<u>Bhutan for Life</u> <u>Environmental and Social Management Plan for</u> <u>National Centre for Hydrology and Meteorology</u> <u>July 2024- December 2025</u>

1. Introduction

a. Project Background

Bhutan for Life (BFL) project aims to ensure a robust network of protected areas (PAs) and biological corridors (BCs) that secures human well-being, and 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 financing resources.

BFL seeks to achieve the following objectives:

- Helps Bhutan remain carbon neutral by increasing forest and vegetative cover within the Protected Area System;
- Enhance the socio-economic well-being 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 in order to manage the environmental and social impacts through 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, summarises 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 persons with the Site/Engineer of the Implementing Agency, and by the contractor to be commissioned 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 the 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 the project activities in accordance with the relevant RGoB Laws and WWF's safeguard operational policies and guidelines;
- Preventing environmental degradation as a result of the project activity;
- 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 as outlined 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 Movable 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); legislation on workers safety (Regulation on Occupational Health, Safety and Welfare, 2012) and other relevant laws (The Local Government Act of Bhutan, 2009; The Penal Code of Bhutan, 2004.

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; Policy on Accountability and Grievance System; Standard on Physical Cultural Resources; as well as general standards on 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 requires 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

a. Geological and topographical conditions

Bhutan Himalaya, like other parts, has also been divided into four parts based on geomorphology, geology, and grade of metamorphism. Each domain is separated from the other by a prominent thrust of regional dimension. These from south to north are:

- Sub Himalaya
- Lesser Himalaya
- Higher Himalaya
- Tethys Himalaya

The Project area for the Cryosphere Monitoring and Research Base Camp and the installation of three Automatic Weather Stations falls under the Greater Himalaya Sequence based on the geological map of Bhutan by Sean Long, Nadine McQuarrie, Tobgay Tobgay, Djordje Grujic, and Lincoln Hollister (2011). The High Himalayan chain lies in the northernmost part and is disposed of in the form of an arc from east to west. Himalayan peaks are as high as El. 7,500 m are present in this chain. In higher reaches many large-size glaciers and glacial lakes are also present and have been recorded from studies of satellite imageries, which sometimes pose dangers of floods by spilling as has been reported in Sunkoshchhu and Bumthangchhu. The Project site falls under the Wangchuck Centennial National Park and the Jigme Dorji National Park. The parks have from low-lying valleys to the snow capped peaks, and the altitude of the Park ranges from 1390m to over 7500 meters above sea level.



Figure: Proposed Cryosphere Monitoring and Research Base Camp

b. Climatic conditions

There is considerable seasonal and local variation in climatic conditions in the area, largely attributable to the latitudinal and altitudinal range, and the mountainous terrain. At more than 270 N of the equator, the park is north of the Tropic of Cancer, and thus in the temperate realm. It is therefore influenced by seasonal changes. The complex mountainous terrain also contributes to local variation in climate, such as warmer and moisture conditions in the southern river valleys and colder, drier conditions in the high elevations. Thus, the variation in altitude and rainfall also creates extreme variability in climate. The southwest monsoon rains from June to September contribute most of the annual rainfall in the region. The area is the source of several streams and rivers which are very crucial for downstream areas.

c. Flora and Fauna

Jigme Dorji National Park is truly a conservation jewel of Bhutan. It is the only park where there are thriving populations of the endangered Royal Bengal Tiger (Panthera tigris) and the endangered Snow Leopard (Panthera uncia). The park was recently recognized as the hotspot of snow leopard conservation in Bhutan. As of now, 52 species of mammals belonging to 19 families and 43 genera are confirmed to be present inside JDNP. Of these, five are endangered, six are vulnerable, and nine are near threatened as per the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species (IUCN 2014). In addition, 10 of these species are listed in Schedule I of the Forest and Nature Conservation Act (FNCA) of 1995. Another salient feature that separates JDNP from the rest of Bhutan's protected areas is its harboring of the largest population of Bhutan Takin (Budorcas taxicolor white), the national animal of Bhutan. A total of 373 species of birds have been documented, of which eight species are listed in Schedule I of FNCA, 1995. The endangered Black-necked Crane (Grus nigricolis) makes an occasional visit to the national park during its migration to and from China. The critically endangered White-bellied Heron has feeding and nesting sites along the Phochhu and Mochhu rivers, especially in the three Gewogs of Toewang Chubu and Goenshari under Punakha Dzongkhag. JDNP has also recorded 1,434 species of vascular plants belonging to 144 families and 563 genera (9 genera and 13 species of gymnosperms and 554 genera and 1,421 species of angiosperms). Around 300 species of medicinal plants are found inside the national park, mostly in the alpine region. The most valuable and widely collected are the Ophiocordyceps sinensis, Neopicrorhiza scrophulariiflora, Aconitum laciniatum and A. patulum. In the lower areas, Taxus baccata (Himalayan yew) and several species of Artemisa are found such as the A. dubia and A. myriantha which are believed to have chemical contents that can cure many diseases.

