 4050 masl. The major chunk of BC 02 lies within the elevation range of 1890 to 3330 masl.

B Climatic conditions

Meteorological data has been derived from station record of Punakha (Thinleygang) and Wangduephodrang (Gasello) from the Meteorology Section, Department of Hydro met Services, Ministry of Economic Affairs Thimphu (Fig 2).

Figure 1. Distribution of slope categories in BC-02



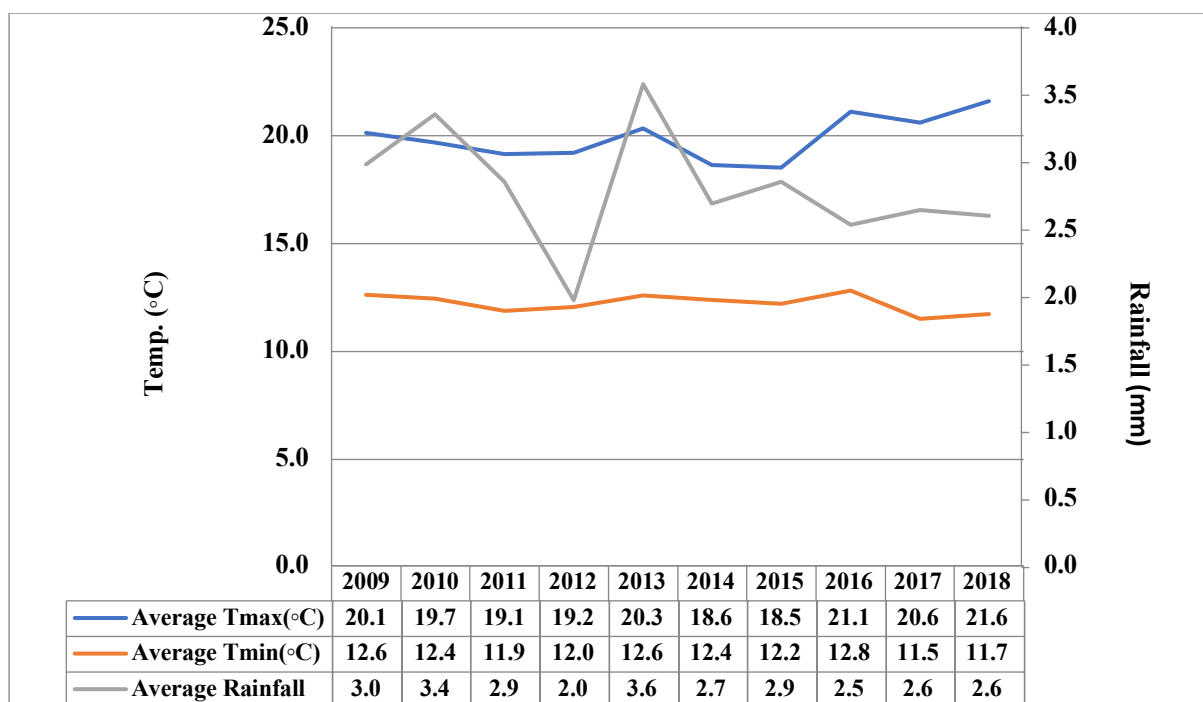


Figure 2. Avg. maximum, minimum temperatures and avg. rainfall from Thinleygang weather station.

Temperature was received maximum in the year 2018 with 21.6 °C and the lowest temperature in the year 2017 with 12.15°C (Figure 2). The highest rainfall was received in the year 2013 with 3.6 mm and was received lowest in the year 2012 with 2.00 mm towards northern part of Biological Corridor C-02 (Figure 2). Northern part of Biological Corridor-02 was reference from Thinleygang meteorological data station, Punakha Dzongkhag.

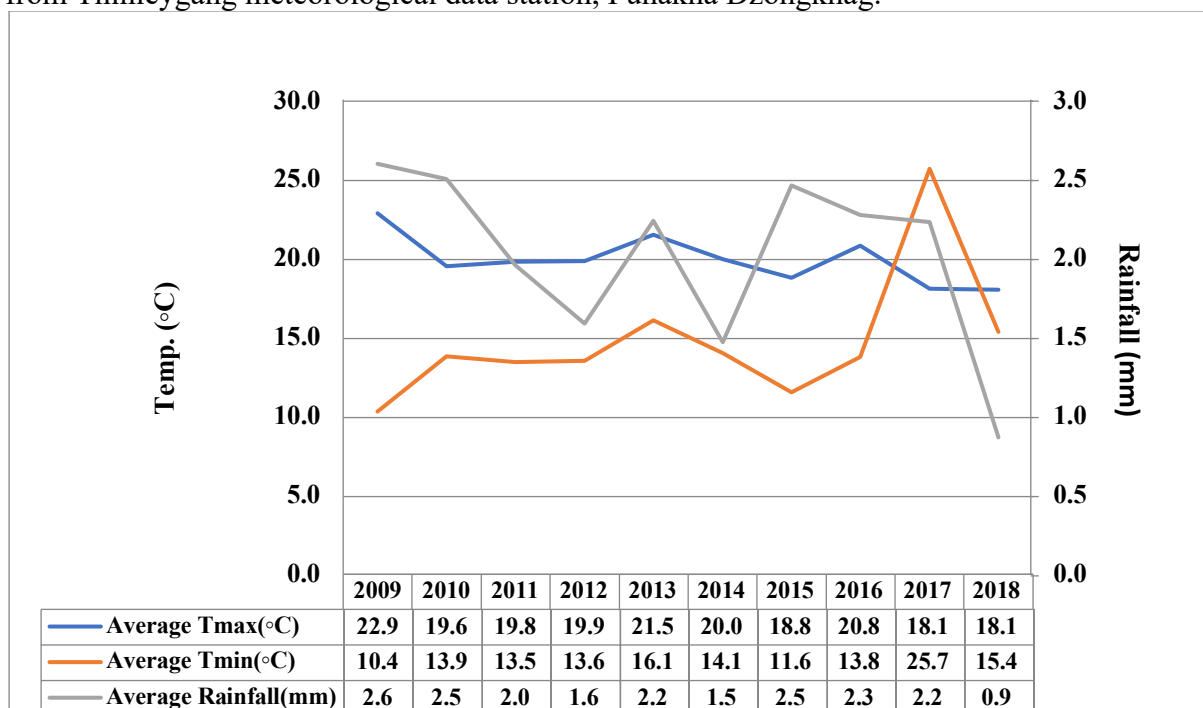


Figure 3 Avg. maximum, minimum temperatures and avg. rainfall from Gasello weather station.

