

Bhutan For Life

**Environmental and Social
Management Plan for
Phrumsengla National Park**

January 2023 - June 2024

Phrumsengla National Park / Ura

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Bhutan for Life
Environmental and Social Management Plan for Phrumsengla National Park (PNP) for
January 2023 - June 2024

1. Introduction

1.1 Project Background

The Bhutan for Life (BFL) project aims to ensure a robust network of Protected Areas (PAs) and Biological Corridors (BCs) that secure human well-being, biodiversity conservation and increase climate resilience in Bhutan. The project shall sustain for 14-years, in this duration an immediate improvement to the management of Bhutan's protected areas for climate resilience and biodiversity gains are sought. Meanwhile the country would gradually ratchet 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;
- Enhance the socio-economic wellbeing of communities 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; and
- 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.

1.2 Scope of ESMP

The preparation of this Environmental and Social Management Plan (ESMP) was deemed necessary in order to manage the environmental and social impacts. The mitigation actions required to implement the project was 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 the 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.

1.3 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; and
- Ensuring that all stakeholders are engaged in the project activities' preparation and implementation, and their concerns are fully addressed.

1.4 Applicable law, policies, and regulation

This ESMP is developed in strict adherence and compliance to the guidelines set forth in 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), and Local Government Act of Bhutan, 2009.

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;
- General standards on both occupational and community health and safety and 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. Regarding environmental impacts, there are no direct contradictions between the RGoB laws and regulations and the WWF's SIPP, but the requirement of the latter is more extensive. All project activities should fully comply both with the RGoBs Regulations on the Environmental Clearance of Projects, and with the procedures and mitigation measures prescribed in this ESMF. In case the

WWF's SIPP requirements turn out to be extensive, strict, or detailed compared to RGoB legislation and policies, the former will apply to all project activities.

Regarding social impacts, the status of non-title holders and informal land use, and the commitment to participatory decision-making processes conclude the primary discrepancies between the RGoB laws and regulations and the WWF's SIPP. 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 land owners or formal users to receive compensation in such cases. Second, the WWF's SIPP require extensive community consultations during the project in order to develop various safeguards documents. RGoB legislation does not include three requirements reflected in SIPP. For the purpose of the BFL project, the provisions of the WWF's SIPP shall prevail over the RGoB legislation in all cases of discrepancy.

2. Environmental and Socio-Economic Conditions

2.1 Geological and topographical conditions

Phrumsengla National Park (PNP) was known as Thrumshingla National Park ever since it was notified in 1993 with an area of 768 km². In 2000, the area was extended towards the north with inclusion of large track of suitable tiger habitats. The park was renamed as PNP in 2014 and the total area was revised to 906 km² with the development of new zonation guideline, 2020. However, the physical features were not altered for a prime reason to signify and interlink the conservation paradigm with inherited local communities' culture. PNP has been implementing conservation activities for the last one and a half decades. The conservation is based on the ten-year periodic conservation management plan (2019-2029).