The Wangchuck Centennial National Park has rich biodiversity and it is home to 693 species of vascular plants, 43 mammal species, 250 birds and 246 species of butterflies. The fauna list includes some of iconic species such as Tiger (Panthera tigris tigris), Snow leopard (P. uncia), Tibetan wolf (Canis lupus), Bhutan takin (Budorcus taxicolor whitei), Himalayan black bear

(Ursus thibetanus), Himalayan musk deer (Moschus chrysogaster)and Red panda (Ailurus fulgens)

d. Socio-economic conditions

The Project site is located above 4000 msl, and there are no permanent settlements. The only temporary yak herders and migrations sheds are a few kilometers downhill from the site.

3. Planned activities in the Year 6-7 (2024-2025)

For Year 6-7 2024-2025, under the BFL, the National Centre for Hydrology and Meteorology (NCHM) proposes the following activities:

- 1. Construction of Cryosphere Monitoring and Research Base Camp at Thanaphu in the Headwaters of Chamkhar Chu; and
- 2. Installation of three Automatic Weather Stations in the High-altitude Region in Bhutan Himalaya.

3. Activity 3.1 Construction of Cryosphere Monitoring and Research Base Camp at Thanaphu in the Headwaters of Chamkhar Chu

Budget: Nu. 6.76 million *Timeline:* July 2024- December 2025 *Location:* Chiwog/Village- Thanaphu, Geowg: Chokhortoe, Dzongkhag: Bumthang

NCHM is an autonomous scientific and technical agency of the Royal Government of Bhutan responsible for understanding the behavior of the atmosphere, its interaction with cryosphere and water bodies, the weather and climate, and the distribution of the country's water resources. It is the national data repository and nodal agency responsible for the generation of information and delivery of products and services on weather, climate, cryosphere, and water resources in Bhutan. The mandate of NCHM is to provide scientific and technical services in hydrology, water resources, meteorology, climatology, and cryosphere to ensure the safety, and socio-economic well-being of society and to support national and international needs. To fulfill the mandates of the Centre, the Centre has identified three glaciers as benchmarked glaciers for a long-term monitoring program. The following are the three benchmarked glaciers in Bhutan.

- a. Thana glacier in the headwaters of Chamkhar Chu
- b. Gangju la glacier in the headwaters of Pho Chu
- c. Shodug glacier in the headwaters of Thim Chu

The Centre implements an annual activity on these benchmarked glaciers to collect mass balance and terminus position data and also ice thickness and other associated data. The data collected is used to generate mass balance information which determines the health of the glacier. Such information in combination with the status of the terminus position of glaciers are being used for determining the impact of climate change on the high mountain region and also for water resource assessment. Thana glacier is located at an altitude of 5600 masl and the base camp lies at 5100 masl. It falls within the area of Jigme Singye Wangchuk National Park.

Normally the team uses alpine tents as their temporary shelter for the monitoring program which requires a few weeks of camping due to the nature of work. However, based on the past experience due to the high elevation of the base camp site, the area experiences extreme weather conditions frequently such as heavy snowfall and blizzards and damages the tents. Exposure to such extreme weather conditions pose life threatening risk to the team members deputed for Thana glacier monitoring program and there were few cases in the past where team members had to be evacuated to a lower region of Churthang which is a day walk down. Apart from the risk posed to lives of the team members, these weather factors impact the work progress in various ways.