Towards the southern part of Biological Corridor-02, the maximum and minimum temperature was received in the year 2009 with 22.9 °C and 10.4 °C (Figure 10). The highest rainfall was received in the year 2009 with 2.6 mm and the lowest rainfall received was in the year 2018

with 0.99 mm (Figure 3). The southern part of Biological Corridor-02 was reference from Gasello meteorological data station, Wangdue Dzongkhag.

C. Hydrological conditions

BC 02 area is home to a diverse array of perennial and seasonal streams and springs, most of which drain into the main Punatsangchu River. It features eight prominent streams, including Nahi Chhu, Hesokha Chhu, Baso Chhu, Rurichhu, Baychhu, Kamina Chhu, and Gaywachhu, which serve as vital lifelines for many downstream communities, providing water for both irrigation and drinking purposes. Notably, Hesokha and Baso Chhu are utilized for hydropower generation at the Basochu Hydropower Plant. All streams and springs ultimately flow into the Punatsangchu River, which traverses the valley bottom. In the Gyawachhu area, the Punatsangchu River forms the border of the BC 02 region.

D.1 Floral diversity

BC 02 has a total of 106 tree species and shrub species belonging to 47 families recorded within 9 forest types. Floral species composition in BC 02 includes four major life forms such as Evergreen trees, Deciduous trees, Deciduous shrubs and Evergreen shrubs. All the life form groups form contrasting physiognomic patterns along altitudinal gradients. The Evergreen trees consist of 78%, deciduous trees 19%, deciduous shrubs 1.5% and evergreen shrubs 1.5% respectively. The results revealed the tree's vegetation was mostly dominated by *Castanopsis tribuloides*, *Quercus lanata*, and *Q. griffithii* in the mid elevations. In the upper reaches the dominant species were *Juniperus recurva* and *Abies densa*.

Total ground vegetation was composed of 65 families of which 24 were tree regeneration, 52 shrubs, 82 herbs, 17 perennial ferns, 9 grass and 4 orchid species. Tree regeneration consist of 10 %, shrubs 19%, herbs 42% and perennial fern 8%, perennial grass 20% and orchids 0.9% respectively.

The result revealed the ground vegetation was mostly dominated by *Fragaria nubicola*, *Rubus calycinus*, *Ophipogon clarkei*, *Eupatorium adenophorum*, *Chromolaena odoratum*, *Pilea umbrosa*, *Bidens pilosa*, *Adiantum caudatum*, *Nephrolepis* sp, *Smilax* sp, and *Gaultheria fragrantissima* etc. The tree regeneration mostly consists of *Pinus bhutanica* and *Quercus griffithii*

D.2 Faunal diversity.

A total of 27 mammal species from 15 families were recorded in BC 02 through camera traps and transect surveys. Furthermore, additional secondary sources like National Tiger Survey (NTS) and Biodiversity Monitoring Grids (BMG) were also used. Of these, four are endangered, five are vulnerable, and five are near threatened as per the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species (IUCN 2014). Mammals of conservation importance, such as Tiger (*Panthera tigris*), Clouded leopard (*Neofelis nebulosa*), Asiatic golden cat (*Catopuma temminckii*), Leopard cat (*Pardofelis marmorata*), Grey langur (*Semnopithecus entellus*), Red panda (*Ailurus fulgens*), Spotted Linsang (*Prionodon pardicolor*) and others, are present in the corridor.



Avifauna of BC-02

D.3 Bird diversity.

A total of 186 bird species under 48 families have been recorded in BC 02 (Annexure II) out of which 1 was critically endangered, 181 were Least Concerned, 3 Near Threatened, 2 Vulnerable and 9 falling under Schedule II of FNCRR 2023.

A total of 129 species were recorded in Cool-broad leaved Forest, 62 in blue pine, 54 in Warm broadleaved, 27 in Fir Forest, 56 in mixed conifer and 35 in Chirpine.

E. Socio-economic conditions.

Communities within and periphery of BC 02 perform varieties of activity for income generation. Income from other sources out-ranks the other income generated from agriculture, livestock and forestry resources in all three gewogs significantly. The income from other sources includes income generated through activities such as business, wages, salaries and financial support from family members. Financial help from family members comprises 22% of the income generated from other sources for Daga Gewog, 42% for Gasetsho Wogm and 35% for Nahi Gewog.

The second highest income generating activity for Daga and Nahi gewog is agriculture while livestock generates more income for Gasetsho Wogm gewog. The annual expenditures of the communities were assessed and listed under 14 categories. The community spends the most on conducting rituals with each household spending an average of Nu.63,424.24 in a year. Expenses on household utilities, child education and agriculture also load heavily on the BC 02 community.

The primary livelihood of communities residing in and around the corridor is subsistence agricultural practices. However, few communities in Uma Khamey, Kamina and Wogayna under Daga gewog, Hebessa under Gasetsho Wogm gewog, Tongcheythangka, Nabisa, Khujula and Hebessa under Nahi gewog have ventured into commercial agriculture farming for their livelihood.

In total, the residents of BC 02 grew 46 income generating crops. Rice is the highest income generating crop which constitutes about 13.5% of income for Daga gewog, 20.8% for Gasetshowom gewog and 24.9% for Nahi gewog. Nahi gewog alone generated a sum of Nu.5,84,056 from sale of rice in the year 2023.

Daga gewog has generated the highest income through the sale of agricultural crops (Nu. 3,214,515) and has the highest holding of land with 682.025 acreage in total.

Besides agriculture, livestock rearing is another important component of rural livelihood. People rear livestock like cattle, pig, poultry and goat mainly for the purpose of egg, dairy, meat and manure production.