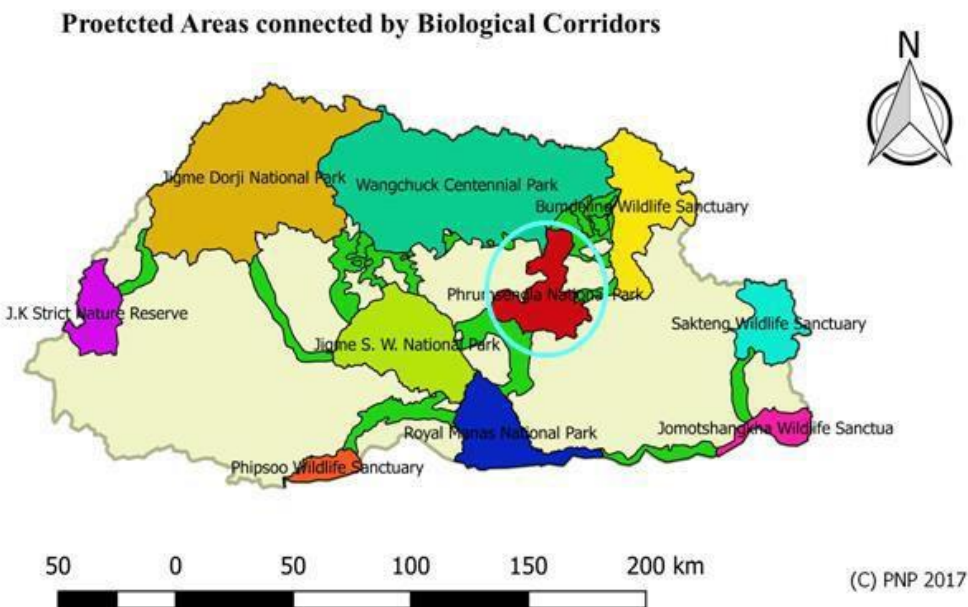


Figure 1 Location of Phrumsengla National Park

The purpose of establishment of the park was to conserve the temperate ecosystem of central region in Bhutan's Protected Area (PA) landscape. The park was fully operationalized in 2000 with joint funding support from Royal Government of Bhutan (RGoB) and World Wildlife Bhutan Program. PNP is a 'linchpin' of Bhutan's Biological Corridor Complex (B2C2) landscape. The park is connected to Jigme Singye Wangchuck National Park (JSWNP), Royal Manas National Park (RMNP), Bumdeling Wildlife Sanctuary (BWS) and Wangchuck Centennial National Park (WCNP) through a string of Biological Corridors (Figure 1). Heterogeneous geomorphology and wide range of elevation attributes to formation of special habitats for wildlife in PNP. The elevation ranges from 900 masl (sub-tropical broad-leaved forest) to about 4500 masl (Alpine meadows) (Figure 2 a). Of this, the major portion, >78% of the total area is above 2500 masl. Slope classes are evenly distributed in terms of area coverage (Figure 2 b).

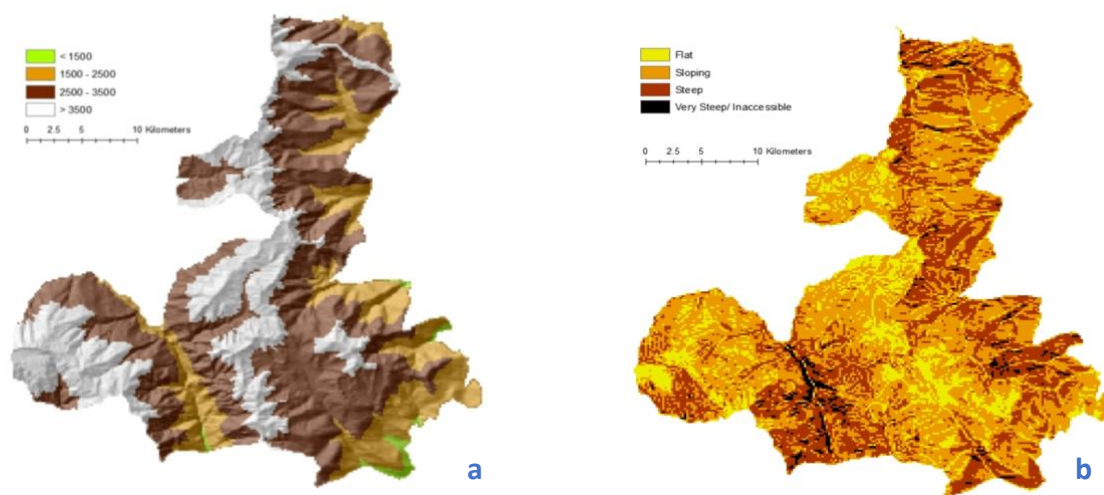


Figure 1: a. Elevation class and b. Slope class

2.2 Climatic conditions

With vast variation of altitudinal ranges, Phrumsengla National Park experiences wide range of temperatures as well. The northern part of the park has -21°C minimum and 13 °C maximum temperatures and in the south-eastern has low of 8 °C and high of 28 °C. The annual average rainfall in the northern part is 700 mm and the lower elevation receives up to 1500 mm.

2.3 Hydrological conditions

Despite being smallest national park, PNP serves as vital watershed area for two major river systems, Kuri chu to its left flank and chamkhar chu to its right flank. Apart from that there are numerous springs and tributaries that feeds the major river systems. The rich biodiversity of the park itself is a good indication of intact natural resources like water resources.

