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Environmental and Social Management and Monitoring Plan

Appendix C – Overview

January 2024

Disclaimer: *This Upper Arun Hydro-electric Project's draft Environmental and Social Impact Assessment (ESIA) was prepared by UAHEL broadly following Good International Industry Practices (GIIP) as those required under the Bank's Environmental and Social Framework (ESF).*

The review of this ESIA is a key part of the Bank's due diligence process and is currently ongoing. This draft ESIA may still contain gaps to fully address all pertinent E&S issues in the project. Any gaps will be covered through supplemental studies, assessments, and/or plans that will be completed in a reasonable timeframe to ensure compliance with the ESF.

For the benefit of potentially project affected people (PAP) and other interested stakeholders, and in alignment with the Bank's Policy on Access to Information this draft ESIA is being disclosed as soon as it became available. This disclosure, however, should not be considered as a final clearance of the ESIA by the World Bank.

26 January 2024

CONTENTS

List of Tables

List of Figures

1. PURPOSE OF THE ESMP

The Upper Arun Hydroelectric Project (UAHEP) Environmental and Social Management and Monitoring Plan (ESMP) is a comprehensive plan for the implementation of mitigation measures prescribed in the Environmental and Social Impact Assessment (ESIA), other project documents (e.g., Resettlement Action Plan), and is a condition of the project permit. The ESMP identifies the overall principles, approaches, procedures, and methods stated in the above documents to mitigate the environmental and social impacts of the Project. The preparation of the ESMP is guided by the World Bank (WB) Environmental and Social Framework (ESF), specifically including the applicable Environmental and Social Standards (ESSs). The ESMP consists of four primary components:

- The Construction Environmental and Social Management and Monitoring Plan (CESMMP), primarily for the construction contractors
- The Operation Environmental and Social Management and Monitoring Plan (OESMMP), primarily for the powerplant operation
- The Biodiversity Management Plan (BMP)
- The Institutional Capacity Assessment

The ESMP will enable Upper Arun Hydro-Electric Limited (UAHEL), the Project Owner, as well as its Construction Contractors and subcontractors (herein referred to as the “Contractors”) and future facility operator for powerplant operation (herein referred to as the “Operator”) to identify in advance and plan to mitigate any adverse social and environmental risks and impacts that may arise. The ESMP will also serve as a reference to UAHEL, its Contractors, the Operator, Nepal regulatory agencies, and other stakeholders to understand the Project’s environmental and social commitments and to ensure that the Project adopts a strategic approach to mitigate the environmental, social, health and safety impacts of the Project.

2. ORGANIZATIONAL STRUCTURE OF ESMP

This ESMP includes four annexes:

- Annex C1: Construction Environmental and Social Management and Monitoring Plan (CESMMP) Framework
- Annex C2: Operations Environmental and Social Management and Monitoring Plan (OESMMP) Framework
- Annex C3. Biodiversity Management Plan (BMP)
- Annex C4. Institutional Capacity Assessment and Strengthening Plan (ICASP)

The OESMMP will also include the Labor Management Procedures and possibly other management plans, which will be prepared by the Project Owner.

3. APPLICABILITY

The ESMP applies to all aspects of the UAHEP, including the project’s), access road, hydropower facility, transmission line, and all ancillary facilities. The ESMP also applies to the UAHEP’s full life cycle, including construction, operation, and decommissioning, to ensure that the Project conforms with all WB, other lender, and Nepal regulatory requirements during all project phases. Since decommissioning is not envisioned to occur for 50 or more years, a separate decommissioning management plan is not included as part of this ESMP, but a requirement to prepare a decommissioning management plan is included as part of the Operation Environmental and Social Management and Monitoring Plan (OESMMP, see Annex 2).

4. ESMP IMPLEMENTATION

This section addresses the implementation of the ESMP, including responsibilities, staffing, timing, management of change, and budget.

4.1 Implementation Responsibilities

UAHEL has overall responsibility for ESMP implementation. UAHEL may assign some of these responsibilities to the Contractors (e.g., portions of Annex 1: CESMMP), Operator (e.g., portions of the OESMMP), and Project Engineer (e.g., some monitoring and construction oversight responsibilities), but UAHEL retains ultimate responsibility for the effective implementation of the ESMP. Implementation of the ESMP is referenced as a condition of the financing agreement between the WB and UAHEL. A Panel of Experts will provide advice to UAHEL, the WB, and other Lenders regarding implementation of the ESMP. See Figure 1 for a project organizational chart and Table 1 for a summary of ESMP responsibilities.

Figure 1: ESMP Implementation Organizational Chart

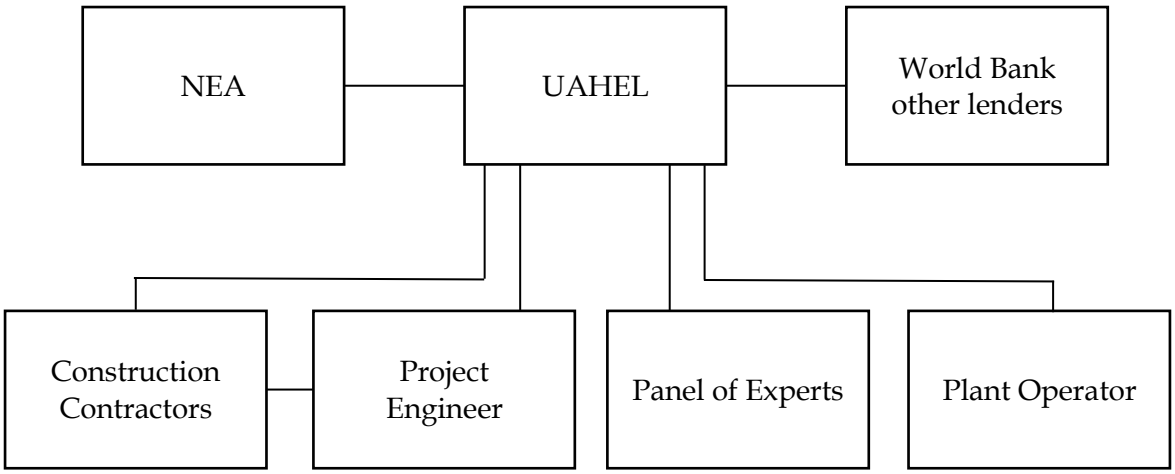

Table 1: ESMP Responsibilities

Entity	Environmental and Social Management Plan Responsibilities
UAHEL	Overall responsibility for effective implementation of the ESMP and management of environmental and social risks in accordance with WB and other lender requirements Will establish an Environmental, Social, Health and Safety (ESHS) Division reporting to the Project Director/ Manager
Project Engineer (Owner's Engineer)	Will assume ESHS oversight and monitoring responsibilities as delegated by UAHEL Will have an ESHS team reporting to the Project Engineer Will report to UAHEL
Construction Contractors	Will be contractually responsible for implementation of the CESMMP Contractor's requirements, including development of a detailed CESMMP, and implementation of the CESMMP Will establish an ESHS team reporting to the Construction Site Manager. Will report to UAHEL
Plant Operator	Will be contractually responsible for implementation of the OESMMP Operator's requirements, including development of a detailed OESMMP, and implementation of the OESMMP
Panel of Experts	Dam Safety and Environmental & Social Panel of Experts will provide independent advice to UAHEL and the WB/other Lenders.
World Bank/ Other Lenders	Will provide independent monitoring and oversight of UAHEL during project construction and operation In the event of non-conformance with Lender's policies and requirements, the Lender's may withhold disbursements of the contractor if the contractor does not rectify the non-compliance within one month of the notification.

Table 2 indicates the specific responsibilities for each ESMP Annex, among the various implementation entities, with the roles as defined below:

- Ultimate responsibility – retains ultimate responsibilities, but delegates some of the implementation measures to others
- Primary responsibility – is responsible for implementing most of the mitigation measures
- Secondary responsibility – is responsible for implementing some of the mitigation measures as assigned by UAHEL
- Monitoring – has responsibility for monitoring the others implementation of the mitigation measures

Table 2: Management Responsibilities by ESMP Annex

Annex	Responsibilities			
	UAHEL	Contractor	Project Engineer	Operator
1. CESMMP	Ultimate	Primary	Monitoring	
2. OESMMP	Ultimate			Primary
3. POESMMP	Primary	Secondary	Monitoring	Secondary

An important aspect of identifying, tracking, and preventing/correcting issues related to Environmental, Health, and Safety (EHS) for the UAHEP will be a digital platform for entering data in the field, from which EHS monitoring reports, dashboard reports, incident reports, and corrective/preventative action reports, among others, will be prepared and tracked. UAHEL will establish this platform for its use and for use by the Project Engineer, Construction Contractors, and Facility Operator.

4.2 ESMP Staffing

As indicated above, UAHEL, the Project Engineer, the Construction Contractors, and Plant Operator will all have dedicated Environmental, Social, Health and Safety (ESHS) teams to support the implementation, monitoring, and/or oversight of mitigation measures.

4.2.1 UAHEL

The UAHEL should have an ESHS Division with at least an ESHS Manager who reports directly to the UAHEP project Director/Manager, if not the Managing Director.

During the construction phase, the ESHS Section should include at a minimum the following staff:

- **ESHS Manager** – The UAHEL Project Team needs a dedicated ESHS manager, who preferably reports directly to the Project Manager/Director. This person should have at an advanced degree in the environmental or social sciences or civil/environmental engineering with at least 15 years of experience in managing environmental and social risks for large infrastructure projects, including at least some experience with hydropower projects and some experience with ESMS. This person should have good working knowledge and applied experience with international standards (e.g., WB, EIB, IFC, ADB). This person should have experience in construction phase monitoring. This person would be approximately 80% office/20% field based.
- **Environmental and Social Specialists** – There should be at least one of each of the following: environment and social manager, senior environmental specialist, senior social specialist/social/resettlement specialist, environmental specialist, sociologist, gender/GBV specialist, engineer, supervisor, senior biodiversity management specialist, stakeholder engagement specialist/community liaison officer, and health and safety specialist, who will report to the ESHS manager. These staff members should have at least a bachelor's degree in environmental science, engineering, or social sciences, as applicable, with at least 10 years of experience in managing environmental and social risks for large infrastructure projects. They should have a good working knowledge and applied experience with international standards (e.g., WB, EIB, IFC, ADB) and experience with construction inspections and monitoring. These staff would be approximately 60% office/40% field based. In addition, a short-term consultant for the terrestrial biodiversity and aquatic biodiversity specialist will be hired by UAHEL, as required.
- **E&S Panel of Experts** – The UAHEP Project Team will have an E&S panel of experts to advise on environmental and social issues for the consultant and UAHEL. These advisors should have at least 15 years of experience applying international standards and have extensive experience with developing and implementing ESMSs and providing construction oversight.

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4.2.2 Construction Contractor

Each Construction Contractor will have an ESHS Team to prepare and implement the CESMMP and applicable portions of the BMP. Each Contractor's ESHS Team shall include a manager, who reports to their respective construction site manager.

- **The Access Road Contractor's ESHS Team** will also have one senior and two staff level specialists in each of the following disciplines – environmental (with special experience in erosion and sediment control), occupational health and safety (OHS), and social/stakeholder engagement, with one of each discipline stationed at each of the major work fronts (i.e., Arun River bridge, southern access road, and the northern access road).
- **The Hydropower Contractor's ESHS Team** will also have a senior environmental specialist, senior social/stakeholder specialist, and a senior OHS specialist, as well as at least three staff level qualified and experienced specialists for each discipline (i.e., three environmental, three OHS, and three social/stakeholder specialists),one each at each of the major work fronts – headworks, headrace adit/Spoil Disposal Area #2, and the powerhouse.
- **The Transmission Line Contractor's ESHS Team** will have one environmental specialist, one social/stakeholder specialist, and one OHS specialist.

Each contractor's ESHS manager shall prepare monthly reports for UAHEL on the status of mitigation measure implementation, any ESHS-related incidents (e.g., spills, grievances, injuries), and the Project's overall ESHS performance.

4.2.3 Project Engineer

The Project Engineer, who is contracted by the Owner, will have an on-site ESHS Team to monitor the Contractor's ESHS performance and appropriate implementation of the CESMMP and aspects of the BMP. The ESHS Team will be led by a manager (who has an advanced degree in applicable subject and 10 years of experience) who reports directly to the Project Engineer. The ESHS Team will have an environmental specialist, a social/stakeholder engagement specialist, a full-time sediment and erosion control/slope stability inspector, and an OHS specialist, all with appropriate education and construction oversight experience (minimum 5 years of experience). The ESHS Team shall prepare monthly reports for UAHEL on the Project's ESHS performance.

4.2.4 Plant Operator

The UAHEL will have an ESHS unit which will be responsible for implementation of the OESMMP/BMP and monitoring the works during the operation phase, as well as work in other projects, as required. The ESHS unit shall include at least a qualified and experienced ESHS manager, supported by an environmental specialist, a biodiversity specialist, an H&S specialist, and a stakeholder/community relations specialist. The ESHS manager shall prepare monthly reports for UAHEL on the Project's ESHS performance.

4.3 Management of Change

The need may arise to modify the ESMP as work methods change or are amended, or new work methods are added. This is part of and consistent with Adaptive Management approach. The ESMP shall not be weakened, all changes shall maintain or strengthen the level of environmental and social protection. The process below establishes Management of Change requirements for any and all changes to the ESMP.

The Owner may propose changes to the ESMP when it is reasonably likely that the current ESMP is not sufficient to prevent:

- Serious health and safety incidents

- Environmental and social impacts greater than those disclosed in the ESIA
- New impacts not disclosed in the ESIA
- Violation of Nepalese law
- Non-conformance with Lenders requirements, including the:
  - World Bank ESF Environmental and Social Standards (ESSs)
  - World Bank Environmental, Health, and Safety (EHS) General Guidelines (2007)
  - Requirements of other Lenders involved in co-financing parts of the Project

The WB can also propose changes to the ESMP if it is clear from the Owners reports or the WB inspections that the risks identified above may occur. In the event of non-conformance with Lender policies and requirements, Lenders may withhold disbursements.

The Owner will notify the WB of any proposed changes to the ESMP and obtain their approval before implementing any changes. The Owner will respond to any changes proposed by the WB and obtain their approval.

The Owner will maintain a current copy of the ESMP

4.4 Reporting

In accordance with the Environmental and Social Commitment Plan, UAHEL is required to report bi-annually (every six months) to the World Bank on the Project's performance. The CESMMP/BMP and OESMMP/BMP frameworks require each Contractor and the Project Engineer to submit reports on the Project's environmental and social performance to UAHEL on a monthly basis throughout the construction period.

In the event of any project-related incidents resulting in an injury to the public or a worker hospitalization or fatality, the Construction Contractor shall notify UAHEL and the Project Engineer immediately (within 24 hours) and, in turn, UAHEL shall notify the World Bank within 24 hours of their notification.

4.5 Estimated Budget

The ESMP budget considers the following items:

- General mitigation measures including ES staffing, capacity building, stakeholder engagement and the GRM;
- Physical mitigation measures;
- Biological mitigation measures, including the budget for BMP implementation, and
- Social risk mitigation measures and benefits sharing, including the budget for health and safety aspects.
- Detailed budget table will be agreed upon with stakeholders and presented in this document by project appraisal.

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Construction Environmental & Social Management and Monitoring Plan

Appendix C – Annex C1

January 2024

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CONTENTS

1. INTRODUCTION

This section describes the purpose, organizational structure, procedures/approval process, management of change process, applicability, staffing and reporting requirements for this Construction Environmental and Social Management and Monitoring Plan (CESMMP).

1.1 Purpose

This document presents the framework for the Construction Environmental and Social Management and Monitoring Plan (hereinafter referred to as the CESMMP), including the minimum Lenders' requirements, for the construction phase of the Upper Arun Hydroelectric Project (UAHEP, or the Project). This CESMMP Framework has been prepared based on the project understanding and the findings and recommendations of the Project's Environmental and Social Impact Assessment (ESIA). This Framework, which is to be included in the bidding documents, specifies the management plans and their minimum requirements to be developed in greater detail by the Construction Contractor (herein referred to as the "Contractor"), and which are required, as part of the contract between the Owner and the Contractor, to be implemented and complied with by the Contractor during the construction phase of the Project. These plans also identify the responsibilities of the Project Owner, Upper Arun Hydro-electric Limited (UAHEL), a subsidiary of Nepal Electricity Authority (NEA).

UAHEL, as the Project Owner, has ultimate responsibility for project construction, ensuring that all project required mitigation measures are implemented, and that the Project conforms with World Bank (WB), European Investment Bank (EIB), and Government of Nepal standards. There are other construction phase mitigation requirements included within the Biodiversity Management Plan (Annex C3), the Resettlement Action Plan, Gender Action Plan, Indigenous Peoples Plan, and the Institutional Capacity and Strengthening Plan (Annex C4), for which UAHEL retains primary responsibility and which will not be delegated to the Contractor. The Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) Prevention and Response Action Plan is a shared responsibility. This CESMMP focuses on those mitigation requirements that UAHEL will delegate to the Contractor, while retaining ultimate responsibility for their implementation via monitoring and oversight.