All 65 sample households interviewed in Gasetsho Wogm Gewog own one or more types of livestock (Figure 20), while 93.10% (81 households) in Nahi Gewog and 95.09% (97 households) in Daga Gewog also keep livestock. Communities across all three Gewogs practice poultry farming, although fish farming was reported in only one household in Daga Gewog. The household with the highest number of cattle is in Wogay village under Daga Gewog, with a total of 70 cattle. Cattle are the primary income-generating livestock for all the Gewogs in BC 02. In terms of income generated from the sale of livestock and its products, Gasetsho Wogm Gewog reports the highest annual income, amounting to Nu. 2,300,080.

New Revised map for BC-02

2. Planned activities in Year 7 2025-2026

Given the scale of the project, these risks are expected to be minimal, site-specific and those for which mitigation measures can easily be developed through standard and applicable regulations. These impacts are again site-specific, reversible and can be minimized/mitigated by developing appropriate measures. Specifically, to address these concerns, the project will comply with the relevant Acts and Rules and Regulations of the Kingdom of Bhutan.

The activities that are planned in BC-02 that require ESMP are:

1. Construction of Lobesa Range Office

Budget: 10 million

Timeline: July 2025 to June 2026

Location: Metsina, Barp Gewog, Punakha

Area: 0.165 acre, Plot No. BAP-2050





Existing condition of the Range Office



Existing condition of wall in Lobesa Range Office

Situated near the Wangdue, Punakha and Thimphu highway roundabout, the Lobesa Range Office caters to two gewogs i.e. Barp and Toeb Gewog of Punakha Dzongkhag. The public service delivery

such as Forestry clearance, firewood marking, developmental activities, prayer flags and community forestry. It also does monitoring, enforcement and evaluation of the two gewogs. Headed by the Range Officer, there are 6 Technical staff and one caretaker and the Thinleygang Beat Office with 4 technical staff is in Thinleygang in Toedpaisa Gewog also falls under the range office.

The present office was constructed sometime in the 1960s with some minor maintenance in 2017. The office was constructed with mud brick and mostly timber in traditional Bhutanese style. The present office needs major repair however the repair is not feasible due to the old structure. Presently there is an issue with electrical wiring, leakage, worn-out ceiling and floors, walls made of wood increasing risks of fire.

After the approval of the budget, the existing structure will be dismantled from which usable timber and roofing materials will be used for the construction of the workers (8 heads) shed and later it will be used for caretaker's residential quarter and other usable timber will be used for construction of seized timber shed at the Division Office. The other non-usable timber will be used for firewood and other construction materials will be disposed of in dumping site. The front portion of the office will be cleared by JCB and create parking space measuring 30m X 7m. In the process of operation, the hedge row species namely: *Ligustrum* species (12 Nos.), *Tecoma stans* (1 No.), *Datura stramonium* (1 No.), *Bougainvillea* (1 No.) need to be removed and later used for landscaping around the office premises. A tree species namely *Callistemon* species (3 Nos) needs to be removed from the site for ease of construction. No trees and shrubs

of economic importance were observed in the compound and the above all species were introduced species used for landscaping. Since the quantity of trees and shrubs removed is very less and is not of protected status, it will be handed over to the caretaker for firewood use.

As per the Department of Surface Transport and Architect, the construction of the office is not allowed within the road right of way of the highway, so we will be clearing the area within the road right of way for development of parking space.

The two-storied concrete office will be constructed in the area with a meeting hall and one office on the 1st floor and other offices in the ground floor for easy access to the public. The office compound will be fenced with chain link to secure the office properties. The Barp Gewog Administration has agreed to supply water to the new Office complex and the staff quarters as an additional beneficiary under the current Advancing Climate Resilience of Water Sector in Bhutan ACREWAS scheme.

Potential Social and Environment impacts:

- Generation of construction and waste from dismantling of existing office
- Risk to commuters and nearby household
- Disruption of traffic
- Worker's health and safety
- Noise and sound disturbance to nearby household
- Disruption of highway drainage
- Risk of mobile network tower
- Risk to communication line (Telephone line) which Bhutan Telecom already has plan to remove.

Environmental and Social Impacts and Mitigation Measures

The construction of the office is likely to disturb and pose risk to nearby communities, though during the consultation they are sure that the contractor will ensure measures to have less risk and noise. The contractor will be informed to have signages and cover surrounding with green net and operate machinery trucks and do construction and dismantling with safety during the day and not work during the night. The contractor will also be informed to cover the construction materials or store in an appropriate place to avoid dust pollution. During the initial parking development, the traffic flow is likely to be disturbed, the traffic police said to write to their division to seek help from them to regulate the traffic. The mobile network tower was installed in 2019 in front left of the office and can be left undisturbed (to consult with Bhutan Telecom) for suggestion on whether to shift or keep on the current location. Initially thought to be powerline, was later known to be communication line upon inspection by Bhutan Power Corporation. The Bhutan telecom after consultation have agreed to relocate the tower as the new tower in Gamaluma, Barp Gewog, Punakha is nearing completion as it was constructed to have more network coverage in Lobesa area. Bhutan Telecom has said that the communication line is of copper wire used for telephone communication which has been phased out. It will soon be removed as they have moved to optic fiber cable. This may cause risks to the workers during the dismantling of the old office and the construction of the new one, and the contractor will be informed and will have to comply with the OHS policy to provide appropriate safety gear and training to use the gear properly. The waste generated from construction materials and dismantling will be disposed of in the allocated dumpsite.

Due to the dismantling of the current office, public service delivery is likely to be disturbed. As an interim measure the office will be shifted to the existing Gewog Community Centre (CC) office currently remaining idle and empty without any use, located below the Barp Gewog Office. Barp Gup will seek the consent from Dasho Dzongdag Punakha to use the CC space as Range Office, Lobesa. Through the support of the Barp Gewog Administration, the Range Office will function normally from the Community Center office after restoring the communication facilities and the public service will be delivered without any hinderance.

The highway drain is also curtained to be damaged, therefore, the maintenance of the drain will be included in the Bill of Quantity (BoQ).