2.4 Flora and fauna

PNP with wide range of elevation range from sub-tropical broadleaved to the alpine ecosystem holds high conservation value and significance for about 1000 species of plants with over 161 species of trees, 274 shrubs and 316 herbs. The park is a significant repository of floral diversity (TNP, 2008) more than 154 species have been identified for having medicinal values, 21 species as endemic to Bhutan, and two species endemic to PNP (*Rubus sengorensis* and *Lobelia nubigena*). The park is home to one globally threatened species (Vulnerable) *Rhododendron dalhousiae* var.

rhabdotun and critically endangered species at local context or in Bhutan; *Podocarpus neriifolius* (Dorji, Y.; 2010). The park is fundamentally significant for conservation of its large tracts of old East Himalayan Silver Fir forest and extensive cover of pristine cool broadleaved forests in the central region of the country. Maximum area of PNP is comprised of fir forest with 267.16 km² followed by mixed conifer and broadleaf forests with 256.47 km² and 238.25km² respectively. Meadows and scrub with 27.43 km² and 48.33 km² also significantly contribute for several forms of life in the park. Therefore, PNP is a prime refuge for many threatened flora and fauna thriving across varied vegetation zones in central region of the country's protected area landscape.

More than 70 species of mammals, about 364 species of birds, and some 55 species of butterflies are recorded in the park. Most recently (August, 2020) the park have recorded National butterfly (Ludlow's Bhutan Swallowtail, *Bhutanitis ludlow*) for the first time. Camera trap picture of a male tiger was captured for the first time in Bhutan on 22nd May 2000 from the PNP in Peeme'. Other than tiger, there are several globally significant species as per IUCN Red List of Threatened Species, 2019 are:

1. Tiger *Panthera tigris* (Endangered)
2. Red Panda *Ailurus fulgens* (Endangered)
3. Musk Deer *Moschus chrysogaster* (Endangered)
4. Wild Dog *Cuon alpinus* (Endangered)
5. Takin *Budorcas taxicolor* (Vulnerable)
6. Himalayan Black Bear *Ursus thibetanus lanigarr* (Vulnerable)
7. Asian Small-clawed Otter *Aonyx cinereus*(Vulnerable)
8. Clouded Leopard *Neofelis nebulosa* (Vulnerable)
9. Asiatic Golden Cat *Catapuma temminckii* (Near Threatened)

Attributed by wide range of elevation and diverse vegetation, the park has rich diversity of birds. Of more than 364 avian species recorded, three are vulnerable, six near-threatened and eight are restricted range species. Significant avifauna species of conservation interest for Phrumsengla National Park are Chestnut-breasted partridge (*Arborophila mandellii*), Rufous-necked hornbill (*Aceros nipalensis*) and Beautiful nuthatch (*Sitta formosa*) listed vulnerable under IUCN list. PNP also records herpetofauna, fish and butterfly species. There are 3 species of amphibians, 12 species of reptiles, 4 species of lizards, and 7 species of fish.