1.2 Organizational Structure

This CESMMP includes 22 individual framework management plans, as follows:

1. Construction Worker Induction Training and Code of Conduct
2. Construction Materials Sourcing Plan
3. Air Quality Management Plan
4. Water Quality Management Plan
5. Hazardous Materials Management Plan
6. Waste Management Plan
7. Noise and Vibration Management Plan
8. Muck and Spoil Management Plan
9. Soil Erosion and Sediment Control Management Plan
10. Spring Management Plan
11. Site Restoration Management Plan
12. Blasting and Explosives Management Plan
13. Occupational Health and Safety Plan
14. Community Health and Safety Management Plan
15. Traffic Management Plan

16. Security Personnel Management Plan
17. Labor Management Procedures
18. Influx Management Plan
19. Cultural Heritage Management Plan
20. Cardamom Management Plan
21. Emergency Preparedness and Response Plan
22. Project Commissioning and Construction Close Out Management Plan

Most of the individual management plans in this framework include the following elements:

- Purpose of the management plan
- Key project risks and impacts
- Contractor minimum requirements
- Owner's responsibilities
- Monitoring requirements

1.3 Procedures

This section describes the process for how the Contractor will apply the CESMMP Framework in a timely manner in accordance with the schedule specified in the Environmental and Social Commitment Plan. The general development and approval process is as follows:

- The Contractor will develop a detailed Draft CESMMP, including a Labor Management Plan, using this Framework to establish the minimum Lenders' requirements.
- The Contractor will provide the Draft CESMMP to the Project Engineer (i.e., the Owner's technical representative) for its review.
- The Project Engineer will provide the Draft CESMMP to the Owner and Lenders for their review.
- The Project Engineer will incorporate any comments of the Owner or Lenders, along with its own comments, and provide an integrated set of comments to the Contractor.
- The Contractor will address all comments provided by the Project Engineer and provide a Final CESMMP to the Project Engineer for his/her review.
- The Project Engineer, Owner, and Lenders will review and, if acceptable, approve (provide "No Objection" in the case of the Lenders) the Final CESMMP and Labor Management Plan.
- Hard and soft signed copies of the Final CESMMP will be distributed by the Project Engineer to the Contractor, Owner, and Lenders.

The Final CESMMP shall be completed before the initiation of ground-disturbing activities.

1.4 Management of Change

The need may arise to modify the CESMMP as work methods change or are amended, or new work methods are added. This is part of, and consistent with, the Adaptive Management approach. The process below establishes the Management of Change requirements for any and all changes to the CESMMP.

It anticipated that most proposed changes to the CESMMP will be initiated by the Contractor. The Management of Change process, however, does allow for the Owner or the Lenders to propose changes when it is reasonably likely that the current CESMMP is not sufficient to prevent:

- Serious health and safety incidents
- Environmental and social impacts greater than those disclosed in the ESIA

- New impacts not disclosed in the ESIA
- Violation of Nepalese law
- Non-conformance with the Lenders' requirements, including the:
  - World Bank Environmental and Social Framework (ESF) Environmental and Social Standards (ESS)
  - World Bank Environmental, Health, and Safety (EHS) General Guidelines (2007)
  - Requirements of other Lenders involved in co-financing parts of the Project

Table 1.1 below defines three categories of potential changes to the CESMMP and the review and approval process associated with each.

Table 1.1: Project CESMMP Management of Change Process

Category of Change	Change Description	Action
Category 3	Changes that have the potential to, or are reasonably likely to, result in decreased Contractor ESHS performance, and/or are likely to result in an increase in ESHS impacts above those disclosed in the ESIA, result in new impacts not disclosed in the ESIA, require the acquisition of rights to use additional land, or require additional permits/approvals from the government	The Contractor will notify the Owner of the proposed change and provide the rationale and justification for the change. The Owner will notify the Lenders within two weeks of the receipt of the request for a CESMMP change. This category of change requires approval by the Owner and Lenders before implementation. The Contractor will not commence specific activities relevant to the change that would likely result in an increase in Environmental, Social, Health, and Safety (ESHS) risks and impacts until changes are agreed with and approved by the Lenders.
Category 2	Changes that have the potential to, or are reasonably likely to result in, decreased Contractor ESHS performance, but are unlikely to result in any increase in environmental/social impacts above those described in the ESIA, or result in new impacts not described in the ESIA, or require the acquisition of the right to use additional land	The Contractor will notify the Owner of the proposed change and provide the rationale and justification for the change. The Owner will notify the Lenders within two weeks of receipt of request for a CESMMP change. This category of change only requires approved by the Owner before implementation, unless the Lenders object within 30 days of receipt of the notice of change.
Category 1	Changes that are expected to result in similar or improved ESHS performance and are unlikely to result in any increase in environmental or social impacts above those described in the ESIA	The Contractor will notify the Owner of the proposed change and provide the rationale and justification for the change. The Owner will notify the Lenders as part of its quarterly Environmental and Social Issues Compliance Report. This category of change requires only Owner approval before implementation.

The Contractor is required to maintain a copy of the current version of the CESMMP at its construction site management office at all times. The Contractor understands that the Owner and/or Lenders will use the current version of the CESMMP as the basis for conducting periodic inspections and audits.

1.5 Applicability

The CESMMP applies to all Project Contractors, including the access road, hydropower, and transmission line prime Contractors, as well as their subcontractors, and any sub-subcontractors (referred to herein simply as subcontractors). It is expected that each of the prime Contractors (e.g., access road, hydropower, transmission line) will develop their own CESMMP, which will apply to themselves and each of their subcontractors. There may be some of the individual management plans that may not be applicable to the work of a prime Contractor (e.g., Security Personnel Management Plan for the Transmission Line Contractor).

1.6 Staffing

Each Construction Contractor will have an ESHS Team to prepare and implement the CESMMP and applicable portions of the Biodiversity Management Plan. The Hydropower Contractor's ESHS Team shall include a manager, who reports to their respective Construction Site Manager.

The Access Road Contractor's ESHS Team will also have one senior and two staff level specialists in each of the following disciplines – environmental (), occupational health and safety (OHS), and social/stakeholder engagement. UAHEL should provide oversight with regard to the implementation of the Contractor part of the Biodiversity Management Plan, e.g., location of arboreal bridges and wildlife underpasses.

The Hydropower Contractor's ESHS Team will also have an ESHS Manager, two senior environmental specialists, two senior social/stakeholder specialists, and two senior OHS specialists.

The Transmission Line Contractor's ESHS Team will have one environmental specialist, one social/stakeholder specialist, and one OHS specialist.

Each Contractor shall prepare monthly reports for UAHEL on the status of mitigation measure implementation, any ESHS-related incidents (e.g., spills, grievances, injuries), and the Project's overall ESHS performance.

1.7 Reporting

Each prime Contractor will submit an Environmental, Social, Health and Safety Monitoring Report on a monthly basis to the Owner, summarizing performance for the prior month, year to date, and from initiation of construction to date.

In the event of any project-related incidents resulting in an injury to the public or a worker hospitalization or fatality, the Construction Contractor and Facility Operator shall notify UAHEL and the Project Engineer immediately (within 24 hours), and, in turn, UAHEL shall notify the World Bank within 24 hours of their notification.

2. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLANS

This section presents the minimum requirements for each of the 22 individual environmental and social management plans.

2.1 Construction Worker Induction Training and Code of Conduct

2.1.1 Purpose and Objective

The purpose of the worker induction training and the Code of Conduct is to establish minimum expectations regarding the training and behavior of the Contractor's personnel, especially in terms of health and safety, protection of the environmental, and interactions with local residents.

2.1.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to construction worker induction training and Code of Conduct:

- Potential conflicts between workers and local residents, including increased risks of GBV/SEA/SH
- Impacts on the physical and biological environment
- Risks to worker health and safety

2.1.3 Contractor Minimum Requirements

The Contractor shall prepare a **Worker Induction Training and Code of Conduct Plan**. This plan shall include at least the following minimum requirements.

Construction Worker Induction Training

The Contractor is responsible for providing appropriate health and safety (H&S) and environmental and cultural sensitivity training to its workers, as described below:

- All new project personnel shall receive appropriate H&S training during their induction (i.e., within their first month of employment). The training shall be conducted by an experienced and qualified H&S professional. The H&S training shall involve a detailed review of the Contractor's Occupational Health and Safety Management Plan (see Section 2.13), a detailed description of the H&S risks each employee will be exposed to given their work assignment, and identification of the appropriate personal protective equipment (PPE) and instruction on its proper use. The Occupational Health and Safety Management Plan provides additional requirements relative to ongoing and refresher H&S training (e.g., daily pre-work tailgate discussions). All personnel will be provided with the necessary PPE.
- All new project personnel shall receive appropriate environmental and cultural sensitivity training during their induction (i.e., within their first month of employment). The training shall be conducted by an experienced and qualified environmental science professional and a social science professional. This training shall involve a description of the sensitive environmental and cultural setting of the Project (e.g., Makalu Barun National Park, Barun Dovan) and the potential presence of threatened and endangered species. New personnel shall be informed about these species and what actions they should take if they were to encounter any of these species, or wildlife in general. New personnel will also receive training regarding the customs and practices of the indigenous people and the Contractor's requirements regarding any interactions with local residents, including awareness raising and training on the prevention of SH/SEA. New personnel will also receive training on the project's Chance Find Procedures (Section 2.19).

Workers' Code of Conduct

The Contractor is required to submit its **Code of Conduct** as part of its bid, which will apply to the Contractor's personnel to ensure compliance with the Contractor's environmental and social obligations. The Contractor shall use, for the purposes of preparing its bid, the Code of Conduct form provided in the World

Bank's Request for Bids (Section IV). The Contractor is not allowed to make any substantial modifications to this form, except that, as a bidder, it may introduce additional requirements, including, as necessary, to consider specific contract issues/risks. The following additional requirements shall be included in the Contractor's Code of Conduct when preparing its bid:

- Demonstrate respect for local customs and traditions. Workers visiting the local communities or interacting with local residents shall follow appropriate standards of dress and personal hygiene and behave in a manner consistent with the Code of Conduct. Fighting (physical or verbal), creating a nuisance, or creating a disturbance in or near local villages is prohibited.
- Do not engage in gender-based violence (GBV) or intimidation, including physical or verbal harassment and sexual exploitation and abuse, directed toward female workers, female residents of the local villages, or other women (such actions will not be tolerated).
- Comply with all laws and regulations of Nepal.
- Do not engage in any hunting, fishing, poaching, wildlife trading, logging, collection of firewood, clearing of vegetation, and collection of/trade in plants, animals, and non-timber forest products (NTFPs).
- Do not possess any illegal substances, abuse alcohol, carry firearms, or consort with prostitutes.
- Do not defecate in open areas or water bodies, but only use provided toilets and waste disposal facilities.

This Code of Conduct shall be reviewed and approved by the Owner prior to the initiation of construction. The Code of Conduct shall be available to local communities at the Public Information Center (PIC) in Gola established for the Project, disseminated (in brochure and leaflet forms), and discussed with employees and surrounding communities.

All new project personnel shall receive appropriate training in the Code of Conduct during their induction (i.e., within their first month of employment).

The Contractor shall retain documentation demonstrating that all project employees, including subcontractor personnel, have received the required H&S, environmental and cultural sensitivity training, and Code of Conduct training, including on the consequences of transgressions to the Code of Conduct.

Employee Grievance Mechanism

The Contractor shall also establish an employee grievance redressal mechanism (GRM) to enable workers to file complaints in accordance with the requirements of ESS 2. The Contractor shall inform its employees of the GRM at the time of recruitment and make it easily accessible to them. The mechanism shall involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any retribution. The mechanism shall also allow for anonymous complaints to be raised and addressed and shall not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for other GRMs provided through collective agreements.

General

The Contractor shall retain documentation demonstrating that all project employees, including subcontractor personnel, have received and understood the required H&S, environmental and cultural sensitivity, and Code of Conduct training; have been informed about the grievance procedure in the most appropriate language; and have signed that they agree to abide by these provisions.

2.1.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Induction Training, Workers' Code of Conduct, and Employee Grievance Mechanism.
- Monitor to ensure that all workers receive the induction training and sign the Code of Conduct.

- Monitor the Contractor's oversight and enforcement of the Code of Conduct.
- Review the Contractor's reporting on training and grievances.
- Monitor the SEA/SH GRM to ensure that protocols are followed in a timely manner, referring complaints to the service provider to review and address SEA/SH complaints.
- Regularly review the monitoring and evaluation (M&E) of progress on SEA/SH activities, including the reassessment of risks as appropriate.

2.1.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number of employees receiving environmental and cultural sensitivity training
- Number of employees receiving H&S training
- Number of new employees receiving and signing the Workers' Code of Conduct
- Number of worker grievances received and a summary of the grievances, the number of grievances resolved and pending, and the average time period from receipt of the grievance to its resolution

2.2 Construction Materials Sourcing Plan

2.2.1 Purpose

The purpose of the Construction Materials Sourcing Plan is to minimize environmental and social impacts associated with obtaining construction materials locally and to ensure that all construction material sources are properly permitted, the sites restored, and that the Project complies with the World Bank's Environmental, Health, and Safety General Guidelines for construction material extraction (World Bank April 30, 2007). This plan is required because the engineering has not advanced sufficiently to identify the exact location of some construction materials, primarily for access road construction.

2.2.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to construction materials sourcing:

- Securing all necessary permits and approvals for material sourcing
- Applying mitigation hierarchy in selecting construction materials sourcing sites
- Obtaining property owner approval and providing appropriate compensation for construction materials
- Providing mitigation for predicted impacts
- Restoring disturbed areas

2.2.3 Contractors Minimum Requirements

The Contractor shall prepare a **Construction Material Sourcing Management Plan**. This plan shall include at least the following minimum requirements:

- The plan will identify sources for all construction material, required permits and approvals, ownership and required agreements and compensation, site-specific mitigation measures, and restoration plans.
- The construction material sourcing sites shall comply with the following:
  - Avoid community or religious forest land

- Avoid any forest clearing, or obtain any necessary forest clearing permits from the Department of Forest and Soil Conservation
- Avoid any physical displacement
- Obtain approval from the government or private land owner to remove the construction material
- Maintain a minimum 100 m buffer from any residences
- Maintain a minimum 100 m buffer from cultural heritage sites
- Avoid MBNP core and associated buffer land
- Avoid disturbance or creation of unstable slopes
- Avoid any in-water removal of construction material
- Avoid materials sourced using child or forced labor

Any exceptions to these siting criteria must be approved by UAHEL, and only with demonstration that no viable sources exist that would conform to the criteria.

2.2.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Construction Material Sourcing Plan, including any exceptions to the siting criteria.
- Monitor Contractor performance (see Section 2.2.3 below).

2.2.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Documentation of government and land owner approval for each construction material site before initiating any borrow/removal activities, that compensation has been mutually agreed upon and paid, and that appropriate sediment and erosion control measures are in place
- The number and location of each active construction material source and the amount of material removed from each site during the past month
- The impacts associated with each construction material source, including any forest clearing or exceptions to the siting criteria listed in Section 2.2.3
- The total area of unrestored disturbed land
- Number and location of each closed construction material source
- Number of grievances filed related to any construction material sources and their resolution

2.3 Air Quality Management Plan

2.3.1 Purpose

The purpose of the Air Quality Management Plan (AQMP) is to minimize the degradation of ambient air quality and the risk to local residents and workers health from project construction activities, and to ensure that the Project complies with Nepal's air quality regulations and the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management) and Environmental, Health, and Safety General Guidelines on air emission and ambient air quality requirements (World Bank, April 30, 2007, Section 1.1).

2.3.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to air quality:

- Fugitive dust from disturbed soils
- Fugitive dust from project crushers and batching plants
- Emissions from project power plants
- Emissions from project vehicles and equipment

2.3.3 Contractor Minimum Requirements

The Contractor shall prepare an **Air Quality Management Plan** to control dust resulting from construction-related activities, such as excavation, drilling, blasting, use of heavy equipment, quarry sites, crushing and concrete batching plants, earthworks, embankment and channel construction, haulage of materials, and construction of workers' camps, prior to the start of project construction activities. The Plan shall include at least the following minimum requirements:

- Dust and particulate material emissions shall be minimized at all times to avoid impacts on surrounding communities, and especially on vulnerable people (e.g., children, the elderly, and residents with respiratory health issues).
- Phased removal of vegetation shall be practiced to prevent large areas from becoming exposed to wind.
- Provide progressive stabilization and restoration of disturbed areas (e.g., stabilize a completed area before disturbing a new area). All disturbed areas will be stabilized and restored, either for agricultural reuse or planted with fast growing vegetation, and properly maintained in order to establish a vegetative cover.
- Prohibit burning and open fires – the Contractor will be prohibited from burning cleared vegetation and solid waste, as well using as wood as cooking fuel in the camps.
- Surface clearing activities shall be restricted to the project footprint.
- Batching plant, crushers, and power plants shall be sited downwind and as far as possible (minimum 500 m) from any local resident houses and worker housing.
- Batching plants and crushers shall use a high-efficiency dust suppression/control system and be enclosed within 3 m high barriers to minimize the spread of dust.
- Unloading from cement delivery trucks shall be done on pallets, which shall be covered with tarpaulin sheets during non-working periods.
- Vehicle speed shall be restricted to 30 kilometers per hour (km/hr) at the site, including the project access road and service roads, to minimize the potential for dust generation in the surroundings.
- Paved roads shall be cleaned and unpaved roads shall be stabilized to reduce offsite tracking of soils and to avoid dust generation.
- Diesel generators for power supply shall be optimally operated and regularly maintained to ensure that the emissions from fuel combustion remain at design levels.
- Provide alternative fuel for heating and cooking to avoid the use of forest related products.
- Machinery shall be turned off when not in use.
- Dust screens shall be placed around construction areas when in proximity to villages.

- The spraying of water shall be carried out as needed on dirt roads, disturbed areas, and soil stockpiles. The water spray operation shall be carried out at least thrice a day on dry and windy days. The frequency of water spraying near local communities shall be increased as needed.
- Access roads shall be paved with gravel in the sections that are located in close proximity to communities and other sensitive receptors to reduce the generation of fugitive dust.
- Construction equipment/vehicles that generate significant air pollution (above the applicable limit) and those that are poorly maintained shall not be allowed on site.
- Trucks transporting powder materials, such as cement, sand, and lime, shall be covered entirely with clean impervious sheeting to ensure that the powder is not released from the vehicle. Overflow of material shall be avoided.
- All the stockpiled materials shall be kept in an enclosure or covered with impervious sheeting to reduce dust emissions.
- Construction equipment with idling control technologies shall be used.
-
- Regular (monthly) maintenance of all vehicles in accordance with manufacturer specifications shall be undertaken mandatorily.