The data collected from Thana glacier and Chubda glacial lake in the headwaters of Chamkhar Chu can serve as important information for planning of developmental activities in the downstream areas of Chamkhar Chu sub basin. Since Thana glacier has been benchmarked for long term monitoring purposes, the seamless data collected from the glacier can be used to conduct scientific research such as impact of climate change on the water resource and its variation in the long run in Chamkhar Chu sub basin. Chubda glacial lake in the headwaters of Chamkhar Chu is categorized as one of the potentially dangerous glacial lakes (PDGL) and the data collected from Chubda glacial lake can provide information on the hazard and risk of GLOF and its likelihood impact on the lives and properties of communities in the downstream region. Beside this purpose, the data and information from Thana glacier and Chubda glacial lake is also expected to serve the purpose of various researchers in the field of environment and related fields.

As the area lies within Wangchuck Centennial National Park, the proposed site of permanent shelter (mountain hut) at the base camp of Thana glacier also falls well within various activities of the park such as camera trapping, cordycep collection monitoring and other surveys. For such activities the proposed shelter hut can also be used by the people from the park services during their surveys and monitoring activities.

The proposed structure is a single-storeyed load bearing structure with RRM wall foundation in mud mortar, RRM wall in superstructure in mud mortar, timber doors and windows with MS grill on windows and collapsible shutter on the door, cement concrete/wooden plank flooring, CGI/shinglap roof over the wooden truss, drainage, and plinth protection, internal wall-wooden paneling laid over heat insulator.

There are no settlements at the Project site. During the construction phase, household solid wastes of about 2 kg per day are expected. After the construction less than 2 kg is expected. The activity

may produce dust during the construction phase. However, it would be very minimal as no machinery will be used at the site. It is also very far from settlements. The activity will not involve the use of heavy equipment and will not have any adverse impacts on the noise level in the vicinity. No vehicular movement as there is no access to the site. There might be occupational health and safety issues for workers during the lifting of relatively heavy construction materials as there would be no machinery to perform this task. There is also the risk from climbing the roof while fixing roofs (although it is only a one-storied building).

The environmental and social impacts are summarized below:

- Waste management during construction
- Dust pollution during the construction
- Occupational health and safety of workers

4. Activity 3.2: Installation of Automatic Weather Stations (AWS) in Shodug, Lingzhi, Thimphu

Budget: Nu. 6.0 million *Timeline*: July 2024- June 2025 *Location*: Chiwog/Village- Shodug, Geowg: Lingzhi, Dzongkhag: Thimphu

Currently, there are more than 200 stations (hydrology and meteorology, manual and automatic) spread across the country but there are limited stations in the higher alpine mountains. As a part of NCHM effort to have a uniform coverage of observation stations, 3 sets of standard AWS are proposed to be procured and installed near the glaciers and glacial lakes for research work as well as to fill up the data gaps. AWS will have the following parameters:

- Temperature
- Precipitation
- Humidity
- Wind speed
- Wind direction
- Solar radiation (long wave)
- Solar radiation (short wave)
- Net radiation

It is proposed to install AWS close to long-term monitoring glaciers and glacial lakes in the headwater of Wangchhu sub-basins of Thim Chhu. All the proposed sites for the AWS fall under the Jigme Dorji National Park along the northern frontier of the country where there are no weather observation stations. It is expected that the data from these stations not only help the Centre to carry out research on glaciers, glacier lakes, water resources, and impact of climate change but also other related research in protected areas and park management and conservation by the Department of Forest and Park Services and other agencies.

An AWS set is proposed on Shodug glacier which is located near Yare La in the headwaters of ThimChhu. Shodug Glacier is a newly identified benchmark glacier for long-term monitoring purposes. At present, there are no weather stations in the vicinity of the glacier and also in the headwaters of the Wangchhu sub-basin. The proposed AWS will be installed at an altitude of 5100 masl. There are no settlements at the Project site. During the construction phase, household solid wastes of about 2 kg per day are expected. After the construction less than 2 kg is expected. The activity may produce dust during the construction phase. However, it would be very minimal as no machinery will be used and the site. It is also very far from settlements. The activity will not involve the use of heavy equipment and will not have any adverse impacts on the noise level in the vicinity. No vehicular movement as there is no access to the site.