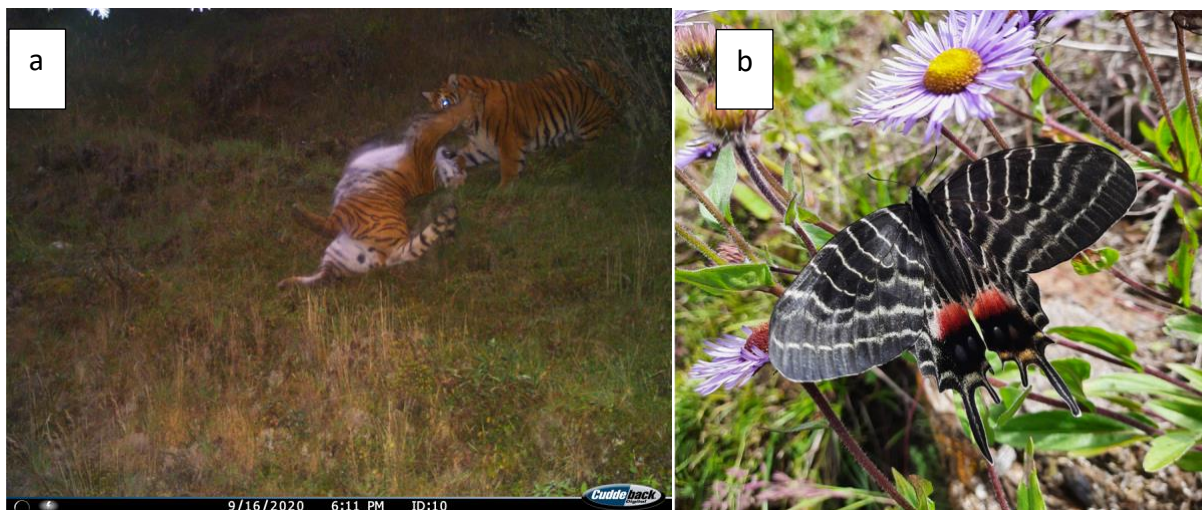


Figure 3: Two tigers of PNP, a. *Panthera tigris* and b. *Bhutanitis ludlow* (National butterfly)

2.5 Socio-economic conditions

The park has about 6,000 inhabitants from 1,165 households living in 32 villages. Administratively, PNP spread across ten Gewogs viz Chumey, Ura and Tang Gewogs of Bumthang Dzongkhag, Saleng and Tsamang Gewogs under Mongar Dzongkhag, Jarey, Metsho and Gangzur gewogs under Lhuentse Dzongkhag, and Shingkhari and Nangkhori gewogs under Zhemgang Dzongkhag. Two villages enclaved inside the park are Sengor village (29 households), Saleng gewog and Bhim-Tharpaling (4 households), Chumey gewog under Mongar and Bumthang Dzongkhag respectively. These people are agro-pastoralist and mainly depend on forest for grazing their cattle. Over 75 percent of the park area is under registered grazing grounds and most of the park residence relies mainly on livestock produces for their livelihood.

3. Planned activities for January 2023 - June 2024

3.1 Bamboo plantation along flashflood prone area under Jaray Gewog

- a. Budget: Nu. 400,000
- b. Timeline: January - June, 2023
- c. Location: Yumchey and Pam under Jaray Gewog

The Ugyen Wangchuk Institute for Forest Research and Training (UWIFRT) with fund support from Bhutan for Life (BFL) has carried the study on Community based Climate Vulnerability and Capacity assessment “CVCA” in all Parks and selected biological corridors of Bhutan. To develop climate adaptation plan at respective offices, each office has conducted stakeholder consultation meeting at Gewog level. Similarly, the Phrumsengla National Park has executed the CVCA survey followed by the development of Climate change adaptation in all five Gewogs of PNP jurisdiction. During the final consultation meeting with community stakeholder, the Jaray Gewog raised the issue of flash flood increasing. The flash flood was found to be life risking and negatively impacting the productivity of the farm cultivation. To address the issue the community stakeholders proposed to plant bamboo and other deep rooted native species along flash flood prone sites to divert monsoon rainwater in the proper gullies and make soil more stable. The plantation will be done at Yumchey and Pam Chewogs of the Jaray Gewog. The proposed activities will benefit 29 households at Yumchey and 23 households at Pam.

4. Potential social and environmental impacts

4.1 Bamboo plantation along flashflood prone area under Jaray Gewog

Following are some the possible common environmental and social impacts foreseen during the implementation of the proposed activities:

- i. Environment Impacts:
 - Risk of introducing invasive species
- ii. Social Impacts
 - Occupational health and safety of the workers

5. Mitigation Measures for Environmental and Social Impacts

Potential impacts to the environment and society along with the mitigating measures are listed below in the table:

Potential impact	Impact scale	Proposed mitigation measures	Responsible Party	Costs (million)
Activity 1: Bamboo plantation along flashflood prone area under Jaray Gewog				Nu. 400,000
1. Risk of introducing invasive plants	Minor (Short term)	<ul style="list-style-type: none"> Preliminary assessment of species composition of the area shall be carried out before the activity; Only the native species with deep root system shall be used to improve the soil stability in the landslide prone area; and Regular assessment of the site shall be carried out after the activity implementation to monitor growth of any undesirable species that are invasive in nature. 	BFL focal person in PNP Phawan Range office	To be part of the activity cost
2. Occupational health and safety of the workers	Minor (Short term)	<ul style="list-style-type: none"> Access to health facilities for the workers need to be available and ensure first aid kit is available at maintenance site all the time- Basic health unit (BHU) needs to be available in walkable distance; Ensure that no underage workers, or children are engaged; Ensure decent working conditions, including an appropriate salary, working hours, accommodation and other essential amenities as per the Operational Health and Safety; 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, and disciplinary practices; Implement a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns- the worker with grievance shall report in their grievance to Range/beat/ HQ or gewog office; and Follow the worker's health and safety guidelines 	BFL focal person in PNP Phawan Range office	To be part of the activity cost

6. ESMP Implementation arrangements

The implementation of project activities will be carried out by the BFL focal person in PNP. The focal person will be responsible for compliance with all procedures outlined in this ESMP,

as well as compliance with any requirements to obtain clearances, 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 PNP for the year 2023. 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 start of the project activities and before any specific tasks with high health risks.