2.3.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Air Quality Management Plan.
- Monitor Contractor performance (see Section 2.3.5 below).

2.3.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Diesel fuel consumed on a monthly basis for both diesel gen sets and vehicles
- Monitor ambient air quality (sOx, nOx, TSP, $PM_{10,}$ $PM_{2.5}$) on a quarterly basis and, if necessary, more frequently in the villages of Rukma, Namase, Hema, and Sibrun and report relative to Nepali and WB standards
- Visual observation of fugitive dust from the crusher and batch plant on a daily basis during the dry season
- Number of grievances filed related to air quality and their resolution

2.4 Water Quality Management Plan

2.4.1 Purpose

The purpose of the Water Quality Management Plan (WQMP) is to minimize risk to surface and groundwater quality from project construction activities, and to ensure that the Project complies with Nepal's water quality regulations and the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management) and Environmental, Health, and Safety General Guidelines wastewater and ambient water quality requirements (World Bank, April 30, 2007, Section 1.3).

2.4.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to water quality:

- Domestic wastewater
- Industrial stormwater runoff from the batching plant, quarry, crusher, spoil disposal areas, workers' camps, parking areas, fabrication shops, maintenance yards, and fuel depot
- Groundwater seepage from the tunnel portals

The water quality risks and impacts associated with hazardous materials are discussed in Section 2.5. The water quality risks and impacts associated with soil erosion are discussed in Section 2.9.

2.4.3 Contractor Minimum Requirements

The Contractor shall prepare a **Water Quality Management Plan**. The Contractor shall be fully responsible for any contamination to the existing water quality within the project site. This plan shall include at least the following minimum requirements.

Domestic Wastewater

- Prohibit any open defecation and any washing, bathing, or urinating in any water courses or springs.
- Provide a sufficient number of toilets facilities (separate toilets for men and women, typical standard is 1 toilet per 15 workers) at each work site. Regularly clean out these toilets and dispose of waste at the wastewater treatment facility described below.
- Prohibit the discharge of any untreated wastewater to any receiving waterbody.
- Provide a wastewater treatment facility (e.g., a package wastewater treatment plant) at each workers' camps to treat domestic wastewater prior to discharge to a receiving water. The wastewater treatment facility will provide secondary treatment and ensure, through regular/frequent monitoring that the effluent meets Nepal's water quality standards and the World Bank EHS guidelines, whichever are stricter.

Industrial Stormwater Runoff

- Batch plants
  - Concrete mixing shall take place on impermeable surfaces or compacted soil.
  - In case of spillage of the concrete mix, the area shall be cleaned immediately. The waste shall be collected and deposited in approved sites. Placing these mixtures in water courses is prohibited.
  - All stormwater runoff from the batching plant shall be directed to a stormwater pond to allow the settling of any suspended material and the pH tested to ensure it is between 6.5–8.5 pH units before discharge to a watercourse.
  - Unused cement bags shall be stored in a weather-proof area where they will not be impacted by rain. Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent windblown cement dust and water contamination. The bags shall not be used for any other purpose and shall be disposed of on a regular basis in accordance with the Waste Management Plan.
  - All excess concrete shall be removed from site on completion of concrete works and disposed of in accordance with the Waste Management Plan. Washing of the excess concrete onto the ground or into watercourses is prohibited.
- Other industrial stormwater runoff
  - All stormwater from the quarry, crusher site, spoil disposal areas, and workers' camps shall be directed to a stormwater pond to allow for the settling of any suspended material before discharge to a watercourse.

- All stormwater runoff from fabrication shops, maintenance yards, parking areas, and the fuel depot shall pass through an oil-water separator before discharge into a watercourse.

Groundwater Seepage from Tunnels and Spoil Disposal Areas

- All groundwater seepage from the tunnel portals and from spoil disposal areas shall be directed to a stormwater pond to allow the settling of any suspended material before discharge to a watercourse.

Stormwater Pond Maintenance

- All stormwater ponds shall be routinely maintained and cleaned out, with any deposited sediments disposed of in an approved upland location.

2.4.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of Water Quality Management Plan.
- Monitor Contractor performance (see Section 2.4.5 below) and ensure water quality-related grievances are addressed by the Contractor in a timely manner and measures put in place to prevent future similar grievances.

2.4.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Wastewater treatment plant effluent volume and quality (i.e., fecal coliforms, dissolved oxygen, biological oxygen demand [BOD], pH, phosphorus as phosphate, total suspended solids, total oil and grease, and other parameters required by the Government of Nepal) from each treatment plant on a monthly basis
- Number of grievances filed related to water quality and their resolution
- Water quality in the Arun River at the proposed access road bridge on a monthly basis

2.5 Hazardous Materials Management Plan

2.5.1 Purpose

The purpose of the Hazardous Materials Management Plan (HMMP) is to minimize risk to the environment and public safety relating to the transport, storage, handling, use, leaks, and spills of hazardous materials (e.g., diesel fuel, other petrochemicals, paints, solvents, oils, grease, herbicides, pesticides), and to ensure that the Project complies with the hazardous materials management requirements of the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management) and Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 1.5).

2.5.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to hazardous materials:

- Health effects from hazardous material exposure
- Accidental spillage or leakage into the river or local streams used for potable and irrigation
- Contamination to ground water seeps/springs

2.5.3 Contractor Minimum Requirements

The Contractor shall prepare a **Hazardous Materials Management Plan**. This plan shall include at least the following minimum requirements.

Transport, Storage, Handling and Use of Hazardous Materials

The Contractor shall provide a method statement detailing the hazardous materials that will be used during construction, as well as the transport, storage, handling, and use procedures and requirements for each hazardous material.

- Use an approved transport company for transporting hazardous materials to the project site. Trucks shall have appropriate safety measures in place, including use of safety placards or other indication of the material being transported, carry spill response materials on the vehicle, and have emergency contact information in place. The transport company shall have a spill prevention and response plan in place. Drivers shall receive training in safe driving techniques and procedures to be followed in the event of an accident or spill.
- Maintain an inventory of all hazardous materials stored on site. A Material Safety Data Sheet (MSDS) shall be available at the construction office for each hazardous material.
- Locate hazardous material/waste storage facilities at least 50 m from any perennial stream or intermittent stream channel.
- All hazardous material/substances shall be stored on site in a manufacturer recommended container, within a covered or enclosed structure, with an impervious liner (e.g., concrete pad or plastic liner), that is secure (e.g., fenced, locked, and/or with security guard and restricted entry), and with appropriate secondary containment sufficient to store the volume of the largest hazardous material container.
- No underground storage tanks are allowed.
- Hazard signs indicating the nature of the stored materials (MSDS) shall be displayed on the storage facility or containment structure and kept on file at the site office.
- Provide spill kits at all work areas where hazardous materials are used and in all vehicles transporting hazardous materials, and ensure staff are trained in their effective use.
- Provide dry chemical or other type of fire extinguishers suitable for the type of hazardous material stored on-site.
- During servicing/repair of equipment or vehicles, a suitable drip tray shall be used to prevent oil/grease spills onto the soil, especially in case of emergency repairs.
- Leaking equipment shall be repaired immediately or removed from the site to facilitate repair. Check storage tanks and vehicles for leaks on at least a weekly basis.
- Empty fuel or oil drums shall not be stored on site.

Spill Prevention and Response Plan

The Contractors shall each prepare a Spill Prevention and Response Plan describing the methods that will be used to prevent and respond to hazardous material spills. The “Prevention” part of the plan shall include the measures listed above relative to hazardous material transport, storage, handling, and use. The “Response” part of the plan shall include at least the following measures:

- The person who identifies the leakage/spillage shall immediately check if anyone is injured and then inform the Contractor’s ESHS office.
- The Contractor shall ensure that all injured persons, if any, are treated and assess the nature of the substance that has spilled/leaked.

- If the accident/incident generates serious environmental pollution risks, with the potential of resulting in serious environmental pollution problems (e.g., spillage/leakage of hazardous materials, large scale spillage/leakage, or spillage/leakage into the nearby water bodies which are used for irrigation/potable water) or health hazard to workers or the public, the Contractor shall immediately notify UAHEL.
- The Contractor shall take immediate action to stop the spillage/leakage and divert the spilled/leaked liquid to a nearby non-sensitive area.
- The Contractor shall arrange maintenance staff with appropriate protective clothing to clean up the spilled material. This may be achieved through covering the area with sawdust (if the quantity of spillage/leakage is small), or sand bags (if the quantity is large), and/or using a shovel to remove the topsoil (if the spillage/leakage occurs on bare ground. Spilled hazardous materials must not be flushed to local surface drainage systems. Instead, government approved clean-up and disposal procedures shall be carried out.
- Depending on the nature and extent of the spill, evacuation of the area may be necessary. The Spill Response Plan shall include procedures, communication protocols, and approval protocols to address this.
- Ensure that transformers oils do not include polychlorinated biphenyls (PCBs) and that measures are in place to contain these oils in the event of any transformer leak or failure.
- The Contractor shall prepare a report with root cause analysis for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective and preventative actions. The incident report shall be submitted to UAHEL for review and comment and shall be maintained in the records.
- Workers shall receive training and conduct periodic exercises so that they understand the emergency response procedures in the event of a spill or leak.

2.5.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Hazardous Materials Management Plan.
- Monitor Contractor performance (see Section 2.5.5 below).
- Review Contractor's Incident Report and Root Cause Analysis.

2.5.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Inventory of all hazardous materials used or stored at the site for the Project
- Number and volume of accidental spills and leaks and their resolution

2.6 Waste Management Plan

2.6.1 Purpose

The purpose of the Waste Management Plan (WMP) is to minimize risk to the environment and public safety relating to the storage, transport, and disposal of solid and hazardous wastes, and to ensure that the Project complies with the waste management requirements of the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management), and the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 1.6).

2.6.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to waste:

- Soil and water contamination from improper waste management and disposal
- Litter from domestic solid wastes and construction debris
- Attract rodents and pests
- Worker and community health

2.6.3 Contractor Minimum Requirements

The Contractor shall prepare a **Waste Management Plan**. This plan shall include at least the following minimum requirements:

- Establish a management system to ensure proper collection, segregation, and disposal of solid, construction, medical, and hazardous wastes so that there is no contaminated surface runoff or public health issues associated with the waste and the waste is appropriately disposed of.
- Develop and implement a worker and community awareness training program to ensure that these groups are aware of potential risks associated with different types of waste materials, safety precautions that should be applied, and notification procedures in the case of any leaks, spillage, or other emergencies.

Solid Waste Management

- The Contractor shall ensure that all facilities are maintained in a neat and tidy condition and no litter or dumping shall be allowed within the project area or by project employees.
- Measures shall be taken to reduce the potential for litter and negligent behavior with regard to the disposal of all refuse. At all places of work, the Contractor shall provide litter bins, containers, and refuse collection facilities for later disposal.
- The Contractor shall separate construction waste from domestic waste.
- Solid waste may be temporarily stored on site in a designated area. The storage area shall have a cover to avoid direct contact with precipitation, a berm to avoid direct contact with surface runoff, and a fence to prevent wind-blown litter. Waste storage containers shall be covered, tip-proof, weatherproof, and scavenger proof, and shall not attract wildlife.
- The Contractor shall identify and demarcate disposal areas clearly indicating the specific materials that can be deposited in each waste container. Waste containers shall be strategically placed in visible locations easily identified and marked. For example, recycle, organic waste, unusable waste, hazardous waste, paper, glass, etc.
- Recyclable materials (e.g., wooden plates for trench works, steel, scaffolding material, site holding, packaging material, paper, empty cement bags and containers, glass, wood, junk), shall be collected and separated on-site from other waste. Collected recyclable material shall be re-used or sold to a waste collector for recycling.
- Employees shall be educated on the segregation of waste with bins demarcated for recyclables and perishables placed in common and work areas.

Disposal of Solid Waste

- The contractor shall identify a suitable location for the sanitary landfill site in the project area and take approval from the UAHEL for the use of the proposed site. The proposed sanitary landfill site must comply with national and international standards.
- Burning solid waste in open air conditions shall be strictly prohibited.
- Solid waste shall not be buried within fill or backfill areas.

Disposal of Construction Waste

The Contractor shall carry out the following activities:

- The disposal of construction debris shall be carried out only at sites previously identified and approved by UAHEL.
- Debris generated due to the dismantling of existing structures shall be suitably reused by the Project or provided for reuse to local residents.
- The Contractor is responsible for arranging transportation and disposal of all construction waste, including dismantling and clearing debris.
- Once the work is completed, all construction-generated debris shall be removed from the site.

Management and Disposal of Hazardous/Medical Waste

The Contractor shall carry out the following activities:

- All hazardous/medical waste (e.g., bitumen, and waste oils, grease, solvents, acids and alkalis, paint, used needles, blood stained materials) shall be properly stored, handled, and disposed of or recycled in accordance with the environmental standards, regulations and management policies of Nepal and the producers of the material. Spent lead acid batteries shall be stored as hazardous waste until they can be shipped to a battery recycling facility.
- Only appropriately trained and authorized personnel shall handle hazardous/medical waste.
- Hazardous/medical waste shall be stored separately from other waste in a secure facility removed from active work areas with posted warning signs. Storage facilities shall meet the same siting and design requirements for hazardous materials, as described in Section 2.5.3, including a cover facility, impervious floor, secondary containment, and a berm to prevent contact with surface runoff, and appropriate placards.
- Under no circumstances shall the spoiling of tar, bituminous products, or any other hazardous waste be allowed on the site, over embankments, in borrow pits or any burying, in water bodies, on agricultural land, or in sensitive areas.
- Unused or rejected tar or bituminous products shall be returned to the supplier’s production plant.
- Used oil, lubricants, cleaning materials, and other similar wastes from the maintenance of vehicles and machinery shall be collected in holding tanks and sent back to the supplier or removed from site by a specialist oil recycling company for disposal at an approved hazardous waste site.
- The transportation of hazardous/medical waste off the site shall be done in cooperation with an approved and authorized waste transport company.

2.6.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Waste Management Plan.
- Ensure waste-related grievances are addressed by the Contractor in a timely manner and measures put in place to prevent future similar grievances.
- Monitor Contractor performance (see Section 2.6.5).

2.6.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number of grievances filed related to waste management and their resolution
- Volume of waste generated broken down by solid waste, recyclables, construction waste, and hazardous waste
- Volume of various types of waste transported off-site for ultimate disposal and location of disposal sites

2.7 Noise and Vibration Management Plan

2.7.1 Purpose

The purpose of the Noise and Vibration Management Plan (NVMP) is to minimize the impacts of construction noise and vibration on local residents and wildlife, and to ensure that the Project complies with the noise requirements of the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management), and the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 1.7).

2.7.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to noise and vibration:

- Noise pollution from crushers, batch plants, camps/generators, explosives, blasting, construction vehicles and helicopters
- Health effects for people and the disturbance of livestock and wildlife from loud noises
- Vibration impacts on residences and community structures/roads
- Vibration impacts on landslide prone areas and unstable slopes
- Community fear and anxiety regarding the potential for landslides

2.7.3 Contractor Minimum Requirements

The Contractor shall prepare a **Noise and Vibration Management Plan**. This plan shall include at least the following minimum requirements.

Noise Requirements

To minimize noise within the construction site, the Contractor shall:

- Prohibit aboveground noise-generating construction activities at night (20:00–5:00 hour). Pile driving will only be undertaken during daylight hours.

- Provide regular maintenance of equipment and vehicles in accordance with the manufacturer's specifications and lowest noise levels possible.
- Use properly designed silencers, mufflers, acoustically dampened panels/noise barriers and acoustic sheds or shields. Mufflers and other noise control devices shall be repaired or replaced if defective.
- All hydropower diesel power plants shall be placed within an acoustic enclosure to reduce impacts on workers at the camps and nearby residences, specifically the workers' camps near the villages of Sibrun, Hema/Namase, and Rukma.
- Install noise barriers (walls, berms or acoustic panels) between the workers' camps and the villages of Sibrun and Rukma.
- Equipment known to emit a strong noise in one direction shall be oriented to direct noise away from noise sensitive receivers.
- Machines and equipment that may be in intermittent use shall be shut down between work periods or throttled down to a minimum.
- Install noise barriers (berms or fences) or shields between the noise source and nearby receptors, especially for noisy sources such as the crusher, batching plants, and generators. This is specifically required near the schools in Sibrun and Namase.
- Construct a new basic school in Rukma on a site agreed upon with the village that is at least about 500 m from the nearest hydropower noise source.
- Provide rubber paddings and/or noise isolators at equipment/machinery for construction to reduce noise and vibration.
- Restrict vehicle speeds to 30 kilometers per hour (km/hr) at site, including the project access road and service roads, and use of horns will be prohibited at night and in villages except for emergencies.
- Keep the noise level of vehicular audible warning devices to the minimum necessary for the health and safety of employees.
- Notify nearby households of expected helicopter activity and the use of explosives and implosives.
- Limit the use of helicopters and aboveground/portal entrance explosives and implosives to daylight hours.
- Equip the Contractor's ESHS Team with portable noise monitors to be able to verify noise levels at the sensitive receptors.
- Avoid the disruption of festivals, community rituals, and gatherings, in consultation with communities, including by temporarily halting the disposal of spoil in the Spoil Disposal Areas #2, #3 and #4 across the river from Barun Bazar during the Barun Mela (see Section 7.3.15 in the ESIA).
- Conduct noise monitoring in the villages of Rukma, Namase, Hema, Sibrun, Jijinkha, and Chongrak, and especially at the Sibrun, Namase, and Rukma schools, to confirm that noise levels are in compliance with WB criteria. If monitoring indicates that noise levels are exceeding WB criteria, then the Contractor will provide adaptive management measures to bring noise levels into conformance with WB criteria.