5. Activity 3.3 Installation of Automatic Weather Stations (AWS) Thanaphu, Chokhortoe, Bumthang

Budget: Nu. 6.4 million *Timeline*: July 2024- June 2025 *Location*: Chiwog/Village- Thanaphu, Geowg: Chokhortoe, Dzongkhag: Bumthang

Currently, there are more than 200 stations (hydrology and meteorology, manual and automatic) spread across the country but there are limited stations in the higher alpine mountains. As a part of NCHM effort to have a uniform coverage of observation stations, 3 sets of standard AWS are proposed to be procured and installed near the glaciers and glacial lakes for research work as well as to fill up the data gaps. AWS will have the following parameters:

- Temperature
- Precipitation
- Humidity
- Wind speed
- Wind direction
- Solar radiation (long wave)
- Solar radiation (short wave)
- Net radiation

It is proposed to install AWS close to long-term monitoring glaciers and glacial lakes in the headwater of Chamkar chu. All the proposed sites for the AWS fall Wangchuck Centennial National Park along the northern frontier of the country where there are no weather observation stations. The site is at Thana glacier in the Chamkarchhu headwater at an altitude of 5250 masl which will be one of the highest weather observation stations in the country. It is expected that the data from these stations not only help the Centre to carry out research on glaciers, glacier lakes, water resources, and impact of climate change but also other related research in protected areas and park management and conservation by the Department of Forest and Park Services and other agencies. There are no settlements at the Project site. During the construction phase, household

solid wastes of about 2 kg per day are expected. After the construction less than 2 kg is expected. The activity may produce dust during the construction phase. However, it would be very minimal as no machinery will be used at the site. It is also very far from settlements. The activity will not involve the use of heavy equipment and will not have any adverse impacts on the noise level in the vicinity. No vehicular movement as there is no access to the site.

6. Activity 3.4 Installation of Automatic Weather Stations (AWS) in Thanza, Lunana, Gasa

Budget: Nu. 6.66 million *Timeline*: July 2024- June 2025 *Location*: Chiwog/Village- Tenchoe, Thanza, Geowg: Lunana, Dzongkhag: Gasa

Installation of another set Lunana near the lakes. There is already an AWS installed at Thanza as a part of GLOF early warning stations. However, there are no weather stations at the lake site. In the absence of a standard weather station at the glacial lake site, it has become difficult to correlate the events taking place on the lakes with the meteorological parameters. Such an issue surfaced during the small GLOF event from Thorthormi Lake in 2020. With a weather station installed at the lake site, it is expected to solve this issue. This AWS will be installed at an altitude of approximately 4500 masl. The site falls under the Jigme Dorji National Park. It is expected that the data from these stations not only help the Centre to carry out research on glaciers, glacier lakes, water resources, and impact of climate change but also other related research in protected areas and park management and conservation by the Department of Forest and Park Services and other agencies. There are no settlements at the Project site. During the construction phase, household solid wastes of about 2 kg per day are expected. After the construction less than 2 kg is expected. The activity may produce dust during the construction phase. However, it would be very minimal as no machinery will be used and the site. It is also very far from settlements. The activity will not involve the use of heavy equipment and will not have any adverse impacts on the noise level in the vicinity. No vehicular movement as there is no access to the site.

Potential impact Impact scale Proposed mitigation is		Proposed mitigation measures	Responsible party	Costs	
Activity 1 Construction of Cryosphere Monitoring and Research Base Camp at Thanaphu in the Headwaters of Chamkhar Chu					
<i>Waste:</i> Construction waste as well as the household waste of the workers	Short term Minor	 Pre-construction: requirements for appropriate waste management should be included in bidding documents, as a precondition for the contractor's selection During construction: Identification of different waste types at the project site; Collection of the waste should be done during the entire construction phase; Collection of biodegradable and non-degradable waste should be done separately. Dumping of waste in its vicinity, or in other non-designated places should be prohibited; After construction: All waste shall be removed from the project site 	BFL Focal/ Site Engineer/ Supervisor of NCHM; & the contractor	Incorporated in the contract agreement	
Dust pollution during the construction	Short term Minor	<i>During construction:</i> - Watering the site twice a day, once in the morning before the start of the work and once in the afternoon.	BFL Focal/ Site Engineer/ Supervisor of NCHM; & the contractor	From the activity cost	
Occupational health and safety of workers	Short term Minor	 -Comply with the workers' health and safety regulations; -Ensure that no underage workers, or children are engaged; - Ensure decent work conditions, including an appropriate salary, working hours, accommodation and food for 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 - Ensure that they are aware of the project's grievance redress mechanism and can use it to raise workplace concerns. 	BFL Focal/ Site Engineer/ Supervisor of NCHM; & the contractor	To be part of a worker agreement. From the activity cost.	
Activity 2. Installation of Automatic Weather Stations (AWS) in Shodug, Thanaphu and Thanza					
<i>Waste:</i> Construction waste as well as the household waste of the workers	Short term Minor	<i>Pre-construction:</i> requirements for appropriate waste management should be included in bidding documents, as a precondition for the contractor's selection <i>During construction:</i>	BFL Focal/ Site Engineer/ Supervisor of NCHM; & the contractor	Incorporated in the contract agreement	