Potential impact	Impact scale	Proposed mitigation measures	Responsible party	Cost
Activity: Construction of Lobesa Range Office				Nu.10M
Waste: Generation of waste as a result of construction activities	Short term Minor	<p><i>Pre-construction:</i> requirements for appropriate waste management should be included in the bidding documents, as a precondition for the contractor's selection</p> <p><i>During construction:</i></p> <ul style="list-style-type: none"> • Identification of the different waste types at the project site (soil, asphalt, food, etc.); • Ensure that camp are located away from existing stream, river, or water sources, and that no discharge from camps is made into nearby water bodies; • Proper containers/waste bins should be provided at the project site; • Dumping of waste on the sides of the road, on private land, or in other non-designated places should be prohibited; • Dumping waste shall be prohibited on fragile slopes, forests, religious or other culturally sensitive areas or areas where livelihood is derived; • Collection, transportation and final disposal of all waste should be undertaken regularly • Possible hazardous waste (motor oils, vehicle fuels, etc.) should be collected separately and authorized collector and transporter should be sub-contracted to transport and finally dispose; • All construction materials should be covered during the transportation to avoid waste dispersion; • The options for reuse/recycling of the generated waste streams should be taken into consideration (e.g. excavated soil, old timber, etc.). • Burning of construction waste should be prohibited. 	BFL Focal and Contractor	Cost to be met by the contractor

		<i>After construction:</i> <ul style="list-style-type: none"> All waste shall be removed from the project site. 		
Noise disturbance: Possible noise disturbance as a result of outdoor equipment usage and transportation vehicles driving around the construction site	Short term Minor	<i>Pre-construction:</i> requirements to limit noise pollution should be included in the bidding documents, as a precondition for the contractor's selection. <i>During construction:</i> <ul style="list-style-type: none"> Noise level control should be performed before the startup of construction activities; The equipment should be fitted with appropriate noise devices that will reduce sound level; The construction work should not be permitted during the nights, the operations on site shall be restricted to the hours 7am—7pm; Vehicles that are excessively noisy shall not be operated until corrective measures have been taken; Earplugs and protecting devices shall be provided to workers on site. 	BFL focal and Contractor	To be met by the contractor
Air quality: dust as a result of construction works and possible emissions from transportation vehicles	Short term Minor	<i>Pre-construction:</i> requirements to limit emissions should be included in the bidding documents, as a precondition for the contractor's selection. <i>During construction:</i> <ul style="list-style-type: none"> Construction site, transportation routes and materials handling sites should be water-sprayed on dry and windy days; Construction materials should be stored in appropriate and covered places to minimize dust; Before allowing vehicles on site, fitness and emission test of the vehicle shall be performed; Vehicle loads likely to emit dust need to be covered; 	contractor	Cost to be met by the contractor

		<ul style="list-style-type: none"> Workers should wear protective masks if dust appears; Vehicle speed should be restricted within the construction site; Regular maintenance of the vehicles and construction machinery should be performed in order to reduce any leakages of motor oils, emissions and dispersion of pollution; <p>Burning of debris from ground clearance shall be prohibited.</p>		
<i>Social impacts</i>				
<i>Workers' health and safety</i>	Short term Minor	<ul style="list-style-type: none"> Comply with the workers' health and safety guidelines Ensure regular health screening for the workers pre and during construction activities Ensure that no underage workers, or children are engaged Ensure decent work conditions, including an appropriate salary, working hours, accommodation and food for workers shall be provided to all workers Ensure that workers are employed on the principle of equal opportunity and fair treatment, and there is no discrimination with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices. Implement a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns 	Contractor	20,000 budget separate from ESS budget
<i>Local community's health and safety</i>	Short term Minor	<ul style="list-style-type: none"> Ensure the safety of all project-related equipment, in line with the requirements above Minimize the use of hazardous materials and ensure that community members are not exposed to them. In case the use of such materials is necessary, provide sufficient notice to local community members and inform them on safety and protection measures. 	BFL focal and contractor	10000 for consultation separate budget from ESS

		<ul style="list-style-type: none"> • Avoid dumping any waste or otherwise contaminating community sources of water supply and water quality. • Provide information to local communities on construction activities and plans 		
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3. ESMP Implementation Arrangements

The implementation of project activities will be carried out by the BFL focal person BC-02. The focal person will be responsible for compliance with all procedures outlined in this ESMP, as well as compliance with any requirements to obtain clearance, permits, approvals, or consent documents from relevant authorities and stakeholders.

This ESMP should be part of the contract that the PA will sign with the Contractor(s) for implementation of the planned activities in BC-02 in 2025-2026. The Contractor is obligated to perform all proposed preventive or mitigation environmental and social measures in this plan and to keep the evidence of any documents related to applying these measures (e.g., letter asking the municipality for disposal of inert waste, records on OHS information session performed for all workers before start of activities, all developed EHS plans, etc.). An OHS information session should be organized by the Contractor for all workers prior to starting the project activities and prior to any specific tasks with high health risks.

The Supervising Engineer needs to monitor the implementation of proposed measures by the Contractor and Contractor's subcontractors with visual checking, reviewing the records of evidence that the measures have been applied and ask the Contractor to apply the measures as soon as possible. Non-compliances should be recorded and the Report on any non-compliance should be reported to the ESS officer immediately, and the ESS officer will report it to the PCU (M&E Officer). Each non-compliance should be disclosed with appropriate measure/s and the evidence should be kept.

Disbursement of project funds to the PA will be contingent upon their full compliance with the safeguard's requirement.

4. ESMP monitoring arrangements

The BFL focal person in BC-02 will closely monitor the implementation of all planned activities and the required mitigation measures and ensure that they fully comply with this ESMP and with the terms and conditions included in the environment clearances issued by RGoB's national authorities.

BC-02 is also fully responsible for the compliance of all external contractors and service providers working in BC-02 with the safeguard's requirements outlined in the ESMP.