Helicopter and Explosives Noise Management

- Limit helicopter and above-ground explosive use to daytime hours.
- Notify households within 500 m of helicopter landing pads and blasting sites at least an hour ahead of time of planned helicopter or explosive use.
- Prohibit helicopters from landing or hovering within 250 meters of any structures.

Vibration Management

To manage vibration-related impacts, the Contractor will implement the following measures:

- Conduct a physical inspection of all structures that could be potentially affected by construction related vibration (e.g., from blasting or heavy truck traffic) to document the condition of the structures using photography or video. This shall include structures within 25 m from heavy truck traffic (i.e., along the project transportation corridor and access road), 100 m from active construction sites, and 250 m from any blasting (including the quarry, road tunnel portals, and other locations where aboveground or below ground blasting will be used).
- Conduct awareness/educational campaign regarding sources of noise and vibration and proposed mitigation measures.
- Provide prior notification of use of explosives and helicopters.
- Promptly investigate any claims of damage from construction activities.
- Provide compensation at repair or replacement value for any damage caused by project-related construction activities in accordance with GRM procedures.
- The Contractor is responsible for any damage caused by construction activities.

2.7.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Noise and Vibration Management Plan.
- Ensure the Contractor completes the physical inspection of structures potentially affected by constructed related vibration before the initiation of construction activities.
- Ensure that noise and vibration-related grievances are addressed by the Contractor in a timely manner and measures put in place to prevent future similar grievances.
- Monitor Contractor performance (see Section 2.7.5 below).

2.7.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Conduct noise monitoring in the villages of Rukma, Namase, Hema, Sibrun, Jijinkha, and Chongrak to confirm that noise levels are in compliance with the WB criteria on a monthly basis and whenever work activities in the vicinity increase. If monitoring indicates that noise levels are exceeding the WB criteria, then the Contractor will apply additional mitigation to reduce noise levels to within the WB criteria.
- Number of grievances filed related to noise and vibration and their resolution

2.8 Muck and Spoil Management Plan

2.8.1 Purpose

The purpose of the Muck and Spoil Management Plan is to minimize risk to the environment and public safety relating to the handling, categorization, transport, and disposal of mucks and spoil to ensure that the Project complies with the waste management requirements of the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management) and the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 1.6 – Waste Management).

2.8.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to muck and spoil:

- Geotechnical stability of the spoil disposal areas
- Careless disposal of construction spoil (unwanted soil and rock)
- Potential for erosion and sedimentation and other impacts on water quality
- Impacts on forest and natural habitat
- Impacts on agricultural land

2.8.3 Contractor Minimum Requirements

The Contractor shall prepare a **Muck and Spoil Management Plan**. This plan shall include at least the following minimum requirements:

- Balance earthwork to the extent possible to minimize spoil disposal requirements.
- Spoil shall be used, rather than treated as a waste, to the extent possible (e.g., use as aggregate for concrete, as base material for road construction, and backfilling of quarries and borrow pits).
- Test the pH of the water in the settling basins and add neutralizing material (e.g., lime) if there is any evidence of acidic conditions, which can promote the mobilization of metals.
- Spoil and muck shall be placed only in designated and approved spoil disposal areas.
- Ensure the geotechnical design of the Spoil Disposal Areas #1 and #2 take into account the environmental, social, and financial risks associated with slope failure related to these facilities.
- Ensure Spoil Disposal Areas #3 and #4 are designed with measures to protect the integrity of the facilities from Arun River monsoon flows.
- Properly manage uphill drainage in the design of the spoil disposal facilities.
- Provide properly designed gabions/retaining walls for all spoil disposal sites.
- Provide stormwater ponds/settling ponds below all spoil disposal areas to allow for the settling of sediments before discharge to a waterbody.
- Provide immediate maintenance and corrective action as needed.
- The disposal sites shall be fully rehabilitated as soon as the disposal operation is completed. The rehabilitation shall include a complete cover of the site with native soil and fully landscaped/vegetated. The stability of the disposal areas shall be inspected on a regular basis.
    - Restore vegetative cover over Spoil Disposal Area #1 and #2 as soon as possible to reduce their contribution to visual impact on Chepuwa Khola waterfall and Arun Gorge area, respectively.
    - Provide enhanced vegetative cover over Spoil Disposal Areas #3 and #4 to reduce their visual impact on Barun Bazar/Mela site.

2.8.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Muck and Spoils Management Plan.
- Monitor Contractor performance (see Section 2.8.5 below) and ensure muck and spoil-related grievances are addressed by the Contractor in a timely manner and measures put in place to prevent future similar grievances.

- Ensure that the Owner's Engineer closely monitors the construction of the spoil disposal areas, as per the engineering design, as a failure of these facilities will result in significant environmental and social impacts and pose risks to community health.
- Conduct regular monitoring and inspection of the spoil disposal areas, especially for the first five years after construction and after each monsoon season.

2.8.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Volume of spoil placed in each spoil disposal area
- Volume of spoil reused for other purposes
- Water quality of seepage leaving all settling basins (i.e. all drainage from spoil disposal areas)

2.9 Soil Erosion and Sediment Control Management Plan

2.9.1 Purpose

The purpose of the Soil Erosion and Sediment Control Management Plan is to minimize erosion and sediment impacts, with special provisions for controlling all disturbed areas during the monsoon season, to ensure that the Project complies with the soil erosion requirements of the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 4.1 – Soil Erosion).

2.9.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to soil erosion and sediment:

- Loss of top soil from erosion and landslides
- Landslides causes property damage, injury, and death
- Slope instability risk and disruption of transportation routes
- Sediment deposition, pollutant discharge and debris flows into the waterbody affecting water quality and aquatic habitat and biota.

2.9.3 Contractor Minimum Requirements

The Contractor shall prepare a **Soil Erosion and Sediment Control Management Plan**. This plan shall include at least the following minimum requirements.

Risk Assessment

- Conduct a risk assessment for each segment of the access and service road taking into consideration location (e.g., downslope land uses), ground conditions, terrain, and the nature of construction activities, and implement appropriate precautions and mitigation measures.

Clearing

- The Contractor shall not clear or disturb any land beyond that required for near-term construction and/or identified for clearing in the approved Grading Plan. Clearing shall be done so that it keeps just ahead of construction and does not leave disturbed areas unprotected from erosive forces such as rain or drainage.
- The Contractor shall establish clearing limits in the field using flagging, temporary fencing, or other means, so personnel know where to stop clearing vegetation. Sensitive environmental areas (e.g.,

community or government forest, extremely steep slopes) shall have signs denoting that this is a no clearing area.

- Removal of vegetation shall be avoided, to the extent possible, on exceedingly steep terrain, landslide prone areas, and ecologically sensitive areas.
- Limit clearing within the right-of-way (RoW) to only those trees approved by the Division Forest Office as necessary for construction and operation of the transmission line, ensuring the government's minimum required conductor clearance to trees of 3 m. The tree stump and root systems, smaller understory trees, shrubs, and the herbaceous layer will be left intact to protect and stabilize the soil from erosion.
- Limit clearing and grubbing to only those areas needed for immediate (i.e., within the next month) construction activities. Avoid clearing and grubbing of areas not required for construction activities within the next month.
- When clearing within 25 m of perennial streams, the Contractor shall use hand cutting or winching to remove timber.
- Herbicides shall not be used for clearing vegetation.
- Vegetation shall be removed in stages to retain topsoil as long as possible to prevent large areas from being eroded by wind and rain.
- Clearing shall be avoided to the extent possible during the monsoon season.
- All trees and plants deemed to have economic value to individuals or communities (for example, medicinal plants) shall be adequately compensated, according to the entitlements identified in the Resettlement Action Plan for the Project.
- Cleared vegetation shall not be burned, rather:
  - In community forests, trees shall be cut and deposited in accordance with the agreement with the community forest user groups.
  - Any cleared vegetation not wanted by the local residents shall be chipped, mulched, and stockpiled for use during site restoration.
  - Any invasive plant species found shall be segregated and disposed of as solid waste.
- The Contractor is responsible for all penalties, fines, and tree replanting requirements for clearing or disturbing any unapproved land.

Earthworks and Grading

Earthworks, grading (e.g., cut and fill), and spoil sites shall be carefully managed to minimize negative impacts on the environment through the following measures:

- The Contractor shall maintain stable cut and fill slopes at all times and cause the least possible disturbance to areas outside the prescribed limits of the construction works.
- All earthworks shall be properly controlled, especially during the rainy season.
- The Contractor shall complete cut and fill operations to final cross-sections at any one location as soon as possible and preferably in one continuous operation to avoid partially completed earthworks, especially during the rainy season.
- To protect any cut or fill slopes from erosion, in accordance with engineering drawings, cut-off drains and toe-drains shall be provided at the top and bottom of slopes and be planted with grass or other cover. Cut-off drains shall be provided above high cuts to minimize water runoff and slope erosion.
- Slope works and earth moving/excavation shall be conducted in order to minimize exposure of soil surface both in terms of area and duration.

- Temporary soil erosion control and slope protection works shall be carried out in sequence with the construction.
- During the cutting, backfilling, and levelling activities, the cut material with the best mechanical properties shall be used for backfilling.
- Any excavated cut or unsuitable material shall be disposed of in designated disposal areas as approved by the Project Engineer.
- Limit the size of individual blast charges to reduce the risk of triggering landslides.

Erosion and Sedimentation

Site activities shall be carefully managed in order to avoid soil erosion and sedimentation of downstream waterways that can impact aquatic ecosystems. Erosion and sedimentation shall be controlled during the construction of the Project by implementing the following mitigation measures:

- Silt fencing shall be provided around stockpiles at the construction sites close to river/tributaries/ and springs. The fencing needs to be provided prior to commencement of earthworks.
- The Contractor shall ensure the establishment of an appropriate drainage system in and around the spoil and muck disposal areas on-site.
- Muck disposal sites shall be provided with retaining walls and other engineering and biological control measures to mitigate erosion.
- The capacity/volume of the muck dumping sites shall be more than the volume of the muck to be disposed taking into consideration the swelling factor.
- Areas of the site that are not approved for construction activities shall be maintained in their existing conditions and shall remain untouched.
- The Contractor shall ensure that minimal ground area is disturbed during the construction phase. The Contractor shall ensure that the disturbed area is stabilized as quickly as possible, drainage is controlled, and the sediments are trapped onsite to prevent runoff.
- The Contractor shall erect erosion control barriers around the perimeter of cuts, disposal pits, and roadways.
- Strictly enforce the prohibition on side-casting or discharge to streams of any excavated material.
- All areas susceptible to erosion shall be protected by installing necessary temporary and permanent drainage works as soon as possible and by taking any measures necessary to prevent storm water from concentrating in streams and scouring slopes, banks, etc.
- Terraces and other erosion control measures shall be implemented, where necessary to prevent soil erosion.
- As a general rule, slopes exceeding 35 percent shall not be machine cleared (bulldozer).
- The Contractor shall preserve as much vegetation as possible as it is beneficial in the following areas:
  - Floodplains
  - Stream banks
  - Steep slopes
  - Other sensitive resource areas where it might be difficult to establish, install, or maintain erosion control devices
- The topsoil with its leaf litter and organic matter shall be conserved, stockpiled, covered or seeded with grasses/legumes to prevent erosion until needed, and then reapplied to disturbed areas to promote the re-establishment of local native vegetation.

- The Contractor shall add local, native grass seed and mulch to barren erosive soil areas or closed construction surfaces.
- The Contractor shall ensure that erosion control measures are implemented before the rainy season begins, preferably immediately before construction starts. Erosion control measures shall be installed at each construction site.
- Slope breakers such as silt fences, staked hay or straw bales, or sandbags shall be installed to reduce runoff velocity and divert water off the construction site.
- Slope breakers shall be installed on slopes greater than 5 percent, where the base of the slope is less than 15 m from water bodies, wetlands, and road crossings.
- The Contractor shall reduce water speed and volume by increasing the number of drainage culverts and selecting proper places for duct placement to avoid erosion effects.
- Retaining and gabion walls shall be built to prevent scouring of river banks at strategic locations, especially upstream of the river above the dam.
- The banks of the river, especially around the tailrace outlet, shall be protected using inlet control structures and proper protection works.
- Sediment control structures shall be installed where necessary to slow or redirect runoff and trap sediment until vegetation is established. These control structures include windrows of logging slash, rock berms, sediment catchment basins, straw bales, brush fences, silt fences, silt curtains, and fiber rolls, etc.
- Water flow through construction sites or disturbed areas shall be controlled with ditches, berms, check structures, live grass barriers, and rock liners.
- Ground surface at the site offices shall be paved in concrete, in order to minimize soil erosion.
- Until vegetation is successfully established, erosion control measures shall be maintained.
- Water shall be sprayed as needed on dirt roads, cuts, fill material and stockpiled soil to reduce wind-induced erosion.
- Larger changes in the landscape from quarries, tunnel spoil tips, etc., shall be landscaped and replanted, both to reduce erosion problems and to reduce the visual impact of the construction.
- Exposed soil and material stockpiles shall be protected against wind erosion and the location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors.
- All structures to control erosion and sedimentation shall be inspected routinely (monthly) to ensure that they are working properly.
- Traffic and movement over stabilized areas shall be restricted and controlled, and damage to stabilized areas shall be repaired and maintained as approved by the Project Engineer.
- Potential impacts/activation of landslides shall be monitored regularly.

Landslide and Slope Stabilization

To manage areas susceptible to landslides and any other construction disturbance to slopes greater than 30 degrees, at a minimum, the Plan shall include the following requirements:

- Carry out the pegging and flagging of landslide area boundary.
- Redirect or manage drainage both vertically and horizontally to avoid the release of concentrated flow to slopes greater than 30 degrees.
- Maintain slopes at less than the angle of repose, to the extent possible.
- Monitor slope stability in the vicinity of blasting, within increased monitoring during the monsoon season, and stop blasting if slopes are becoming unstable until a mitigation plan is approved.

- Protect steep slopes greater than 30 degrees through necessary civil structures such as breast wall, gabion structures, or concreting, as per the requirements of the site.
- Use bio-engineering techniques for long-term slope stabilization wherever possible.
- All disturbed surfaces shall be stabilized and none shall be left exposed.

2.9.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Soil Erosion and Sediment Control Management Plan.
- Monitor Contractor performance (see Section 2.9.5 below) and ensure erosion, sediment and landslide-related grievances are addressed by the Contractor in a timely manner and measures put in place to prevent future similar grievances.

2.9.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Status of implementation and maintenance of erosion and sediment control measures
- Number and location of slope failures
- Number of locations where sediment has escaped past control measures
- Number of grievances filed related to erosion and sedimentation and their resolution

2.10 Spring Management Plan

2.10.1 Purpose

The purpose of the Spring Management Plan is to minimize impacts on local spring on which local residents rely for their water supply, and to ensure that the Project complies with the ecosystem services requirements of the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management – Water Use).

2.10.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to springs:

- Changes in the volume of flow in the springs and streams
- Changes in the quality of the water in the springs and streams

2.10.3 Contractor Minimum Requirements

The Contractor shall prepare a **Spring Management Plan**. This plan shall include at least the following minimum requirements:

- Identification and flagging of the location of these springs to alert construction workers.
- Maintain a 50 m buffer to any springs or water courses to the extent possible.
- Monitor and document water yield and water quality in project-affected springs and streams before, during, and after construction to detect impacts.
- Extend or provide piping of springs or water supplies from upstream above any project construction activities to the point at which residents access water, so as to avoid any water quality impacts on community water sources.

- Use grouting and reinforced concrete as quickly as possible to minimize or eliminate groundwater seepage into the tunnels and caverns.
- If monitoring indicates the Project has resulted in a reduction of flow in a spring or stream to the extent that sufficient water is no longer available to meet community needs, the Contractor will:
  - Provide a permanent alternative source of water to the affected households or villages. The Project already proposes two permanent water treatment plants (one each in the powerhouse and headworks areas) with the capacity to meet local water demands, along with a water distribution system that extends from the headworks water treatment plant to Contractor's Camp #1 near Rukma, and from the powerhouse water treatment plant to Contractor's Camp #2 at the headrace tunnel adit near Hema. This water shall be provided at no cost to affected households.
  - Provide power to replace any reduction in micro-hydropower generation or mill operation, at no cost to the affected households.

2.10.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Spring Management Plan.
- Monitor Contractor performance (see Section 2.10.5 below) and ensure any spring-related grievances are addressed by the Contractor in a timely manner and measures put in place to prevent future similar grievances.

2.10.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Volume of flow and water quality in the springs and streams located within or downstream from the Project's area of disturbance before, during and after construction
- Number of grievances filed related to springs and community water sources and their resolution.

2.11 Site Restoration Management Plan

2.11.1 Purpose

The purpose of the Site Restoration Management Plan is to make sure that the project area is restored in a progressive manner to a similar condition to that prior to the commencement of the works, or to a condition agreed to with the land owner through grading/backfilling activities, soil replacement, revegetation, clean-up and best management practices.