4. Environmental and Social Impacts and Mitigation Measures

- Identification of different waste types at the project site; -Collection of the waste should be done during the entire constru - Collection of biodegradable and non-degradable waste should be separately.				
		-Dumping of waste in its vicinity, of in other non-designated places should be prohibited; <i>After construction:</i> All waste shall be removed from the project site		
Dust pollution during the construction	Short term Minor	<i>During construction:</i> - Watering the site twice a day, once in the morning before the start of the work and once in the afternoon.	BFL Focal/ Site Engineer/ Supervisor of NCHM; & the contractor	From the activity cost
Occupational health and safety of workers	Short term Minor	 -Comply with the workers' health and safety regulations; -Ensure that no underage workers, or children are engaged; - Ensure decent work conditions, including an appropriate salary, working hours, accommodation and food for 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; - Ensure that they are aware of the project's grievance redress mechanism and can use it to raise workplace concerns 	BFL Focal/ Site Engineer/ Supervisor of NCHM; & the contractor	To be part of a worker agreement. From the activity cost.

5. ESMP Implementation Arrangements

The implementation of project activities will be carried out by the BFL Focal of NCHM. 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 Centre will sign with the Contractor(s) for implementation of the planned activities. 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 organised by the Contractor for all workers prior to the project activities and prior to any specific tasks with high health risks.

The BFL Focal with the Site Engineer/ Supervisor of NCHM will monitor the implementation of proposed measures. Non-compliances should be recorded and reported to the ESS immediately, and the ESS will report it to the PCU (M&E Officer). Each non-compliance to the guidelines should be resolved with appropriate measures and the evidence should be maintained. Disbursement of project funds to the Contractors will be contingent upon their full compliance with the safeguard's requirements.

6. ESMP monitoring arrangements

The BFL Focal in NCHM with the Site Engineer/ Supervisor of NCHM in coordination with the respective officials from the Jigme Dorji National Park and Wangchuck Centennial National Park where the activities will be carried out 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. NCHM is also fully responsible for the compliance of all external contractors and service providers working in the NCHM with the safeguard requirements outlined in the ESMP. The monitoring of activities under this ESMP will be carried out in the following manner: July 2024- December 2025

Sl#	Activities	Monitoring	Timeline		Location	Means of Verification
		team	Start	Complete		
1	1 Construction of Cryosphere Monitoring	Site Engineer	July 2024	December 2025	Thanaphu,Field visit reportChokhorto2 weeks after the	Field visit report within 2 weeks after the visit
	and Research Base Camp at Thanaphu in	BFL Focal	January 2025	December 2025	e, Bumthang	Quarterly Report and
	the Headwaters of Chamkhar Chu	ESS focal	July 2025	December 2025		Annual Report
2	Installation of Automatic Weather Stations (AWS)	Site Engineer	\July 2024	December 2025		

in Shodug, Thanaphu and Thanza	BFL Focal	January 2025	December 2025	Shodug, Lingzhi, Thimphu	
	ESS focal	July 2025	December 2025		

Activity 3.1. Construction of Cryosphere Monitoring and Research Base Camp at Thanaphu in the Headwaters of Chamkhar Chu

Monitoring by implementing entity, NCHM

- Field visits Site Engineer/ Supervisor of NCHM at least 2-3 times during the inception, during half-year progress, and completion: July 2024 December 2025.
- BFL focal at least 2 times during half-year progress, and completion: July 2024 December 2025.
- Reports by the implementing entities submitted to ESS focal within 2 weeks after each field visit

Monitoring by ESS officer:

- Field visits by ESS officer at least once during the half-year progress, together with the implementing party
- Reports by ESS focal to the PCU (M&E officer) within one week after the field visit

Bi-annual reports by PCU (M&E) to Secretariat

- Annual Progress Report June 2025
- Semi-Annual Progress Report

Activity 3.2 to 3.4 Installation of Automatic Weather Stations (AWS) in Shodug, Thanaphu and Thanza.