The monitoring of activities under this ESMP will be carried out in the following manner:

Sl.No	Activities	Monitoring team	Timeline		Location	Means of Verification
			Start	Complete		
1	Construction of Lobesa Range Office	Field focal	June, 2025	June, 2026	Metsina, Barp Gewog, Punakha	Field visit
		ESS focal	April 2026	April 2026		

Monitoring by ESS Focal officer at PCU:

- Monitoring through photographic/video evidence submitted by the IAs

- during the implementation as per the given dateline in the table above;
- Reports by ESS officer to BFL Fund Secretariat - Semi-annual report submitted to the BFL Fund Secretariat; and
- Bi-annual reports of the Secretariat to WWF US (as part of mid-year and final Annual Performance Reports).

5. Capacity Need and Budget

Activities under this ESMP will be implemented by the BFL focal person, supervising engineer/staff, and a contractor that will employ workers as mentioned in the contract agreement.

- *The budget for each of the activities is:*

Sl#	Activity	Amount (Nu.)	Budget for ESS mitigation
1	Construction of Lobesa Range Office	10 million	Meet from Activity cost
Total		10	

9. Consultation and Disclosure Mechanisms

This ESMP has been prepared in a participatory manner involving concerned Section Heads and Range Officers. A community consultation will be carried out as described in section 10. This is mainly to inform local communities regarding the planned project activities, solicit their opinions, and enable them to question proposed mitigation measures.

The detailed minutes of the consultation meeting will be kept as a requirement for this ESMP. The full English version of this ESMP, as well as an executive summary in Bhutanese, shall be disclosed on the website of MoENR, BFL and WWF, Bhutan Program. Hard copies of the ESMP should also be available at the PA Management Office and at the PCU Office.

10. Stakeholder engagement plan

The consultation for the construction was done on 24th March 2025 in Lobesa Range Office in the presence of the range of office staff, public and relevant officials. The issues or concerns were

- Traffic Disruption during the construction which we will seek help from traffic police to ensure safety and regulate traffic flow throughout the construction. appropriate sign and barrier will be placed for safety.
- Risk to nearby community which however the public didn't have major concern however, green net will be installed to avoid locality from walking into the construction site, installed signages, ensure mitigations to avoid risk and inform the neighbors if there are any risk related activities during the construction
- Clearance for Regional Office, Department of Surface Transport regarding the Road Right of Way was sought as the construction site is near highway. The officials from the department visited the site and said to write to the office to ensure that the building doesn't fall in the Road Right of Way (RoW) and they have said parking development is allowed. The architecture has also designed the office so that the office does not fall in the RoW.

- The mobile network tower falls in front of the office installed sometime in 2022 which we consulted with Bhutan Telecom and said they will relocate. The new mobile tower at Gamaluma is nearing completion and will cover more than the existing network coverage without disrupting the network. Before the dismantling, Bhutan Telecom will be consulted for smooth operation.
- The communication line behind the office has been phased out and it will be dismantled by the Bhutan Telecom.
- The public service delivery and day-to-day office work are likely be affected so the office will be shifted to community center located in the lobesa, Barp Gewog, Punakha.
- The Occupational Health and safety of the workers to be addressed as per the rules and regulations and requirements of the BFL
- There was need for change in some of the room and toilet locations which can be addressed during the detailed workout with Architect and engineer



11. Grievance Mechanisms

This ESMP and its mitigation measures are required to be disclosed to communities for 30 days prior to the start of implementation of activities.

In addition, the BFL focal point is responsible for making local communities aware of the grievance mechanisms: the BFL-specific grievance mechanism, WWF's Grievance Redress Mechanism (GRM), and the GCF Independent Review Mechanism (see attached GRMs pamphlet in the ESMP Annexure section).

BFL-specific Grievance Mechanism

If the stakeholders have any grievances related to the BLF project they can report their grievances via letter, phone call or verbally to following offices:

- I. Respective nearby gewog office
- II. Lobesa Range Office (Ngawang Gyeltshen, Lobesa Range Officer, Contact no:17620368, email: ngawanggyeltshen@gmail.com)
- III. PA/BC (BC-02) Wangdue Divisional Forest Office Head Office (Grievance officer Name Tsheringla email ID: Tsheringla@moenr.gov.bt)
- IV. BFL, PCU at Department of Forest and Park Services (Ugyen Dechen, 17491881, bflprojectofficer@gmail.com)

WWF Grievance Mechanism

A grievance can be filed with the Project Complaints Officer (PCO), a WWF staff member fully independent from the Project Team, who is responsible for the WWF Grievance Mechanism and who can be reached at:

Email: SafeguardsComplaint@wwfus.org

Mailing address:

Project Complaints Officer
Safeguards Complaints,
World Wildlife Fund
1250 24th Street NW
Washington, DC 20037

Stakeholders may also submit a complaint online through an independent third-party platform at <https://secure.ethicspoint.com/domain/media/en/gui/59041/index.html>.

GCF Independent Review Mechanism

The Independent Review Mechanism (IRM) provides recourse to those affected or who may be affected by GCF projects. Complainants can find information on filing a complaint and proceed to file a complaint on the GCF IRM website: <https://irm.greenclimate.fund/case-register/file-complaint>.

Annexure 1: GRM brochure for BC2-RBP and RPCO



HOW TO FILE YOUR COMPLAINT

To file your complaint, please contact any of the designated individuals provided below. You may maintain anonymity if you prefer.

BFL FOCAL OFFICER

- Tsheringla
- 17978388
- wangdue-forest-division@googlegroups.com
- Wangdue Divisional Forest Office, Lobesa, Punakha

WANGDUE RANGE OFFICE

- Sangay Norbu
- 17290497
- wangdue-range@googlegroups.com
- Wangdue Forest Range Office, Wangdue

NOBDING RANGE OFFICE

- Tshewang Namgyal
- 17560810
- nobding-range@googlegroups.com
- Nobding Forest Range Office, Nobding, Wangdue

YOU MAY ALSO CONTACT THE BFL PROJECT COORDINATION UNIT (PCU) OR FUND SECRETARIAT (FS) AT:

BFL FUND SECRETARIAT (FS)

- Kuenzang Tobgay
- 17750414
- kuenzangtobgay@bfl.org.bt
- Bhutan For Life Fund Secretariat, Royal Textile Academy, Thimphu

BFL PROJECT COORDINATION UNIT (PCU)