2.11.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to site restoration:

- Failure to restore pre-construction conditions
- Unnecessary delays in stabilizing and restoring disturbed areas
- Failure to adequately stabilize and revegetate disturbed areas

2.11.3 Contractor Minimum Requirements

The Contractor shall prepare a **Site Restoration Management Plan**. This plan shall include at least the following minimum requirements:

- For temporarily disturbed areas that remain in private ownership (including agricultural lands), the land shall be restored to its original condition and use, unless otherwise agreed with the property owner and after consultation that is recorded in writing.
- For disturbed land acquired by the Project, but not required for project facilities, the land shall be stabilized and revegetated with adequate drainage.
- All disturbed lands shall be permanently stabilized as soon as construction activities are completed.
- Use bio-engineering measures at least along the access road as specified in the road design plans, and in other areas as appropriate.
- Revegetation shall start at the earliest opportunity and use appropriate local species of vegetation.
- No invasive or foreign vegetation shall be used for land stabilization or restoration.
- Appropriate grass or other erosion control material (such as jute) shall be planted on steep slopes to provide suitable vegetative cover and to minimize the risk of erosion.
- The Contractor shall use mulch, blankets, and mats, along with native grass seeds, in situations when disturbed soil is difficult to stabilize, such as bare or exposed soil, steep slopes, (generally steeper than 1:3), slopes where the erosion potential is high, disturbed areas where plants are slow to develop.

2.11.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Site Restoration Management Plan.
- Monitor Contractor performance (see Section 2.11.5 below) and ensure site restoration-related grievances are addressed by the Contractor in a timely manner and measures put in place to prevent future similar grievances.

2.11.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number of hectares vegetatively stabilized
- Number of hectares restored
- Number of hectares still disturbed
- Land handed back to owners

2.12 Blasting and Explosives Management Plan

2.12.1 Purpose

The purpose of the Blasting and Explosives Management Plan is to conduct the blasting process in a safe and sound manner. The plan also minimizes the risk to the environment and public safety relating to the transport, storage, and use of explosive materials; and ensures that the Project complies with the explosive management requirements of the Nepal Army and World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 1.5).

2.12.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to blasting and explosives:

- Use of explosives will generate noise and vibration which may startle or disturb nearby people, livestock, and wildlife
- Potential damage to structures from vibration
- Blasting techniques could result in some localized fracturing of rock, which could create a preferential groundwater flow path that could also reduce or eliminate flow in some springs and streams
- Accidental explosions and danger of explosives

2.12.3 Contractor Minimum Requirements

The Contractor shall prepare a **Blasting and Explosives Management Plan**. This plan shall include at least the following minimum requirements.

- The transportation, storage, processing, packaging on site, blasting and the disposal of the blasting material shall comply with the Nepalese regulations on the use of explosives.
- Before blasting is carried out, a detailed survey shall be conducted in the nearby villages to evaluate the degree of impacts that may be caused due to the blasting activity (e.g., possible damage to structures or infrastructure due to vibration, effects on animals, effects on local residents). The survey, which shall be conducted prior to the use of any explosives, shall include all structures located within 250 meters of the blasting location to verify condition of these structures. Compensation shall be provided by the Contractor for any structures reported to be damaged from blasting activities, to the extent that the structure survey did not find pre-existing damage.
- No above-ground blasting shall be allowed by the Contractor during night-time. Underground blasting for tunnel construction will be allowed as long, as it can be demonstrated that it will not disturb local residents.
- The Contractor shall take necessary precautions to prevent damage to special features in the surroundings (e.g., ecological, historical, or culturally important areas) and the general environment.
- Only qualified and authorized personnel shall handle explosives and manage the blasting process.
- The Contractor shall adopt optimized blasting techniques using delay detonators for blasting in confined areas (inside the tunnels).
- Prior to a surface blasting event (i.e., excluding underground blasting), water shall be sprayed on the surface of the blast area to increase its moisture content, and blasting mats (constructed from truck tires bolted together), wire mesh, gunny sacks, and/or sandbags shall be used on top of the blast area at each shot to prevent flying rocks and dust. Blasting shall not be carried out in adverse weather conditions. Spraying shall be conducted after the blast to control fugitive dust.
- The Contractor shall provide notification to any occupants of surrounding land at least one day prior to any surface blasting activity and shall address any concerns that they may have. The Contractor shall also issue a warning siren 20 minutes before the blast, again about 1 minute before the blast, and an “all clear” siren shortly after the blast, which can be heard up to approximately 1 kilometer from the surface blast site.
- The Contractor shall ensure that any unauthorized persons shall be located a safe distance (e.g., at least 250 meters) away from the blasting point. Before the detonation takes place, the Contractor shall check that there are no people inside the controlled area.
- The use of electric detonators shall be prohibited during thunderstorms.
- If there has been a failure in the blasting operation, only competent personnel may be allowed on site to do the work necessary to detonate the explosive, or completely redo the blasting.

- The quantity of blasting materials shall be carefully controlled according to the real situation requirements to avoid unnecessary breakage of rock mass.
- Explosives and detonators shall be of good quality and suitable for the blasting operation. Explosives with past expiration dates shall not be used.
- Explosives and detonators must be packed in closed boxes. Explosives damaged by handling or transportation shall not be used and shall be disposed of in accordance with established procedures and any national regulations.
- The boxes of explosives and blasting caps must be visibly labelled with signs indicating their contents and instructions on how to handle and dispose of them.
- The Contractor shall ensure proper stemming after charging of explosives. Proper stemming material (stone chips and drill cutting) will help in minimizing dust throw and, hence, lower spread of dust particles in ambient air or within tunnel or adits.
- The explosives storage building shall be a dry, well-ventilated facility located away from villages, buildings, roads, and high activity areas. It shall also have a metal door with a safety lock, lightning protection, and warning signs, and be under strict surveillance.
- The Contractor shall provide strict security and restricted entries in magazine area. It is currently understood that the Nepal Army is required to provide security for any explosives storage and use in Nepal.
- The Contractor shall provide a good firefighting system at the explosive storage area, if kept in a storage bunker on-site.
- Specific training on explosive handling and safety management shall be provided to the personnel appointed in magazine area.

2.12.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Blasting and Explosives Management Plan.
- Monitor Contractor performance (see Section 2.12.5 below) and ensure blasting and explosive-related grievances are addressed by the Contractor in a timely manner and measures put in place to prevent future similar grievances.

2.12.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number of detonations and amount of explosives used
- Number of grievances filed related to blasting and explosives and their resolution

2.13 Occupational Health and Safety Plan

2.13.1 Purpose

The purpose of the Occupational Health and Safety Plan (OHSP) is to implement all reasonably precautions to protect the health and safety of project workers, and to ensure that the Project complies with the occupational health and safety requirements of the World Bank's Environmental and Social Framework (ESS 2: Labor and Working Conditions), the World Bank's Environmental, Health, and Safety General Guidelines

(World Bank, April 30, 2007, Sections 2.0 and 4.2), as well as the Workers' Accommodation: Processes and Standards (IFC and EBRD 2009).

2.13.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to occupational health and safety:

- Workers are subjected to inadequate (including unsafe or unhealthy) living conditions
- Workers are subjected to inadequate (including unsafe or unhealthy) working conditions

2.13.3 Contractor Minimum Requirements

The Contractor shall prepare an **Occupational Health and Safety Plan**. This plan shall include at least the following minimum requirements to address matters regarding the health and well-being of workers during the construction phase:

- The OHS Management Plan shall reference and adopt an accepted international standard such as the American National Standards Institute (ANSI) A10, US Occupational Safety and Health Administration (OSHA), UK Health, Safety, Environment (HSE) Construction Code of Practice, or Australia/New Zealand OHS Standards, to be approved by UAHEL.
- OHS Plan shall have the following minimum structure:
  - Objectives
  - Policy and compliance with the law and other requirements
  - Applicable safety standards
  - Disciplinary policy
  - Rules and responsibilities for Contractors and employees
  - First aid, OHS services and personnel
  - Competent person
  - Hazard identification
  - Monitoring and reporting
  - Incidents reporting and investigation
  - Permission system for hazardous works
  - Alcohol and drugs policy/programs
  - Training
- The Contractor shall prepare a SEA/SH Action Plan as part of the tendering process. The plan should subsequently be available for inspection by the primary Contractor and the NEA to ensure that it is maintained and current. For Contractors already undertaking work at the project site, this requirement should be applied retrospectively as a matter of urgency.

Worker Health and Living Conditions

General requirements:

- Provide education and training to the workers on basic personal hygiene; the prevention of diseases, including respiratory diseases, water and food borne diseases such as diarrhea, and communicable diseases such as tuberculosis; and on HIV/AIDs symptoms, counselling, and treatment services.

- Implement an awareness program for workers and local communities on the prevention, detection, screening, and diagnosis of sexually transmitted diseases, especially with regard to HIV/AIDS. The program shall also include information on alcohol abuse, GBV, SEA, and human trafficking.
- The workers' camp facilities shall be autonomous, adequate for the number of workers in each camp, and not rely on local/public facilities for accommodation, healthcare, sanitation, cooking, recreation, and other infrastructure or services
- Workers' accommodation and living conditions shall meet at least the minimum requirements identified in the IFC/EBRD's Workers' Accommodation: Processes and Standards (IFC and EBRD 2009) and ILO (specifically Recommendation No.115), and report on how the benchmarks are defined and met against the requirements of the accommodation. These standards include building construction; housing; general health, safety, and security; fire safety; electricity, plumbing, water, and sanitation; general living facilities (e.g., drainage, heating, ventilation, and air conditioning [HVAC], water, wastewater, and solid waste); rooms/dormitory facilities (e.g., bed arrangement, storage facilities); sanitary and toilet facilities (e.g., toilet facilities, showers/bathrooms and other sanitary facilities); canteen, cooking, and laundry facilities; medical facilities; and leisure, social and telecommunication facilities. The Contractor shall provide basic hygiene supplies to all workers (e.g., soap, laundry detergent).
- Separate accommodation, toilets, and shower/bathroom facilities shall be provided for men and women. Notices shall be displayed outside each block of latrines and urinals, in the language understood by the majority of the workers stating "For Men Only" or "For Women Only", as the case may be. Such facilities shall be conveniently accessible and kept in a clean and hygienic condition. Latrines shall also be constructed in areas that are likely to be visited frequently by the construction workers. Latrines shall be located at a distance of at least 50 meters away from residential areas and watercourses. If septic tank systems are used for any residential labor camps, the seepage pits shall be located at a safe distance from water sources to avoid contaminating them. Wastewater shall not be disposed of into water bodies without treatment.
- Operation and maintenance – The Contractor is responsible for providing appropriate maintenance to ensure that these facilities comply with IFC/ERBD Worker Accommodation: Processes and Standards (IFC and EBRD 2009) throughout the construction period.
- Appropriate areas shall be designated for smoking. NO SMOKING signs shall be placed in areas where smoking is prohibited, for example, in the dormitories and medical facilities.

Workers' facilities for the hydropower component:

- Water – The Contractor shall supply water to each of the workers' camps without impacting on the water supply to nearby villages. Raw water will be tested and treated as necessary to meet Nepal's and the World Bank's potable water quality standards. Water lines shall be extended to serve major work areas.
- Wastewater – Each workers' camp will be served by a wastewater treatment facility approved by UAHEL and the WB, which shall be designed to meet Nepal and WB wastewater effluent standards and sized to meet the camp's wastewater flow.
- Cooking and meals–- Meals shall be nutritious and take into account ethnic, religious, and cultural differences of the workforce. The Contractor shall not purchase or serve to workers any fish caught in the Arun River or its tributaries or any wild/bush meat.
- Medical facilities – Each workers' camp will be served by a health post capable of treating all first aid cases and common sickness (e.g., flu), which will be staffed by a senior nurse. Each camp shall be supplied with appropriate facilities, beds, equipment, and basic laboratory facilities. At least one workers'

camp shall support a medical facility that will be designated for the treatment of more severe case, communicable diseases, and medical emergencies where patients can receive higher level care and/or be stabilized until they can be transported to district or provincial hospitals. This medical facility shall have at least one isolation room for infectious disease patients. This facility shall be staffed by at least one MBBS doctor, a senior nurse, health technicians, and a laboratory technician. The Contractor will also have an ambulance or appropriate motor vehicle to transport patients to a hospital and arrangements in place to allow for the helicopters to provide medical evacuation for urgent cases. All medical waste will be managed as hazardous waste, packaged in separate containers with appropriate placards and warning signage, in accordance with the Waste Management Plan (see Section 2.6).

- Recreation and leisure facilities – The Contractor shall provide adequate recreational facilities for its workforce, including multi-purpose leisure and recreation halls with television/video facilities, and indoor and outdoor facilities for exercise and sports. It shall have dedicated places for religious observance. The workers' camp will provide access to public phones/Internet facilities for free or at affordable rates that allows workers to interact with their families and friends.

Workers' facilities for the Access Road Contractor:

- Water – The Contractor shall supply water to each of the workers' camps without impacting on the water supply to nearby villages. Raw water will be tested and treated as necessary to meet Nepal's and the World Bank's potable water quality standards. Water lines shall be extended to serve major work areas.
- Wastewater – Each workers' camp will be served by a wastewater treatment facility (e.g., treatment plant or large septic system) approved by UAHEL and the WB, which shall be designed to meet Nepal and WB wastewater effluent standards and sized to meet the camp's wastewater flow.
- Cooking and meals – Meals shall be nutritious and take into account ethnic, religious, and cultural differences of the workforce. The Contractor shall not purchase or serve to workers any fish caught in the Arun River or its tributaries or any wild/bush meat.
- Medical facilities – Each workers' camp will have a separate clinic room headed by a nurse with adequate medical supplies, an ambulance ,and helicopter evacuation available in the case of emergency. The contractor must have an agreement with the nearest available hospital for the treatment of emergency cases.
- Recreation and leisure facilities – The Contractor shall provide adequate recreational opportunities for its workforce, including access to phones/Internet facilities for free or at affordable rates that allows workers to interact with their families and friends.

Workers' facilities for the Transmission Line Contractor

- Water – The work crews will either access water locally or transport water to the tower workers' camps.
- Wastewater – Each construction site will be served by a latrine. The latrine will be properly closed when each work crew leaves the site.
- Cooking and meals – No open fires will be allowed. Cooking will be with natural gas.
- Medical facilities – The contractor's camp will have a separate clinic room headed by nurse with adequate medical supplies and an ambulance.
- .

Worker Safety and Working Conditions

The Contractor is responsible for ensuring safe working conditions for its employees. The OHS Plan shall include the following elements:

- Describe potential health and safety hazards based upon the specific project works/activities.
- Describe the procedures and equipment which are technically appropriate to deal with such works/activities.
- Describe all major responsibilities and authorities relating to the implementation of the OHS Management Plan.
- Describe the specific project supervision methods (including audits, documentation and record-keeping, on-site monitoring and medical surveillance) to be implemented to ensure that the plan is completely and properly implemented.
- Describe the specific health and safety training that will be provided to any persons involved with the works and the minimum levels of training required.
- Describe the emergency response procedures that will be implemented.
- Describe the estimated cost, time schedule and assigned responsibility for implementing each component of the plan.

General requirements:

- Provide all personnel, including day laborers, with the proper personal protective equipment (PPE), such as safety boots, safety glasses, helmets, hearing protection, gloves, dust masks, and/or respirators, and enforce their use.
- Carry out health screening and fitness tests for all workers at the time of recruitment. This health screening shall be undertaken in keeping with the work profiles of the workers. The fitness test shall screen for communicable diseases and any health risks that may create issues in undertaking the task assigned. In addition to this, regular annual health check-ups shall be undertaken for all workers.
- Provide safety training, regular refresher training, and daily “tailgate” talks on safety issues. The Contractor shall maintain records for each employee to document the H&S training that they have received.
- Notify and provide training to all appropriate personnel of any changes to the OHS Plan per the Management of Change process.
- During heavy rains, accidents, or emergencies of any kind, all work aboveground shall be suspended.
- Underground work and electrical/mechanical equipment shall be braced to withstand seismic events during the construction.
- MSDSs shall be maintained for each hazardous material present on the worksite.

Special requirements:

- Workers working in the following situations shall receive specialized training H&S training:
    - Underground or confined spaces
    - Working at heights
    - Working with explosives
    - Working with hazardous materials

- Working in or over watercourses

- This specialized training shall ensure that workers are aware of the potential hazards of working in these areas, understand the safety precautions required, and understand the proper use of any specialized PPE.
- The Contractor is responsible for providing appropriate safety measures, including proper lighting and ventilation of underground works and monitoring of gases, stabilization of tunnels, and prevention of rock-fall.

2.13.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Occupational Health and Safety Plan.
- Monitor Contractor performance (see Section 2.13.5 below).

2.13.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number of near misses, visits to the Project's medical center by employees, lost time injury rate, and fatalities
- Number of staff receiving H&S training or refreshers
- Number of staff working who have not received H&S training
- Summary of worker grievances relating to occupational H&S
- Summary of status of accommodation facilities against the benchmarks

2.14 Community Health and Safety Management Plan

2.14.1 Purpose

The purpose of the Community Health and Safety Management Plan (CHSMP) is to implement all reasonable precautions to protect the health and safety of nearby communities and villages, and to ensure that the Project complies with the requirements of the World Bank's Environmental and Social Framework (ESS 4: Community Health and Safety), Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 3.0), as well as the World Bank's Guidance Note for Borrowers on ESS 4: Community Health and Safety (World Bank, June 2018).

2.14.2 Key Project Risks and Impacts

The following construction phase activities will have impacts on the community health determinants and parameters:

- Changes in the physical, biological, and social conditions may impact individual health status, especially vulnerable people such as the elderly, children, and people with pre-existing health conditions.
- Physical and economic displacement and social and economic shocks caused by dramatic and rapid changes taking place in local villages may affect the psychology and mental well-being of local residents.
- Potential introduction of communicable and infectious diseases (e.g., COVID-19) due to contact with migrant workers or increase in vector population
- Long-term presence of migrant labor may create social conflicts between workers and local communities as well as increase the rate of illicit behavior and crime such as SH/SEA.