The PNP’s 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-compliances should be reported to the ESS consultants immediately, and the ESS consultants will report it to the PCU (M&E Officer). Each non-compliance should be closed 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 safeguards requirements.

7. ESMP monitoring arrangements

The BFL focal person of the Phrumsengla National Park in collaboration with the concern range officer will closely monitor the implementation of all planned activities and the required mitigation measures and ensure that they fully comply with this ESMP. The terms and conditions included in the environment clearances issued by RGoB’s national authorities wherever and whenever required must be strictly followed. PNP is also fully responsible for the compliance with the safeguards requirements outlined in the OHS.

Protocol for monitoring of activities under this ESMP will be carried out as follows:

Sl#	Activities	Monitoring team	Timeline		Location	Means of Verification
			Start	Complete		
1	Bamboo plantation along flash flood prone areas at Jaray Gewog	Field Focal	February 2023	April 2023	Yumchey and Pam	Field visits and reports
		ESS Focal	April 2023	April 2023		Field visits and reports
		BFLFS	July 2023	July 2023		Reports

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 in July, 2023; and
- Bi-annual reports of the Secretariat to WWF US (as part of mid-year and final Annual Performance Reports).

8. Capacity Need and Budget

Activity 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.

Sl. No.	Activity	Amount (Nu.)	Budget for ESS mitigation
1	Bamboo plantation along flash flood prone areas at Jaray Gewog	400,000	To be met from activity cost
Total		400,000	

The proposed activities are of very small scale and there are no adverse social and environmental impacts which require mitigation measures. Therefore, separate fund for mitigation measures is not proposed.

9. Consultation and Disclosure Mechanisms

This ESMP has been prepared in a participatory manner, and a community consultation will be carried out before implementing the activity to consult the local communities regarding the planned project activities, solicit their opinions, and enable them to question proposed mitigation measures.

The consultation for the Bamboo plantation along the flash flood prone areas under Jaray Gewog will be conducted before implementing the plantation activity. For the consultation stakeholders like Gewog administration, local stakeholders Community Forest executive members, and other representative will be included to solicit ideas and traditional knowledge for the implementation of the activity.

The detailed minutes of the consultation meetings/official correspondences will be kept as a requirement for this ESMP, along with a full list of participants (disaggregated by gender and age). The full English version of this ESMP, as well as an executive summary in Bhutanese, shall be disclosed/uploaded on the website of MoENR, BFL and WWF Bhutan Program. The hard copies of the ESMP will be made available at the PA Management Office and at the PCU Office.

10. Stakeholder engagement plan

Consultation with the Jaray Gewog administration, Community Forest executive members and other local representative members will be conducted in February 2023 to discussion on the selection of native species and contract award of the work to the community.

Annexure 1

BFL: Suggested 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) 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 climate, 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 located 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 through the implementation of fire codes applicable to industrial settings. 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 adequate number of relevant fire extinguishers.

- Workers shall wear shoes without iron or steel nails or any other exposed ferrous materials which is likely to cause sparks by friction.
- Smoking, lightening, or carrying of matches, lighters or smoking materials shall be prohibited.
- 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.
- Equipping facilities with firefighting equipment (e.g., fire extinguishing bottle). 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.

Lavatories and Showers

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

Potable Water Supply

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

Clean Eating Area

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

Lighting

- Workplaces should, to the degree feasible, receive natural light and be supplemented with sufficient artificial illumination to promote workers' safety and health, and enable safe equipment operation. Supplemental 'task lighting' may be required where specific visual acuity requirements should be met.
- Emergency lighting of adequate intensity should be installed upon failure of the principal artificial light source to ensure safe shut-down, evacuation, etc.