- Ugyen Dechen
- 117491881
- bflprojectofficer@gmail.com
- BFL Project Coordination Unit, Department of Forests and Park Services, Ministry of Energy and Natural Resources, Thimphu

KHOTOKHA FMU OFFICE

- Nar Bahadur Pradhan
- 17610535
- khotokha-fmu@googlegroups.com
- Khotokha FMU, Gangrichen, Bjenag Gewog, Wangdue Phodrang

GASELLO BEAT OFFICE

- Wangda
- 17623664/77623664
- kelwangs1984@gmail.com
- Gasello Forest Beat Office, Petakarp, Wangdue

KAMICHU BEAT OFFICE

- Lham Tshering
- 17284103
- namgang20@yahoo.com
- Kamichu Forest Beat Office, Kamichu, Wangdue

GANGTEY-PHOBJI BEAT OFFICE

- Yeshey Namgyel
- 17881256
- yeshinamgyel1989@gmail.com
- Gangtey-Phobji Forest Beat Office, Phobjikha, Wangdue

IF THE NATIONAL PROCESS OF GRM IS UNABLE TO RESOLVE THE GRIEVANCE, COMPLAINTS MAY ALSO BE FILED WITH WORLD WILDLIFE FUND (WWF).

Write to the WWF GCF Accredited entity at: SafeguardsComplaint@wwfus.org

Project Complaints Officer, Safeguards Complaints, World Wildlife Fund 1250 24th Street NW Washington, DC 20037

COMPLAINTS MAY ALSO BE FILED WITH GCF INDEPENDENT REDRESS MECHANISM (IRM) OPTION. COMPLAINT CAN BE FILED BY:

- Sending it by mail or email at irm@gcfund.org
- Sending a voice or video recording
- Filling out the online complaints form available at: <https://gcf.isight.com/external/case/new/group=Complaint>

A complaint for IRM should generally include:

- Name, address and contact information
- A description of the programme (caused adverse impacts to the complainant)
- A description of how the complainants have been/may be adversely impacted by the project/programme
- Whether confidentiality is being requested and the reasons for it.

COMPLAINTS MAY ALSO BE FILED WITH THE WWF THIRD PARTY GRIEVANCE REPORTING MECHANISM BY USING ETHICS POINT WEBSITE AT:

<https://secure.ethicspoint.com/domain/media/en/gui/59041/index.html>

This mechanism can receive reports online or by phone in multiple languages.

IF YOU ARE UNSATISFIED WITH THE COMPLAINT RESOLUTION PROCESS, YOU CAN APPEAL TO:

GRM Appeal Committee, Bhutan For Life Project, DoFPS, Thimphu, Bhutan.

BFL: OCCUPATIONAL HEALTH AND SAFETY STANDARDS

Employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. Implementing entities should hire contractors that have the technical capability to manage the occupational health and safety issues of their workers, extending the application of the hazard management activities through formal procurement agreements.

This section provides guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. It is based on the IFC's Environmental, Health, and Safety Guidelines (April 30, 2007)¹ and the Occupational Health and Safety Guidelines of Bhutan's Construction Development Corporation Ltd., which relies on the national Regulation on Occupational Health, Safety and Welfare 2012, Regulation on Working Conditions 2012 and Labour Act 2007, and in compliance to Sl. No. 21 of Regulation on Occupational Health, Safety and Welfare 2012.

1. General Facility Design and Operation

Integrity of Workplace Structures

Permanent and recurrent places of work should be designed and equipped to protect occupational health and safety:

- Surfaces, structures and installations should be easy to clean and maintain and not allow for accumulation of hazardous compounds.
- Buildings should be structurally safe, provide appropriate protection against the climatic conditions, and have acceptable light and noise conditions.
- Fire resistant, noise-absorbing materials should, to the extent feasible, be used for cladding on ceilings and walls.
- Floors should be level, even, and non-skid.
- Heavy oscillating, rotating or alternating equipment should be in dedicated buildings or structurally isolated sections.

Severe Weather and Facility Shutdown

- Workplace structures should be designed and constructed to withstand the expected elements for the region and have an area designated for safe refuge (e.g., in case of earthquake).

Workspace and Exit

- The space provided for each worker, and in total, should be adequate for safe execution of all activities, including transport and interim storage of materials and products.

Fire Precautions

The workplace should be designed to prevent the start of fires. Other essential measures include:

- The workplace shall be provided with adequate means of protection and escape in case of fire.
- The workplace shall be provided with an adequate number of relevant fire extinguishers.
- Workers shall wear shoes without iron or steel nails or any other exposed ferrous materials which are likely to cause sparks by friction.
- Smoking, lightning, or carrying matches, lighters or smoking materials shall be prohibited within and around the construction sites.

All other precautions, as are reasonably practicable, shall be taken to prevent initiation of ignition from all other possible sources such as open flames, frictional sparks, overheated surfaces of machinery or plant, chemical or physical, chemical reaction and radiant heat.

- At every workplace adequate provision of water supply for firefighting shall be provided and maintained.
- Facilities shall be equipped with firefighting equipment (e.g., fire extinguishing bottles). The equipment should be maintained in good working order and be readily accessible. It should be adequate for the dimensions and use of the premises, equipment installed, physical and chemical properties of substances present, and the maximum number of people present.
- Manual firefighting equipment shall be easily accessible and simple to use.
- Fire extinguishers and emergency alarm systems that are both audible and visible should be in place.
- Fire exits should be identified and marked in Dzongkha and English- all workers should be made aware of the fire exits.

Lavatories and Showers

- Adequate lavatory facilities (toilets and washing areas) should be provided for the number of people expected to work in the facility (one for at least one for every 20 workers). Toilet facilities should also be provided with adequate supplies of water and soap and also be connected to a sewerage system.

Potable Water Supply

- Adequate supplies of clean drinking water should be provided to workers at the work site.

Clean Eating Area

- Where there is potential for exposure to poisonous substances by ingestion, suitable arrangements are to be made for the provision of clean eating areas where workers are not exposed to hazardous or noxious substances.