Monitoring by implementing entity, NCHM

- Field visits Site Engineer/ Supervisor of NCHM at least 2- 3 times during the inception, during half-year progress, and completion: July 2024 December 2025.
- BFL focal at least 2 times during half-year progress, and completion: July 2024 December 2025.
- Reports by the implementing entities submitted to ESS focal within 2 weeks after each field visit

Monitoring by ESS officer:

- Field visits by ESS officer at least once during the half-year progress, together with the implementing party
- Reports by ESS focal to the PCU (M&E officer) within one week after the field visit

Bi-annual reports by PCU (M&E) to Secretariat

- Annual Progress Report June 2025
- Semi-Annual Progress Report

7. Capacity Need and Budget

Activities under this ESMP will be implemented by the National Centre for Hydrology and Meteorology, and the work shall be executed by the contractor for the Construction of the Facility. The competency and expertise of the human resource shall be mentioned in the bidding document and will be strictly monitored. The budget for the construction is Nu. 5.76 million from July 2024-December 2025. The estimated budget proposal is for activities to be carried out from July 2024 to December 2025.

Sl#	Activity	Amount (Nu.)	Budget for ESS mitigation
1	Construction of Cryosphere	6.76 million	
	Monitoring and Research Base Camp		
	at Thanaphu in the Headwaters of		
	Chamkhar Chu		
2	Installation of Automatic Weather	6.0 million	No separate budget required
	Stations (AWS) in Shodug, Lingzhi,		
	Thimphu		
3	Installation of Automatic Weather	6.4 million	
	Stations (AWS) Thanaphu,		
	Chokhortoe, Bumthang		
4	Installation of Automatic Weather	6.66 million	
	Stations (AWS) in Thanza, Lunana,		
	Gasa		
	Total	25.82 million	

8. Consultation and Disclosure Mechanisms

The full English version of this ESMP, as well as an executive summary in Bhutanese, shall be disclosed on the website of the Ministry of Energy and Natural Resources, BFL and WWF, National Centre for Hydrology and Meteorology. Hard copies of the ESMP should also be available at the PA Management Office and at the PCU Office.

9. Stakeholder Engagement Plan

The local community that resides in the vicinity of the project site will be engaged throughout the construction period.

The BFL focal person has to submit the official minutes of consultation meetings (along with a list of participants, disaggregated by gender and age) to ESS officer within one week after the completion of the consultation. The ESS officer will submit the consultation reports to the PCU (M&E officer) one week after their receipt. The PCU (M&E officer) will report to the Secretariat on a semi-annual basis.

10. Grievance Redressal Mechanism

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 Mechanism, and the GCF Independent Review Mechanism.

BFL-specific Grievance Mechanism

A grievance redressal mechanism (GRM) is in place to address any grievances arising from the implementation of BFL activities, on resources, non-performances of project obligation including safeguards, violation of law and/or corruption, project governance and implementation, fair access and benefit sharing, stakeholder engagement, labour-related issues and incidents, gender related issues and others.

If the stakeholders have any grievances related to the BLF project they can report their grievances via letter, phone call or verbally to nearby gewog or forest offices. The report can also be sent to the BFL PCU office or WWF office. The specific brochure for the BFL GRM is attached in the annexure. Further the complainant can also contact the nearby gewog office/forest office/NCHM focal person for implementing BFL focal if there is any grievance related to implementation of the project activities.

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

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: <u>https://irm.greenclimate.fund/case-register/file-complaint</u>

Annexure I

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 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. 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 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 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.

• 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 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 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

• 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 servicing, inspection, and/or cleaning should have unobstructed, unrestricted, and ready access.

• Covers need to be provided where ever 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 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 stall 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, 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.

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 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 90 dB(A) for a duration of more than 8 hours per day without wearing ear plugs/ear muffs.

• 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 persons 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 hazard') 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 work station.

Working Environment Temperature

Exposure to hot or cold working conditions in indoor or outdoor environments can result temperature stressrelated 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 man- 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 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' 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 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 hand wash basins and showers/bathrooms facilities are provided.

9. Cooking and laundry facilities

Cooking and laundry facilities should 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 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

Annexure II