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 servicing, inspection, and/or cleaning should have unobstructed, unrestricted, and ready access.
- Covers should, if feasible, be installed to protect against falling items.
- Measures to prevent unauthorized access to dangerous areas should be in place.

First Aid

- The employer should ensure that qualified first-aid can be provided at all times. A sufficient number of 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.
- Remote sites should have written emergency procedures in place for dealing with cases of trauma or serious illness up to the point at which patient care can be transferred to an appropriate medical facility.

Work Uniform

- The contractor shall provide a working uniform to each worker.
- All workers shall be required to attend the duty in proper uniform unless otherwise instructed by the Contractor.

Air Supply

- Sufficient fresh air should be supplied for indoor and confined workspaces. Factors to be considered in ventilation design include physical activity, substances in use, and process related emissions. Air distribution systems should be designed so as not to expose workers to draughts.
- Re-circulation of contaminated air is not acceptable. Heating, ventilation and air conditioning (HVAC) systems should be equipped, maintained and operated so as to prevent growth and spreading of disease agents (e.g. Legionella pneumophila) or breeding of vectors (e.g. mosquitoes and flies) of public health concern.

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

- The Contractor is responsible to hold an information session to familiarize all workers with the OHS procedures specified in these guidelines, in order 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.
- 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 accident 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 85 dB(A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).
- The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A).
- Although hearing protection is preferred for any period of noise exposure in excess of 85 dB(A), an equivalent level of protection can be obtained, but less easily managed, by limiting the duration of noise exposure. For every 3 dB(A) increase in sound levels, the ‘allowed’ exposure period or duration should be reduced by 50 percent.
- 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

Exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, should be controlled through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure.

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 hazard') and where entry is controlled or prohibited
- Establishing "No Approach" zones around or under high voltage power lines
- Rubber tired construction or other vehicles that come into direct contact with, or arcing between, high voltage wires may need to be taken out of service for periods of 48 hours and have the tires replaced to prevent catastrophic tire and wheel assembly failure, potentially causing serious injury or death
- Conducting detailed identification and marking of all buried electrical wiring prior to any excavation work

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.
- Provisions should be made for persons who have to wear prescription glasses either through the use of overglasses or prescription hardened glasses.

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 work station (a solid piece of light metal, canvas, or plywood designed to block welding light from others). Devices to extract and remove noxious fumes at the source may also be required.

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, and avoiding consumption of alcoholic beverages

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:

- Facility and workstation design with 5th to 95th percentile operational and maintenance workers in mind
- 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
- 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 area, 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 life-lines
- 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 arrested 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 work station 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 mask. 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 overhang shirt, jackets, mufflers etc.
- Tuck shirt and jacket well.
- Secure helmet with belt under the chin.
- Tuck the bottom sleeves of trouser inside safety boot.
- Dress with reflector

5. Standards for workers' accommodation

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 worksite safe and free.
- The living facilities are built using adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.

2. Drainage

- The site is adequately drained.

3. 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 or WHO standards.
- 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 is regularly monitored.

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 rubbish collection are provided and emptied on a regular basis.
- Pest extermination, vector control and disinfection are undertaken throughout the living facilities at least once.

6. Rooms/dormitories facilities

- Rooms/dormitories are kept in good condition.
- Rooms/dormitories 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.
- Mobile partitions or curtains are provided.
- Adequate number of furniture such as table, chair, mirror, and lamps are provided for all workers.
- Separate sleeping areas are provided for men and women.

7. Bed arrangements and storage facilities

- A separate bed is provided for every worker.
- The practice of “hot-bedding” is prohibited.
- There is a minimum space of 1 meter between beds.
- The use of double deck bunks is minimized.
- If double deck bunks are in use, there is enough clear space between the lower and upper bunk of the bed.
- Workers are provided with comfortable mattresses. Workers may be expected to use their own pillows and bed linens.
- Workers wash bed linen frequently and applied with adequate repellents and disinfectants (where conditions warrant).
- 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 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 hand wash basins and showers/bathrooms facilities are provided.
- Shower facilities are provided with water heating facilities.

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.

10. Leisure, social and telecommunications facilities

- Basic social collective spaces should be available to workers.
- Workers are provided with dedicated places for religious observance, as appropriate.
- The employer provides workers with local sim cards that can be used for communication on their personal cell phones.

Contents of first aid box or cup-boards

The first aid boxes or cup-boards 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