- Potential conflicts between workers and local residents
- Increase in non-communicable diseases due to alteration in lifestyle and consumption pattern
- Introduction of vehicular traffic in an area unfamiliar with traffic safety measures
- Crowding of local health care facilities and potential shortage of medical supplies
- Unsafe or inappropriate use of explosives and hazardous materials
- Inappropriate use of force by security personnel in controlling access to construction areas and protecting the project workers, equipment, and facilities from vandalism, sabotage, and terrorism
- Sudden and rapid changes in water levels downstream from the powerhouse during peaking operations
- Potential for project-related emergencies (e.g., dam safety)

2.14.3 Contractor Minimum Requirements

The Contractor shall prepare a **Community Health and Safety Management Plan**. This plan shall include at least the following minimum requirements. Please note that the following community health and safety risks are covered in separate management plans:

- Water quality and wastewater treatment – see Water Quality Management Plan (Section 2.4)
- Transport of hazardous materials – see Hazardous Materials Management Plan (Section 2.5)
- Water availability – see Spring Management Plan (Section 2.10)
- Explosives – see Blasting and Explosives Management Plan (Section 2.12)
- Project demands on community infrastructure and services – see Occupational Health and Safety Plan (Section 2.13)
- Traffic safety – see Traffic Management Plan (Section 2.15)
- Security personnel – see Security Personnel Management Plan (Section 2.16)
- Emergency preparedness and response – see Emergency Preparedness and Response Plan (Section 2.21)
- Dam Safety – see Emergency Preparedness and Response Plan (Section 2.21).

Other Community Health-related Requirements

- To conduct mandatory health check-up of in-migrant workers to identify pre-existing contagious diseases before they come to the workers camps.
- Provide medical/health/first aid centers at each workers' camp so as to not place any additional burden on local health posts. Only workers with emergency conditions that exceed the capability of project medical facilities will use public facilities (i.e., hospitals in Khandbari and Kathmandu).
- The contractor will ensure the availability of condoms to the workers to minimize STDs.
- UAHEL will have a gender/GBV specialist to manage and coordinate gender/GBV and SEA/SH issues related to the project.
- Develop a communicable disease (e.g., COVID-19) management plan that describes safety precautions, requirements for worker testing before coming to the workers' camps and periodically thereafter, visitor testing requirements and safety requirements, and procedures to put in place in the event a worker tests positive for COVID-19 or another communicable disease.

Other Community Safety-related Requirements

- Provide community education and awareness training/seminars on project-related safety risks, including vehicular traffic, hazardous materials, construction equipment, explosives, helicopters, and security personnel and use of the grievance mechanism.
- Install safety fencing and warning signage to control public access at high risk areas, including the tunnel and cavern portals, quarry, power plants, headworks site, crusher and batching plants, and spoil disposal areas.
- Provide adequate night-time lighting around the Contractor workers' camps.
- Install a perimeter security fence around the Contractor workers' camps with guards to restrict public access.
- Restrict workers to workers' camps during night-time hours unless working a night shift. No worker access to villages during night-time hours.
- Adopt a policy on GBV, SEA, and trafficking in persons as per the SEA/SH Prevention and Response Action Plan and

2.14.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Community Health and Safety Management Plan.
- Community health-related actions:
  - Organize annual health camps in coordination with the District Health Office to check reproductive health.
  - Implement an awareness program regarding psychological stress due to land acquisition. The process will identify stressed individuals and refer them for counselling, if required.
- Community safety-related actions:
  - Project will request the concerned authority to establish police posts at appropriate location in the project area and deploy police personnel, including females, to these posts.
  - Set up an extended SEA/SH GRM at the project level, as a part of the overall UAHEP GRM, which will include a child-friendly procedure.
- Develop a specially constituted SEA/SH GRM Committee comprised of representatives of the client, community, rural municipality, and Contractor, that is also representative preferably of women. Develop a standard operating procedure (SOP) for the SEA/SH GRM Committee.
- A gender/GBV specialist will lead, support, and link/coordinate with the project GRM, extended SEA/SH GRM and contractors' GRM.
- Conduct awareness programs on SEA/SH for the local community and project workers.
- Monitor Contractor performance (see Section 2.14.5 below).

2.14.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number of workers receiving health screening for pre-existing communicable diseases, including COVID-19; number of workers testing positive for any communicable diseases
- Number of incidents where workers have required treatment at public medical facilities/hospitals

- Number of health and safety education and awareness training sessions provided
- Number of incidents of any trafficking in persons, GBV, or SEA by project employees
- Number of grievances filed by the community relating to interactions with project workers

2.15 Traffic Management Plan

2.15.1 Purpose

The purpose of the Traffic Management Plan (TMP) is to minimize the risk of traffic accidents and resulting injuries and fatalities to both workers and the public, as well as wildlife, to maintain safe and continuous pedestrian access to community facilities, and to ensure that the Project complies with the traffic safety requirements of the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 3.4) as well as the World Bank's Good Practice Note on Road Safety (World Bank, October 2019).

2.15.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to traffic:

- Vehicular traffic accidents and wildlife strikes
- Speeding of vehicles
- Interruption of local resident access to community facilities, non-timber forest products, and other community services

2.15.3 Contractor Minimum Requirements

The Contractor shall prepare a **Traffic Management Plan**. This plan will apply to all project-contracted vehicular traffic and all vehicle-accessible areas in construction sites, laydown and storage areas, labor camps, the project access road, and service roads. They will be applicable for the entire duration of each Contractor's activities, from preparatory work to closure and site handover. The plans will cover motorized vehicles, parking, and pedestrian movement. This plan shall include at least the following minimum requirements.

The Contractor shall:

- Incorporate the following into the final project access road design:
  - Ensure pavement markings and signs are to standards for reflectivity.
  - Use edge and center-lines to provide clear guidance.
  - Ensure signs are legible for the speed; position to maximize reflectivity; and clearly provide information and appropriate identify all hazards.
  - Use edge marker posts to provide clear guidance as to the direction ahead.
  - Use raised reflective pavement markers.
  - Provide lighting as needed where the project access road passes through villages.
- Ensure all project-related vehicles comply with designated speed limits:
  - Vehicles moving within the construction site shall be limited to 20 km/hr.
  - Contractors vehicles travelling along the Koshi Highway shall be limited to 30 km/hr or the posted speed limit.
  - Vehicles shall have GPS trackers installed.
  - Incorporate penalties in transport subcontracts for non-compliance with vehicle speed limits.
- Provide appropriate signage and safety measures:

  - The Contractor will provide speed bumps and caution signage at each entrance to a village along the project access road (i.e., Sibrun, Hema, Namase, and Rukma) to alert drivers that they are entering a residential area and near identified wildlife crossings (see Appendix C – ESMP, Annex C3 – Biodiversity Management Plan).
  - The Contractor will provide directional signage around the construction areas to facilitate traffic movement.

- Provide driver-safety training:
  - The Contractor shall ensure that all drivers of project vehicles as well as suppliers and their delivery drivers are aware of procedures and restrictions (e.g., restricted areas) while driving through project roads. All project-contracted drivers will participate in driver training.
- Provide vehicular traffic safety education and awareness training, at the completion of project access road construction, for drivers, and community members on a regular basis, especially for school children.
- Prepare a Pedestrian Plan for the project area to enable residents to walk between villages and for students to have safe access to schools, including:
  - Provide continuous safe access to the pedestrian bridge across the Arun River near Chongrak.
  - Designate and construct as needed a continuous and safe walking path from the Chongrak pedestrian bridge to the Rukma-Chepuwa pedestrian bridge and on to the village of Chepuwa. Where portions of the existing path system are impacted by project activities, construct an alternative path in consultation with the local village.
  - Provide alternative safe student access to the Sibrun and Namase Basic Schools, separate from the project access road.
  - Provide pedestrian crossings with appropriate signage where residents will need to cross the project access road to access community facilities.
  - Develop and install signage to maintain pedestrian safety during construction and operation (e.g., pedestrian crosswalks, village entrance signage, school crossing signs).
- Use signs and flagmen for traffic control as needed.
- A pilot/escort vehicle with flashing lights, siren, and megaphone will lead large/heavy project-contracted trucks to warn traffic, especially at bridges. These trucks will approach and cross all bridges at a maximum speed of 5 km/hr; traverse bridges through mid-width (center); stop other traffic approaching the bridge in both directions; clear the bridge of all pedestrians, cyclists, and animals; and minimize trips during the monsoon season.
- Entry/exit routes and transportation timings for heavy transport vehicles shall be planned to minimize disturbance to the surrounding locality.
- Make sure the construction vehicles, and especially their tires, are properly cleaned if possible.
- Material shall be appropriately secured in the vehicles to ensure safe passage between destinations during transportation.
- Trucks/dumpers loads shall be covered (e.g., tarpaulin sheets) during offsite transportation.
- The Contractor shall be responsible for any clean-up resulting from the failure by its personnel or suppliers to properly secure transported materials.
- The Contractor is responsible for the costs associated with repairing any damage caused to local roads and bridges due to the transportation of excessive loads.
- Make arrangements to conduct random alcohol and drug testing of drivers.
- Limit night-time vehicle traffic between the powerhouse and headworks areas.

2.15.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Traffic Management Plan.
- Monitor Contractor performance (see Section 2.15.5 below).

2.15.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number of community traffic safety education and awareness program sessions conducted
- Number of employees completing driver safety training
- Number of traffic incidents (including wildlife strikes) and pedestrian injuries
- Monitoring of construction vehicles movement and speed based on GPS trackers.
- Results of random alcohol and drug testing of drivers
- Number of grievances filed related to traffic and their resolution

2.16 Security Personnel Management Plan

2.16.1 Purpose

The purpose of the Security Personnel Management Plan (SPMP) is to minimize the risk to project workers and local communities related to the use of security personnel by UAHEL or the Contractor, and to ensure that the Project complies with the World Bank's Good Practice Note for Borrowers on Assessing and Managing the Risks and Impacts of the Use of Security Personnel (World Bank, October 2018).

2.16.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to public safety and security:

- The deployment of security forces to prevent trespassing, vandalism, theft, sabotage of project property, etc.
- The use of security personnel and establishment of check-posts
- The use of excessive force against local community by security personnel deployed by the contractor.

2.16.3 Contractor Minimum Requirements

The Contractor shall prepare a **Security Personnel Management Plan**. The Contractor is responsible for maintaining the safety and security of all Contractor personnel and visitors to the construction site and to avoid use of excessive force against the public. This plan shall include at least the following minimum requirements:

- Prepare a security risk assessment identifying the key security risks to the Project.
- If the security risk assessment indicates that security personnel are required, prepare a Security Management Plan to manage risks to the security of project-affected communities and project workers that could arise from the use of security personnel.
- Avoid the use of force by direct or contracted workers in providing security except when used for preventive and defensive purposes in proportion to the nature and extent of the threat.

- Ensure that the Project is compliant with IFC Performance Standard 4 and the UN Voluntary Principles on Security and Human Rights (http://www.voluntaryprinciples.org/).
- Make reasonable inquiries/background checks to verify that any security personnel to be hired for the Project are not implicated in any past wrongdoings such as allegations of past abuses, inappropriate use of force, or criminal activities. These checks will be documented and maintained for each of the security personnel screened. No individual for whom there is credible evidence of wrongdoing shall be hired.
- The security agency shall give preference in hiring security personnel to local candidates with required qualifications, and diversity shall be maintained in hiring by including women.
- In the case that a third-party security service provider is engaged by the Contractor, the Contractor shall ensure that the private security agency complies with the Companies Act of Nepal, and the Labour Act of Nepal.
- Develop standard operating procedures for security guards and conduct trainings as per the applicable Code of Conduct for private security providers.
- Train security personnel in the appropriate use of force and appropriate conduct toward workers and affected communities.
- Require security personnel to act according to the applicable Nepalese law and any requirements established by UAHEL and/or the World Bank.
- Keep unauthorized persons off the construction site.
- Authorized persons shall be limited to the Contractor's and the Owner's personnel or other individuals approved by the Contractor or Owner. The Contractor shall implement a sign-in/sign-out procedure for site visitors. Visitors shall receive a safety briefing and only be allowed into the construction site with a project escort.
- Establish security checkpoints to confirm the identity and purpose of each individual seeking to enter the construction area.
- Obtain permission for visitors and relatives of the camp residents to enter the camp. This permit shall be approved by the construction camp manager.
- Arrange guided tours whenever required to inform people about the construction activities of the Project to avoid local people from gathering and crowding near construction sites.
- The agency will allow external audits and inquiries into any credible allegations of abuse or wrongdoing.
- Security personnel will only be authorized to carry weapons with prior approval by UAHEL. The use of weapons will be only for preventive and defensive purpose.

2.16.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Security Risk Assessment (SRA) and Security Personnel Management Plan (SPMP).
- Monitor performance of the Contractor and its subcontractor in providing security (see Section 2.16.5 below).
- Review all allegations of unlawful or abusive acts by security personnel, take action to prevent recurrence, and, where necessary, report unlawful and abusive acts to the relevant authorities.

- Co-ordinate with public security force to support the project in managing law and order in the project area.

2.16.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number and type of site visitors within the reporting period
- Number and nature of security incidents
- Report immediately on any use of force by security personnel
- Confirmation that all security guards have received the required training
- Number of security-related grievances filed

2.17 Labor Management Plan

2.17.1 Purpose

The purpose of the Labor Management Plan (LMP) is to protect project workers (including migrant workers, contracted workers and community workers) rights, and to ensure that the Project complies with the requirements of the World Bank's Environmental and Social Framework (ESS 2 – Labor and Working Conditions) as well as the Labor Management Procedures for the Project.

2.17.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key construction phase project risks and impacts related to labor:

- Potential use of child labor or forced labor
- Unfair terms and conditions of employment, unfair treatment, worker discrimination, and differential conditions between Contractors and subcontractors for similar work
- Violation of recognized labor rights including freedom of association and collective bargaining of project workers

2.17.3 Contractor Minimum Requirements

The Contractor shall prepare a **Labor Management Plan**. This plan shall include at least the following minimum requirements:

- Document that the Contractor has adopted a Labor Policy that expressly prohibits child labor, forced labor, and discrimination of workers, and commits the Contractor to fair treatment of workers, equal opportunity, especially for women and people with disabilities, and the recognition of labor rights, including freedom of association and collective bargaining. The Contractor shall not make decisions relating to the employment or treatment of Contractor's Personnel on the basis of personal characteristics unrelated to inherent job requirements.
- The Contractor shall ensure that foreign workers are provided with the required residence visas and work permits. The Contractor will not retain their passport, work permit and other personal documents. At the completion of their employment, the Contractor shall be responsible for their return to their place of domicile.
- The Contractor, including its subcontractors, shall not employ or engage a child under the age of 14. No workers below the age of 17 will be allowed by the Contractor to undertake any work that is hazardous.
- The Contractor shall recognize workers' organizations as per law or any alternative forums which are constituted by workers protect their rights regarding working conditions and terms of employment and express their grievances on these issues.

- The Contractor shall not discriminate or retaliate against the Contractor's personnel who participate, or seek to participate, in workers organizations and collective bargaining or alternative mechanisms.
- The Contractor shall ensure gender neutral hiring advertisements (i.e., avoid terms such as workmen, linemen) and include that women are encouraged to apply).
- The Contractor will provide employment to women who have acquired new skills, such as machine operators, so that women receive a fair share of the employment opportunities in construction work.
- Source as much unskilled labor as possible from Bhotkhola and Makalu rural municipalities.
- Maximize local content in procurement (i.e., from local people and towns) whenever possible, and whenever project requirements are met.
- The Contractor will provide minimum wages as per applicable laws and shall inform all workers about any deduction applicable to their wages and the conditions of such deductions in accordance with the applicable laws during their recruitment process.
- The Contractors and subcontractors will keep a record of all workers engaged by them and make it available to the Project for periodic labor audits.
- The Contractor shall have a grievance mechanism to allow employees to raise workplace concerns. The Contractor's personnel shall be informed of the GRM at the time of engagement/contracting, and the measures put in place to protect them against any reprisal for its use. The GRM shall not impede access to other judicial or administrative remedies that might be available, or substitute for GRMs provided through collective agreements (see Section 2.2.3 of ESIA).

2.17.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Labor Management Plan (LMP).
- Monitor Contractor performance (see Section 2.17.5 below).

2.17.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Total number of employees (i.e., signed contracts), disaggregated by:
  - Gender
  - Country of nationality
  - "Local" employees (i.e., number from Bhotkhola and Makalu Rural Municipalities)
  - Age (below 18, over 18)
  - Persons with disabilities
- Any incidents of child or forced labor
- Standard contract terms and conditions of employment
- Number and nature of any labor-related grievances

2.18 Influx Management Plan

2.18.1 Purpose

The purpose of the Influx Management Plan (IMP) is to minimize the environmental and social risks on local communities related to the influx of workers and followers, and to ensure that the Project complies with the requirements of the World Bank's Environmental and Social Framework (ESS 4: Community Health and

Safety) and the World Bank's Note on Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labor Influx (World Bank, December 2016).