Lighting

- Workplace should receive adequate natural light and if required supplemented with artificial illumination to promote worker's safety and enable safe equipment operation.
- Emergency lighting of adequate intensity should be provided in case of failure of the powerline.

Safe Access

- Passageways for pedestrians and vehicles within and outside buildings should be segregated and provide for easy, safe, and appropriate access.
- Equipment and installations requiring service, inspection, and/or cleaning should have unobstructed, unrestricted, and ready access.
- Covers need to be provided wherever necessary, if there is risk of falling of overhead object.
- Measures to prevent unauthorized access to dangerous areas should be in place.

First Aid

- The employer should ensure that qualified first-aid can be always provided. Enough first aid boxes or cupboards shall be provided and maintained so as to be readily available during all working hours, provided that the distance of the nearest first aid box or a cupboard shall be not more than 200m from any working place.
- First aid kits include all equipment outlined in Annex 1 to these Guidelines.

- Each first aid box or a cupboard shall be distinctly marked "FIRST AID"

Air Supply

- Workplace should have adequate ventilation for fresh air

2.Information Provision on Occupational Health and Safety (OHS)

2. The Contractor is responsible to hold an information session to familiarize all workers with the OHS procedures specified in these guidelines, to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow workers.

3. The information session should consist of basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training.

3. Physical Hazards

Physical hazards represent potential for accidents or injury or illness due to repetitive exposure to mechanical action or work activity.

Rotating and Moving Equipment

Injury or death can occur from being trapped, entangled, or struck by machinery parts due to unexpected starting of equipment or unobvious movement during operations. Recommended protective measures include:

- Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal operating conditions. Examples of proper design considerations include two-hand operated machines to prevent amputations, or the availability of emergency stops dedicated to the machine and placed in strategic locations.

- Where a machine or equipment has an exposed moving part or exposed pinch point that may endanger the safety of any worker, the machine or equipment should be equipped with, and protected by, a guard or other device that prevents access to the moving part or pinch point. Guards should be designed and installed in conformance with appropriate machine safety standards.

Noise

- No worker should be exposed to a noise level greater than 90 dB(A) for a duration of more than 8 hours per day without wearing ear plugs/earmuffs.
- Exposures to impulsive or impact noise shall not exceed 140dB(A).
- For every 3 dB(A) increase in sound levels from the permissible limit of noise, the 'allowed' exposure period or duration should be reduced by 50 percent.
- Where it is not practicable to reduce the noise, the employer must limit the duration of time persons employed or working in the workplace are exposed to the noise so that such persons are not exposed to excessive noise.

- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible.
- Periodic medical hearing checks should be performed on workers exposed to high noise levels.

Vibration

In any workplace where people are at work in any process or operation which involves exposure to vibration which may constitute a risk to their health, it shall be the duty of the employer to provide, so far as is reasonably practicable, effective means to reduce the vibration.

Electrical

Exposed or faulty electrical devices, such as circuit breakers, panels, cables, cords and hand tools, can pose a serious risk to workers. Overhead wires can be struck by metal devices, such as poles or ladders, and by vehicles with metal booms. Vehicles or grounded metal objects brought into close proximity with overhead wires can result in arcing between the wires and the object, without actual contact. Recommended actions include:

- Marking all energized electrical devices and lines with warning signs
- Locking out (de-charging and leaving open with a controlled locking device) and tagging out (warning sign placed on the lock) devices during service or maintenance
- Checking all electrical cords, cables, and hand power tools for frayed or exposed cords and following manufacturer recommendations for maximum permitted operating voltage of the portable hand tools
- Double insulating / grounding all electrical equipment used in environments that are, or may become, wet; using equipment with ground fault interrupter (GFI) protected circuits
- Protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas
- Appropriate labeling of service rooms housing high voltage equipment (electrical hazards) and where entry is controlled or prohibited
- Establishing “No Approach” zones around or under high voltage power lines
- Conducting detailed identification and marking of all buried electrical wiring prior to any excavation work
- Every person who is working on an electric supply line or apparatus or both shall be provided with tools and devices such as gloves, rubber shoes, and safety belts, ladders, earthing devices, helmets, line testers, hand lines whichever is relevant for protecting him/her from mechanical and electrical injury.

Eye Hazards

Solid particles from a wide variety of industrial operations, and/or a liquid chemical spray may strike a worker in the eye causing an eye injury or permanent blindness. Recommended measures include:

- Use of machine guards or splash shields and/or face and eye protection devices, such as safety glasses with side shields, goggles, and/or a full-face shield. Frequent checks of these types of equipment prior to use to ensure mechanical integrity is also good practice.
- Where machine or work fragments could present a hazard to transient workers or passers-by, extra area guarding or proximity restricting systems should be implemented, or PPE required for transients and visitors.

Welding / Hot Work

Welding creates an extremely bright and intense light that may seriously injure a worker's eyesight. In extreme cases, blindness may result. Additionally, welding may produce noxious fumes to which prolonged exposure can cause serious chronic diseases. Recommended measures include:

- Provision of proper eye protection such as welder goggles and/or a full-face eye shield for all personnel involved in, or assisting, welding operations. Additional methods may include the use of welding barrier screens around the specific workstation.

Working Environment Temperature

Exposure to hot or cold working conditions in indoor or outdoor environments can result in temperature stress-related injury or death. Use of personal protective equipment (PPE) to protect against other occupational hazards can accentuate and aggravate heat-related illnesses. Extreme temperatures in permanent work environments should be avoided through implementation of engineering controls and ventilation. Where this is not possible, such as during short-term outdoor work, temperature-related stress management procedures should be implemented which include:

- Monitoring weather forecasts for outdoor work to provide advance warning of extreme weather and scheduling work accordingly
- Providing temporary shelters to protect against the elements during working activities or for use as rest areas
- Use of protective clothing
- Providing easy access to adequate hydration such as drinking water or electrolyte drinks.

Ergonomics, Repetitive Motion, Manual Handling

Injuries due to ergonomic factors, such as repetitive motion, overexertion, and manual handling, take prolonged and repeated exposures to develop, and typically require periods of weeks to months for recovery. These OHS problems should be minimized or eliminated to maintain a productive workplace. Controls may include:

- Use of mechanical assists to eliminate or reduce exertions required to lift materials, hold tools and work objects, and requiring multi-person lifts if weights exceed thresholds (adult male-50kg, adult female-25kg)
- Selecting and designing tools that reduce force requirements and holding times, and improve postures
- Incorporating rest and stretch breaks into work processes, and conducting job rotation
- Implementing quality control and maintenance programs that reduce unnecessary forces and exertions

Working at Heights

Fall prevention and protection measures should be implemented whenever a worker is exposed to the hazard of falling more than two meters; into operating machinery; into water or other liquid; into hazardous substances; or through an opening in a work surface. Fall prevention / protection measures may also be warranted on a case-specific basis when there are risks of falling from lesser heights. Fall prevention may include:

- Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area
- Proper use of ladders and scaffolds by trained workers
- Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard areas, or fall protection devices such as full body harnesses used

in conjunction with shock absorbing lanyards or self-retracting inertial fall arrest devices attached to fixed anchor point or horizontal lifelines

Appropriate training in use, serviceability, and integrity of the necessary PPE

- Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrest fall

Illumination

Work area light intensity should be adequate for the general purpose of the location and type of activity, and should be supplemented with dedicated workstation illumination, as needed. Controls should include:

- Use of energy efficient light sources with minimum heat emission
- Undertaking measures to eliminate glare / reflections and flickering of lights
- Taking precautions to minimize and control optical radiation including direct sunlight.
- Exposure to high intensity UV and IR radiation and high intensity visible light should also be controlled
- Controlling laser hazards in accordance with equipment specifications, certifications, and recognized safety standards. The lowest feasible class Laser should be applied to minimize risks.

4. Personal safety equipment for workers

All workers are equipped with the following personal safety equipment: helmet, gloves, ordinary boots and reflective vest.

Workers that are exposed to dust should also be provided with eye protection glasses and face masks. Workers that are exposed to noise should be provided with ear plugs. Workers that need to work in the dark should be provided with hand and cap lamps.

Workers are instructed regarding safety equipment as follows:

- Always wear complete set of protective wear.
- Do not wear loose clothing, such as an overhang shirt, jackets, mufflers etc.
- Tuck shirt and jacket well.
- Secure helmet with a belt under the chin.
- Tuck the bottom sleeves of the trousers inside the safety boot.
- Dress with reflector

5. Standards for workers' accommodation²

1. General living facilities

- The location of the facilities is designed to avoid flooding or other natural hazards
- The living facilities are located within a reasonable distance from the worksite.
- Transport is provided to the worksite safe and free if the accommodation is reasonably far from the worksite.
- The living facilities are built using adequate materials, kept in good repair and kept clean and free from waste and refuse.

2. Drainage

- The site is adequately drained.

Heating, air conditioning, ventilation and light

- Living facilities are provided with adequate heating, ventilation, and light systems including emergency lighting.

4. *Water*

- Workers have easy access to a supply of clean/potable water in adequate quantities.
- The quality of the water complies with national/local requirements and is regularly monitored.
- Tanks used for the storage of drinking water are constructed and covered to prevent water stored therein from becoming polluted or contaminated.
- The quality of the drinking water

5. *Wastewater and solid waste*

- Wastewater, sewage, food and any other waste materials are adequately discharged in compliance with national and/or international standards and without causing any significant impacts on camp residents, the environment or surrounding communities.
- Specific containers for waste collection are provided and emptied on a regular basis.

6. *Rooms/dormitories facilities*

- Rooms/dormitories are kept in good condition. They are aired and cleaned at regular intervals.
- Rooms/dormitories are built with easily cleanable flooring material.
- Rooms/dormitories and sanitary facilities are located in the same buildings.
- Residents are provided with enough space.
- The number of workers sharing the same room/dormitory is minimized.
- Doors and windows are lockable and provided with mosquito screens when necessary.
- Separate sleeping areas are provided for men and women.
- A separate bed is provided for every worker and use of double deck bunks is minimized.
- Workers are provided with comfortable mattresses. Workers may be expected to use their own pillows and bed linens.
- Adequate facilities for the storage of personal belongings are provided.
- Separate storages for work clothes and PPE and depending on condition, drying/airing areas are provided.

8. *Sanitary and toilet facilities*

- Sanitary and toilet facilities are constructed from materials that are easily cleanable.
- Sanitary and toilet facilities are cleaned frequently and kept in working condition.
- Toilets, showers/bathrooms and other sanitary facilities are designed to provide workers with adequate privacy including ceiling to floor partitions and lockable doors.
- Separate sanitary and toilet facilities are provided for men and women.
- Toilet and shower facilities are conveniently located and easily accessible.
- Toilet facilities are environmentally friendly (e.g., pit toilet) and sewage is not disposed into the worksite.
- Open defecation in the vicinity of project sites should be prohibited.
- An adequate number of handwashing basins and showers/bathrooms facilities are provided.

9. *Cooking and laundry facilities*

Cooking and laundry facilities should be available for workers at the worksite or in close vicinity to it. These facilities should be kept in clean and sanitary conditions.

Annex 1. Contents of first aid box or cupboards

The first aid boxes or cupboards shall be distinctively marked with white cross on a green background and shall contain the following equipment:

1. Small sterilized dressings (12)
2. Medium size sterilized dressings (6)
3. Large size sterilized dressings (6)
4. Large size sterilized burn dressings (6)
5. (1/2 oz.) Sterilized cotton wool (6 packets)
6. (2oz.) Bottle containing a two per cent alcoholic solution of iodine (1)
7. (2oz.) Bottle containing Betadine (antiseptic solution) having the dose and mode of administration indicated on the label (1)
8. Roll of adhesive plaster (1)
9. A snake bite lancet (1)
10. Torch light (1)
11. Pair of scissors (1)
12. Tablets Aspirin (5gms) 2 dozen
13. Burn Ointment (2 tubes)
14. Dettol (2 phial, about 2 ozs)
15. Bandages 4 inches wide
16. Bandages 2 inches wide
17. Triangular bandages (2)
18. Packets of safety pins (1)
19. A supply of suitable splint