2.18.2 Key Project Risks and Impacts

In spite of efforts to reduce influx number, there will still be in-migrants and their presence will have following impacts:

- Increase in demand and competition for local civic services such as transportation and health care results in crowding out of local users
- Increase in demand for goods lead to price hikes
- Increase in volume of traffic and higher risk of accidents
- Increase in demand for natural resources (water and firewood)
- Increase in risk of spread of communicable diseases
- Increase in social conflicts within and between communities
- Increase in incidents of illicit behavior and crime

2.18.3 Contractor Minimum Requirements

The Contractor shall prepare an **Influx Management Plan**. This plan shall include at least the following minimum requirements to minimize the influx of additional (follower) population into the project area:

- Establish project employment offices in Kathmandu, , and Gola for workforce hiring.
- Prohibit "at the gate" hiring. The Gola employment office is to serve only local residents (e.g., Bhotkhola and Makalu Rural Municipalities) who can prove their local residency to discourage the influx of job-seekers.
- People seeking employment will be restricted from entering the project construction area by security personnel at the security checkpoints.
- The Contractor will announce vacancy via various means of communication methods to clarify where hiring will be done, the minimum requirements, and to discourage influx to the project area for employment.
- The Contractor will be responsible for the return of the workers it hires to the place where they were recruited or to their place of domicile, as soon as their employment in the Project ends.
- The Contractor will provide training to all workers and staffs on SEA/SH and adopt a Code of Conduct that prohibits workers/staff from engaging in any form of sexual activity with members of the local community, except in the case of marriage.
- Provide awareness programs for local officials at the affected rural municipality and ward levels regarding monitoring and managing labor influx.
- Require non-local workers (i.e., those from locations other than Bhotkhola and Makalu Rural Municipalities) to live in the designated workers' camps and discourage non-local workers from moving their families to the project area, as a conditions of employment.
- The Contractor will provide safe transportation to Khandbari for workers on leave.

2.18.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Influx Management Plan.
- Monitor Contractor performance (see Section 2.18.5 below).

- Coordinate with Bhotkhola and Makalu Rural Municipalities and Sankhuwasabha District officials regarding the monitoring of project-related labor influx:
  - Hold a meeting regularly with district and municipal representatives to review influx and growth of any illegal and unsafe settlements.
  - Provide advice to district and rural municipal officials in managing any influx and ensuring orderly development.
- Provide training to maximize opportunities for local businesses to obtain contracts for the provision of goods and services to the Project.

2.18.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Location of Contractor's employment offices
- Confirmation that only local workers have been hired at the local employment office (assumed to be in Gola)
- Number of non-locals looking for employment that were turned away at the local employment office
- Confirmation of periodic meetings with district and rural municipal officials
- Number of incidents of labor influx identified by district and rural municipal officials, such as new project-related unauthorized structures and illegal activities (e.g., prostitution)

2.19 Cultural Heritage Management Plan

2.19.1 Purpose

The purpose of the Cultural Heritage Management Plan (CHMP) is to preserve and protect both tangible and intangible cultural heritage from adverse impacts associated with the construction and operation of the Project in accordance with the World Bank's Environmental and Social Framework's requirements (ESS 8). Cultural heritage and archaeological resources include all tangible heritage as listed in Nepal's Ancient Monument Preservation Act, 2013 (1956 AD) as well as other tangible and intangible resources, as defined under WB ESS 8. These include:

- Monuments
- Structures having archaeological, paleontological, historical, architectural, or religious significance
- Works of art
- Natural sites or natural features (including trees and plants) with cultural values
- Graves and burial grounds
- Archaeological and paleontological finds (scattered or in their original context)

Accordingly, shrines, stupas, temples, other places of worship, trees, *chautaris* (rest area/local meeting places), stones and natural features associated with indigenous community spiritual beliefs are all included.

2.19.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key project risks and impacts related to cultural heritage resources during the construction phase:

- Physical impact on cultural sites within the direct project footprint, requiring relocation prior to construction work
- Impact of construction related environment nuisances, such as vibration, noise, and dust, in cultural heritage sites close to construction sites

- Impact on natural heritage sites, particularly rivers, waterfalls, and hot springs, due to modifications in these natural features
- Impact on the culture of local indigenous people due to presence of large number of in-migrant population with different cultural background
- Impact of changes in occupation pattern (being engaged in non-farm wage labor) for multiple years (as per the project schedule – the construction phase is 6 years) on cultural and ritual practices associated with farming and subsistence life
- Chance of discovery of in-situ cultural artefacts with archaeological significance as a result of construction of project components, which will involve large-scale excavation at several locations
- Relocation of temples and shrines in the project area including:
  - Two stupa/gumba located in Sibrun
  - One devithan located in Namase
  - Two chautari, with one located in Hema and one in Sibrun
  - Two manes, with one located in Hema and one in Rukma
- Relocation of burial sites and cremation areas located along riverbanks, because their access may be impacted by construction activities
- Disturbance to sites in close proximity to project facilities including:
  - Chepuwa and Bhimbhima waterfalls inside the land acquisition area at the Dam site
  - Changes in flow in the Arun River
  - Other natural areas of spiritual/religious significance to local residents
- Potential impacts on cultural resources that are not yet known may occur during the construction phase of the Project, from 'Chance Finds', during clearing or excavation work. Adverse impacts from the loss of such resources, uncovered by chance, are avoided by suitable mitigation measures.
- Change in traditional architecture, and traditional buildings resulting from increased connectivity
- Increased noise levels in close proximity to cultural sites and disturbances during festivals, cultural gatherings, and traditional ceremonies
- Influx of non-local workers and potential change in demographics resulting from increased connectivity may potentially have impacts on existing cultural and traditional norms of the community, distinct cultural and religious practices, language, respect for local culture and traditions, traditional knowledge and lifestyle, rituals and cultural practices.

2.19.3 Contractor Minimum Requirements

The Contractor shall prepare a **Cultural Heritage Management Plan**. This plan shall include at least the following minimum requirements.

Cultural Heritage Management

Cultural heritage management actions including, as a minimum, the following requirements:

- Relocate affected cultural heritage sites, only after the local community or their custodians are consulted, to an acceptable alternative location that is agreed upon, perform a forgiveness ritual, and physically move the site in a culturally acceptable and agreed upon manner.
- Ensure that access to cultural sites by their users is not restricted during construction activity.
- The Contractor, if necessary, will build alternative access to the natural heritage sites during construction phase. After construction is over, the view scape from these natural heritage sites shall be properly designed to have minimal impact of landscape modifications on scenic aesthetics and spiritual values.

- The Contractor will organize training and awareness programs for employees and workers on local cultural sensitivities and ensure implementation of the Workers' Code of Conduct (see Section 2.1).
- Coordinate with the UAHEL (see Section 2.19.4) to proactively protect and conserve cultural heritage structures in the vicinity of construction sites from the impact of vibration and dust.
- Avoid the disruption of festivals, community rituals, and gatherings, in consultation with communities, for the duration of the Barun Mela.
- Conduct regular consultations with the local communities to notify them of construction work.
- Maintain an updated central list of tangible cultural heritage site and artefacts around the project impact area for the avoidance of heavy transport (to mitigate potential vibration damage).
- Implement a **Chance Finds Procedure** taking into consideration applicable Nepali Legislation and good international industry practice based on World Bank's ESF (ESS-8); the 1972 UNESCO Convention on the Protection of World Cultural and Natural Heritage, to which Nepal is a signatory; and the International Council on Monuments and Sites' (ICOMOS') Guideline on Heritage Impact Assessment. Ensure that all relevant workers are trained in this procedure (see next subsection for more details on the Chance Finds Procedure).
- Establish an effective GRM to ensure that any concerns regarding impacts on cultural heritage resources are addressed immediately.
- Organize training and awareness program for Contractors and their employees on local cultural sensitivities and ensure implementation of the Workers' Code of Conduct.
- Implement a Blasting and Explosives Management Plan (see Appendix C – ESMP) that requires Contractors to take necessary precautions to prevent damage to special features in the surroundings (e.g., ecological, historical, or culturally important areas) and in the general environment.
- Pursue a proactive Stakeholder Engagement Program that is built on transparency, mutual trust, and inclusiveness in terms of its construction and community-based development initiatives. This involvement will empower communities to identify and address issues of concern to them and will facilitate solutions to some of the manageable changes resulting from the Project.

Chance Finds Procedure

A Chance Finds Procedure (CFP) has been developed to include measures for impact avoidance and, where prevention is not practicable, the mitigation of adverse impacts. The CFP is to be applied to all active sites during the construction and operation phases. The objective of the CFP is to ensure that any work undertaken in relation to cultural heritage and archaeological resources identified during the construction and operation phases are undertaken in compliance with project policy, national legislation, international best practice, and in consideration of the local cultural context and community and stakeholder preferences.

This procedure has been drafted taking into consideration applicable Nepali Legislation and good international industry practice based on World Bank's ESF (ESS 8); 1972 UNESCO Convention on the Protection of World Cultural and Natural Heritage, to which Nepal is a signatory; and ICOMOS Guideline on Heritage Impact Assessment.

World Bank's ESS 8 on Cultural Heritage (para 8) requires the development of a Chance Finds Procedure as part of this Environmental, Social, Health and Safety Management Plan if the Project is in an area where cultural heritage may be expected to be found.

Roles and Responsibilities

All Contractors must follow the Chance Finds Procedure, which includes the following required actions:

Construction Contractor responsibilities:

- Stop construction activities immediately after chance finds are believed to have been exposed.

- Establishment of protection area around the find where no further work can be undertaken to prevent further damage or loss of finds in the specific area.
- Notify the site foreman/Supervising Engineer, ESHS personnel, and UAHEP. Written notification shall be provided within 24 hours of the find.
- Resume construction work in the specific work site once authorization is provided by the Department of Archaeology and UAHEL.

Project Owner and Project Engineer's responsibilities:

- Keep records and follow expert verification procedures.
- Undertake consultations with the local communities.
- Notify the relevant authorities, including, but not limited to: the Department of Archaeology and the local Police Office (in the case of human remains).
- Follow chain of custody instructions for movable finds, including coordinating with relevant Department of Archaeology and other Government of Nepal agencies.
- Undertake mitigation activities.
- Communicate all decision making and outcomes to relevant stakeholders.

The Chance Finds Procedure is to be implemented in the event that previously unknown cultural heritage or archaeological resources are exposed or identified during construction of UAHEP and its ancillary facilities, or if new land-take results in additional cultural heritage resources becoming adversely impacted by the Project.

Chance finds will include all tangible cultural heritage assets that have not previously been identified, claimed by the local communities/authorities, or documented and treated during resettlement planning and implementation of the Resettlement Action Plan (RAP). Chance finds may be identified by any member of the Project, affected communities, or other stakeholders.

The Chance Finds Procedure does not apply to sites or resources that were identified, documented or claimed by project affected people (PAP) or affected communities during resettlement planning – all such resources shall be adequately and conclusively treated prior to commencement of the construction phase in order to minimize undue disturbance of the sites, minimize grievances raised as a result of inadequate treatment, and avoid delays to the construction schedule.

All project personnel in managerial or supervisory roles shall undergo Chance Find Procedure Training and discussion of the procedure shall be included in toolbox talks. All Contractor and subcontractor personnel involved in excavation works shall understand the Chance Finds Procedure and be made aware of their responsibilities in the event that they identify chance finds during their work. All project personnel shall be aware of national legislation regarding the removal of archaeological and paleontological artefacts from the project area, and shall be familiar with reporting responsibilities and lines of communication in the event that the Chance Finds Procedure is triggered during the construction phase. Dedicated training shall be provided to key personnel and HSE tailgate meetings shall be used for dissemination of information to Contractor and subcontractor personnel.

Cultural heritage is best protected in situ, as this will result in the least damage to the site and minimize disturbance to local community usage of the site. However, it is acknowledged that there may be no technically practicable or financially feasible alternatives to removal of the affected site, especially if the project benefits outweigh anticipated cultural heritage losses. Table 2.1 summarizes the roles and responsibilities of the different stakeholders in the Chance Find Procedure.

Table 2.1: Roles and Responsibilities in Chance Find Procedure

Department of Archaeology (Ministry of Culture, Tourism and Civil Aviation)	• Provide guidance with regard to Nepali legislation. • Provide experts in case of major or significant finds. • Participate in decision making processes. • Monitor and supervise project activities. • Carry out the onward handling of chance finds of archaeological or paleontological nature.
Paleontologist	• Provide expertise in case of finds that are of paleontological nature.
Police Department	• Provide security in case of significant finds. • Provide services if human remains are potentially the result of a crime.
Project Engineer	• Inform the local community about project activities. • Establish communication lines with relevant authorities. • Ensure that management procedures for Chance Finds align with local cultural practices and are agreed upon with the local communities and PAPs. • Ensure that baseline cultural heritage data is provided to the Construction Contractor. • Ensure the Construction Contractor's compliance. • Ensure that all personnel working on site are trained in Chance Finds Procedure. • Conduct routine inspections of site activities. • Ensure compliance with the Chance Finds Procedure by all project personnel. • Update and improve the Chance Finds Procedure according to evaluation results and in response to new information. • Report on monthly, quarterly and annual basis.

UAHEL on-site Stakeholder Engagement Specialist	• Communicate with PAPs and local communities when chance finds are encountered. • Consult with PAPs to identify the nature of chance finds and to document pre-existing knowledge (if any). • Identify PAPs with (potential) claims to chance finds, particularly PAP or communities willing to assume responsibility for burials. • Facilitate and participate in verification and due diligence procedures. • Facilitate consultations with PAP regarding relocation procedures.
Contractors and Subcontractors	• Adhere to the Chance Finds Procedure. • Designate authorized personnel to deal with Chance Finds Procedure. • Monitor ground disturbances at all times, as part of routine supervisory and compliance monitoring activities. • Stop work upon identification of chance finds. • Notify the relevant personnel upon identification of chance finds. • Ensure demarcation and safeguarding of the site where required. • • Ensure compliance and address non-conformities. • Register and report grievances and community concerns, as per the approved GRM. • Report on monthly, quarterly and annual basis.
Project Security Personnel	• Ensure safeguarding of chance finds and implement limited access procedures to demarcated sites. • Ensure that artefacts are not removed from the site by unauthorized personnel. • Report all cases of non-compliance or unauthorized activities.

Detailed Procedures by Type of Chance Finds

The type of chance find encountered dictates the actions required to mitigate project impact. The categories of chance finds include (1) graves and burial grounds; (2) archaeological and paleontological finds; and (3) privately or community-owned/used heritage resources, each of which are described below.

Claimed Graves

These are graves that are visibly marked or are unmarked on the ground surface and which are claimed by PAPs or other community members. Claimed graves are most likely to be encountered due to changes in land-take. Actions to be taken are as follows:

- The cultural heritage asset inventory shall be updated prior to commencement of construction activities.
- Where claimed graves are identified, the same treatment as used during RAP implementation shall be adhered to. This shall entail, at a minimum:
  - Documentation of the site
  - Consultations with PAPs and community on relocation preferences (nature of ceremony, expenses anticipated, and proposed relocation site, etc.)
  - Verification
  - Due diligence (if required)
  - Compensation and/or financial assistance packages for grave structure and relocation procedures (if eligible)
  - Relocation (exhumation and reinternment)
  - Monitoring and documentation of the individual site relocation and outcomes
- Monitoring and evaluation of the processes

Previously Unidentified Graves

These are graves that are unmarked on the ground surface and that have not been previously claimed by PAPs or other community members and, therefore, have not been documented or treated during Resettlement Planning and RAP implementation. These graves are most likely to be identified during ground breaking and excavation activities, when the first evidence of their existence will be the unanticipated exposure of human remains or burial artefacts. Actions to be taken are as follows:

- Work in the immediate vicinity shall be stopped.
- Site foreman, project manager, HSE officers and supervisors shall be informed.
- The burial site shall be demarcated and secured.
- Initial documentation of the site shall be provided to the project manager, the Project, and community liaison officers (CLOs), including:
  - Photographic documentation of the excavation
  - Photographic documentation of the exposed remains
  - Brief description of the burial
  - Depth of the burial
  - Observed damage as a result of excavation activities
- .

- The CLOs shall liaise with PAPs and local communities to obtain more information about the burial (if any is available), and to ascertain whether relatives of the deceased or an interested community can be identified.
    - If relatives of the deceased who wish to take responsibility for the grave are identified, it shall be treated as a claimed grave and relocated accordingly.
    - If relatives of the deceased cannot be identified, but the project-affected community wishes to assume responsibility, the Project shall facilitate exhumation and reinternment according to local custom and in accordance with community wishes.
    - If no claimants are found, the Project shall assume responsibility, and the grave shall be relocated to a public burial ground or to land provided by the Project for reburial purposes.

In order to mitigate construction delays, work may be continued at a distance of at least 25 meters once the burial site has been demarcated and safeguarded. Further training of project personnel working in the vicinity may be required.

Potentially Speculative Graves

These are graves that were claimed during resettlement planning, but which were subsequently deemed as speculative due to lack of corroborating evidence gathered during Verification and Due Diligence procedures. In scenarios where PAP claims are persisting into the construction phase or where grievances against the Project have been lodged concerning inadequate treatment of claimed burials, the claimed sites shall be treated as 'watching briefs' during ground breaking and excavation activities. Actions to be taken are as follows:

- A complete list of relevant sites shall be compiled prior to commencement of the construction phase, and shared with the Construction Contractor and UAHEP team.
- Excavation activities in the vicinity of such sites shall be undertaken cautiously. PAPs with claims of graves in that area shall be invited to witness the process, along with relevant community leaders.
- Lack of physical evidence shall be documented and PAP satisfaction with the processes undertaken shall be verified.
- Physical evidence, if found, shall be subsequently treated as a 'claimed grave' and relocated accordingly.

Archaeological and Paleontological Finds – Isolated Finds

Fewer than five items found in close proximity shall be considered an 'isolated find'. Isolated artefacts such as bone fragments, archaeological items or fossils may be exposed during the process of excavation – identified either in situ at the sides or base of the excavation, or appearing in spoil heaps. Actions to be taken are as follows:

- Work in the immediate vicinity shall be paused.
- Site foreman, ESHS staff and supervisors shall be informed.
- The item(s) shall be carefully retrieved by the relevant authority.
- Contextual information shall be documented, including:
    - Position
    - Depth of find
    - Photographic documentation of the excavation hole and vertical sections
    - Photographic documentation of item
    - Observed damage as a result of excavation activities

- The item(s) shall be bagged and safely stored.
- Work on the site can commence under watching brief conditions to ascertain whether or not more artefacts are uncovered.
- UAHEP shall be informed by the Department of Archeology regarding the result of the investigation.

Archaeological and Paleontological Finds – Cluster Finds

Five items or more found in close proximity shall be considered a 'cluster find'. They are most likely to be identified in situ at the sides or base of the excavation, but first indications may be as isolated finds appearing in spoil heaps.

Actions to be taken:

- Work in the immediate vicinity shall be stopped.
- The site foreman, project manager, and HSE officers and supervisors shall be informed.
- The site of the finds shall be demarcated, secured, and safeguarded against further disturbances and opportunistic thefts (significant chance finds may require an immediate additional security presence).
- Initial documentation of the site shall be provided to the project manager and the Project, and forwarded to the Department of Archaeology including:
  - Photographic documentation of the excavation hole
  - Photographic documentation of the finds
  - Brief description of the finds
  - Depth of the finds
  - Observed damage as a result of excavation activities
- The Department of Archaeology shall undertake controlled test pit investigations to assess the extent and nature of the cluster, and liaise with the project manager and the Project to develop an appropriate response, which may include:
  - Rescue excavations if removal from site will not compromise contextual data
  - Referral to appropriate authorities if identified as a recent human burial
  - Referral to a paleontologist if finds are identified as fossils, especially if they are fossils in a wider undisturbed paleontological context

In order to mitigate construction delays, work may be continued at a distance of at least 25 meters once the finds area has been demarcated and safeguarded.

Privately or Community-owned or Used Heritage Resources

These include structures (temples, shrines and stupas), natural sites or features, and trees and plants with cultural value. Privately or community-owned or used heritage resource are most likely to be identified prior to commencement of the construction phase, if changes in land-take result in additional cultural resources being impacted by the Project. It is recommended that the same procedures used during resettlement implementation are adhered to. Actions to be taken are as follows:

- Inventory of affected cultural heritage resources shall be compiled
- Documentation of each resource shall be undertaken, including, but not limited to:
  - Photographic documentation
  - Field sketches
  - GPS coordinates and GIS mapping
  - Detailed documentation of site conditions and site usage
  - Degree of impact (whether fully or partially affected by the Project)
- Comprehensive consultations with PAPs and local community regarding site history, significance, uniqueness and usage
- Assessment of anticipated heritage losses as a result of the Project
- Assessment of management controls – whether project impact can be avoided and, if not, mitigation measures
- Consultation with authorities and communities on preferred mitigation options, and identification of relocation sites
- Assessment of relocation needs
- Compensation and/or financial assistance packages for relocation procedures
- Compensation for loss of business (if eligible)
- Obtaining of permits and community consent to relocate
- Relocation and replication of site
- Monitoring and documentation of the individual site relocation and outcomes
- Monitoring and evaluation of the Chance Find Procedure

2.19.4 Owner and Project Engineer's Responsibilities

In case of an accidental find while the contractor safeguards the site and informs the owner, the Project will do the following to manage impacts on tangible and intangible aspects of cultural heritage:

- The Project will notify the Department of Archeology in case of such a find.
- Based on the recommendation of the investigation report provided by the department, further actions will be taken.

- Carry out extensive consultations with the local communities prior to relocating cultural heritage resources impacted by the Project.
- Monitor Contractor performance (see Section 2.19.5 below).

2.19.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Number of affected cultural sites relocated
- Number of chance finds
- Number of grievances filed related to cultural heritage resources
- Number of days construction activities were stopped to avoid disturbance of key festivals in the area

2.20 Cardamom Management Plan

2.20.1 Purpose

The purpose of the Cardamom Management Plan is to minimize project impacts on an important cash crop for many project-affected households (PAH) in the Project's direct impact area, consistent with the requirements of the World Bank's ESF ESS5.

2.20.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key project risks and impacts related to cardamom during the construction phase:

- Risk of damage or loss of high value cardamom cropland due to project construction activities

2.20.3 Contractor Minimum Requirements

The Contractor shall prepare a **Cardamom Management Plan**. This plan shall include at least the following minimum requirements.

- Implement all reasonable measures to avoid impacts on cardamom fields, especially in temporary access lands. This shall include:
  - Provide fencing to clearly demarcate cardamom lands that can and cannot be disturbed.
  - Spray cardamom crops that may be impacted by fugitive dust periodically with water in consultation with the property owners/farmer.
  - Ensure that slopes above cardamom fields are well stabilized and maintained to prevent erosion, sedimentation, and/or landslides.
- Compensate for any damage to cardamom in temporary access lands, in accordance with the Project's RAP.
- Restore disturbed cardamom fields so that they are suitable for reuse for cardamom.

2.20.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Cardamom Management Plan.
- Provide livelihood restoration support to farmers whose cardamom fields are temporarily disturbed during project construction by providing technical support to help re-establish cardamom (e.g., guidance on drainage, soil management, use of fertilizers).
- Monitor Contractor performance (see Section 2.20.5 below).

2.20.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Area of cardamom cropland acquired
- Area of cardamom cropland temporarily disturbed
- Number of grievances filed related to cardamom land
- Area of cardamom cropland restored
- Area of cardamom cropland re-established in cardamom

2.21 Emergency Preparedness and Response Plan

2.21.1 Purpose

The purpose of the Emergency Preparedness and Response Plan (EPRP) is to help protect workers and local residents from unplanned events that could result in injury or death, and to ensure that the Project complies with the emergency preparedness and response requirements of the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 3.7).

2.21.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key project risks and impacts related to emergency preparedness and response during the construction phase:

- Risks to community health and safety as well as all project workers and potential damage or loss of life and physical assets due to natural disasters and project-related emergencies.

2.21.3 Contractor Minimum Requirements

The Contractor shall prepare an **Emergency Preparedness and Response Plan** describing in detail the procedures that the Construction Contractor will put in place in the event of accidents or natural disaster. This plan shall address all reasonably foreseeable emergencies that may occur at the Project, including flooding, glacial lake outburst floods (GLOFs), dam break, sudden unexpected release of water from the dam or powerhouse, earthquakes, fires, landslides, tunnel collapse, hazardous gas concentrations in the tunnels, drowning, traffic accidents, and similar events. This plan shall include at least the following minimum requirements:

- For each of the emergency situations, the Emergency Preparedness and Response Plan shall describe the:
    - Contractor's command structure for responding to an emergency
    - Measures that the Contractor will take to prevent the emergency from occurring, if possible
    - Monitoring to detect developing emergency conditions (e.g., monitor flow in the river, real-time gas monitoring system in the tunnel)
    - Contractor will ensure that equipment is available and well-maintained at the construction site
    - Alarms, including both visual and auditory alerts, to notify personnel and the public of emergency conditions
    - Communication procedures and equipment that the Contractor shall use for notifying its personnel, emergency responders, nearby and downstream residents, the Owners, and local and national government officials of impending or actual emergency conditions

- Training exercises and drills that the Contractor will conduct to ensure that workers are aware of and prepared in the event of each type of emergency
- Awareness and other training for local residents, so they know how to protect themselves in the event of an emergency
- Evacuation plans for its personnel, as well as nearby or downstream residents
- Rescue procedures
- Records the Contractor will maintain onsite documenting the training exercises and drills it has conducted
- Detailed procedures the Contractor will follow in the event of each type of emergency
- Conditions under which the Project can return to normal operations and the procedures to document those conditions
- Incident reporting and close out requirements
- Measures that the Contractor will take to document lessons learned from training exercises, drills and actual emergencies

- The Contractor shall prepare this Emergency Preparedness and Response Management Plan in consultation with appropriate central, district, municipal, and ward office.
- Once the plan has been approved by UAHEL, the Contractor will hold information meetings with each of the local villages to ensure local residents are familiar with the plan and emergency procedures.

2.21.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Emergency Preparedness and Response Plan.
- Monitor Contractor performance (see Section 2.21.5 below).

2.21.5 Monitoring Requirements

- Number of community information meetings held
- Number, type, and severity of emergencies that occur
- Number of worker and community injuries and fatalities

2.22 Project Commissioning and Construction Close-Out Management Plan

2.22.1 Purpose

The purpose of the Project Commissioning and Construction Close-Out Management Plan is to establish the environmental and social procedures related to project commissioning and the requirements associated with construction close-out, in accordance with the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management).

2.22.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key project risks and impacts related to project commissioning and construction close-out:

- Reservoir inundated without clearing vegetation, resulting in increased greenhouse gas emissions

- Changes in community safety risks
- Contractor's equipment, surplus material, rubbish, debris, waste, and temporary facilities potentially left behind at site after completion of construction
- Disturbed areas not stabilized and re-vegetated at project closure

2.22.3 Contractor Minimum Requirements

The Contractor shall prepare a **Project Commissioning and Construction Close-Out Management Plan**. This plan shall include at least the following minimum requirements:

- Notify residents that the Project is entering the commissioning stage and provide appropriate safety briefings.
- Conduct survey of soil and geologic condition at the future reservoir margin to identify erosion and landslide-prone formations and areas and implement appropriate stabilization of those areas.
- Clear and remove forest and other decomposable vegetative material within the reservoir's FSL before inundating – this forest shall not be cleared until the reservoir is ready to be filled to minimize erosion and slope stability hazards.
- Ensure all project safety signage is in place prior to commissioning beginning.
- Notify local residents at least a week in advance that project commissioning will be occurring and that filling the reservoir will begin. Provide appropriate safety briefings in each of the nearby villages.
- Plug the diversion tunnel and incrementally fill the reservoir to the FSL (ideally this should occur during the dry season), including:
    - Conduct wildlife survey and relocate any less mobile wildlife that could be caught in the rising reservoir water level
    - Ensure that the required environmental flow is released continuously commencing simultaneously with the plugging of the diversion tunnel.
- Ensure the required Environmental Flows is maintained during reservoir filling.
- Monitor river conditions in the diversion reach to ensure that there are no barriers to fish movement when only Environmental Flows are released. If barriers are identified, provide channel improvements to remove barriers and/or create pools to allow fish to rest/serve as refuges.
- Monitor river conditions downstream from the powerhouse during initial peaking operations to ensure that there are no barriers to fish movement and no significant fish stranding risks. If barriers or fish stranding risk areas are identified, provide channel improvements to remove barriers and enable fish to escape pools.

Project close-out requirements include:

- Dismantle and remove any remaining Contractor's equipment, surplus material, rubbish, debris, waste and all temporary facilities from the site for reuse, recycling, or disposal at a Government of Nepal approved disposal facility.
- At the completion of the construction work, all construction camp facilities shall be dismantled and removed from the site and the whole site shall be restored to a similar condition to that prior to the commencement of the works, or to a condition agreed to with the land owner.
- Complete all re-grading, slope stabilization, and revegetation of disturbed areas, so as to prevent any post-construction erosion, including, but not limited to, the spoil disposal areas.
- Restore all disturbed areas to their previous condition either for agricultural use or replanting forest using native species.

- Water courses shall be cleared of debris and drains and culverts checked for clear flow paths.
- No foreign material generated/ deposited during construction shall remain on site.
- Any oil/fuel or other contaminated soil shall be removed, transported and property disposed of off-site at a government approved waste treatment/disposal facility.
- Soak pits and septic systems shall be covered and effectively sealed off.
- Restore/repair any damage to occupied drainage, irrigation and other agricultural infrastructure.
- Contact property owners, repair any damage, and address any claims for settlement.
- Return land used under temporary access agreements to the owners.
- Address any ESHS non-conformities as identified by the Owner or Lenders, as part of a close-out audit.

2.22.4 Owner and Project Engineer's Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Contractor's Project Commissioning and Close Out Management Plan.
- Monitor Contractor performance (see Section 2.22.5 below).
- Initiate operation phase monitoring requirements (see Appendix C – ESMP, Annex C2 – OESMMP,) during this phase, so as to ensure a robust baseline against which to compare the Project's operational performance.
- Complete the Project's Operation Phase Emergency Preparedness and Response Plan.
- Conduct a final audit and identify any ESHS non-conformities.
- Issue construction completion certificate by Project Engineer.

2.22.5 Monitoring Requirements

Each prime Contractor will monitor its (and its subcontractors') performance and report monthly on the following metrics:

- Complete all monitoring and prepare final close out monitoring report documenting Contractor performance over the full duration of the construction.

Prepared for:

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Operation Environmental and Social Management and Monitoring Plan

Appendix C – Annex C2

January 2024

Disclaimer: *This Upper Arun Hydro-electric Project's draft Environmental and Social Impact Assessment (ESIA) was prepared by UAHEL broadly following Good International Industry Practices (GIIP) as those required under the Bank's Environmental and Social Framework (ESF).*

The review of this ESIA is a key part of the Bank's due diligence process and is currently ongoing. This draft ESIA may still contain gaps to fully address all pertinent E&S issues in the project. Any gaps will be covered through supplemental studies, assessments, and/or plans that will be completed in a reasonable timeframe to ensure compliance with the ESF.

For the benefit of potentially project affected people (PAP) and other interested stakeholders, and in alignment with the Bank's Policy on Access to Information this draft ESIA is being disclosed as soon as it became available. This disclosure, however, should not be considered as a final clearance of the ESIA by the World Bank.

CONTENTS

1. INTRODUCTION

This section describes the purpose, organizational structure, procedures/approval process, management of change process, applicability, staffing, and reporting requirements for the Operation Environment and Social Management and Monitoring Plan (OESMMP).

1.1 Purpose

This document presents the framework for the Operation Environment and Social Management and Monitoring Plan (hereafter referred to as the OESMMP), including the minimum Lenders' requirements, for the operation phase of the Upper Arun Hydroelectric Project (UAHEP, or the Project). This OESMMP Framework has been prepared based on the project understanding and the findings and recommendations of the Project's Environmental and Social Impact Assessment (ESIA). The OESMMP Framework specifies the management plans and their minimum requirements to be developed in greater detail by the Facility Operator (herein referred to as the Operator), and which are required, as part of the contract between the Owner and the Operator, to be implemented and complied with by the Operator during the operation phase of the Project. These plans also identify the responsibilities of the Project Owner, Upper Arun Hydro-Electric Limited (UAHEL), a subsidiary of Nepal Electricity Authority (NEA).

UAHEL, as the Project Owner, has ultimate responsibility for project operations, ensuring that all project required mitigation measures are implemented, and that the Project conforms with World Bank (WB), other Lenders', and Government of Nepal standards. There are other operation phase mitigation requirements included within the Biodiversity Management Plan (Annex C3), Gender Action Plan, Indigenous Peoples Plan, the Institutional Capacity and Strengthening Plan (Annex C4), for which UAHEL retains primary responsibility and which will not be delegated to the Operator. This OESMMP focuses on those mitigation requirements that UAHEL will delegate to the Operator, while retaining ultimate responsibility for their implementation via monitoring and oversight.

1.2 Organizational Structure

This OESMMP will include at least the following 15 individual management plans:

1. Operation Worker Induction Training and Code of Conduct
2. Water Quality Management Plan
3. Hazardous Materials Management Plan
4. Waste Management Plan
5. Air Quality Management Plan
6. Noise Management Plan
7. Spring Management Plan
8. Occupational Health and Safety Plan
9. Community Health and Safety Management Plan
10. Traffic Management Plan
11. Security Personnel Management Plan
12. Labour Management Plan
13. Cultural Heritage Management Plan
14. Emergency Preparedness and Response Plan
15. Project Decommissioning Management Plan

Most of the individual management plans in this framework include the following elements:

- Purpose of the management plan
- Key project risks and impacts
- Operator minimum requirements
- Owner's responsibilities
- Monitoring requirements

1.3 Procedures

This section describes the process for approving and, as needed, modifying the OESMMP, and each party's responsibilities relating to the OESMMP. The development and approval of the OESMMP will be completed at least one months prior to the initiation of project operations. The general development and approval process is as follows:

- The Operator will develop a detailed Draft OESMMP, using this Framework to establish the minimum Lender's requirements.
- The Operator will provide the Draft OESMMP to the Owner for its review.
- The Owner will provide the Draft OESMMP to the Lenders for their review.
- The Owner will incorporate any Lenders' comments along with its own comments and provide an integrated set of comments to the Operator.
- The Operator will address all comments provided by the Owner and provide a Final OESMMP to the Owner for its review.
- The Owner and Lenders will review and, if acceptable, approve (provide "No Objection" in the case of the Lenders) the Final OESMMP.
- Hard and soft signed copies of the Final OESMMP will be distributed by the Owner to the Operator and the Lenders.

1.4 Management of Change

The need may arise to modify the OESMMP, as part of an adaptive management and continual improvement process. The process below establishes the Management of Change requirements for any and all changes to the approved OESMMP.

It anticipated that most proposed changes to the OESMMP will be initiated by the Operator. The Management of Change process, however, does allow for the Owner or the Lenders to propose changes when it is reasonably likely that the current OESMMP is not sufficient to prevent:

- Serious health and safety incidents
- Environmental and social impacts greater than those disclosed in the ESIA
- New impacts not disclosed in the ESIA
- Violation of Nepal law
- Non-conformance with Lenders' requirements, including the:
  - World Bank ESF Environmental and Social Standards (ESS)
  - World Bank Environmental, Health, and Safety (EHS) General Guidelines (2007)
  - Requirements of other Lenders involved in co-financing parts of the Project

1.5 Applicability

The OESMMP applies to all components of the Project, including the project transportation corridor (i.e., transportation corridor to the Project, project access road, hydropower facilities, and transmission line). The OESMMP applies for the entire duration of project operations, until project decommissioning.

1.6 Staffing

The Operator will have ESHS staff to implement the OESMMP and applicable portions of the Biodiversity Management Plan (BMP) and to monitor the Project's environmental and social performance. The ESHS staff shall include at least one qualified and experienced ESHS manager, supported by an environmental specialist, a biodiversity specialist, a health and safety (H&S) specialist, and two stakeholder/community relations specialists.

1.7 Reporting

Each prime Operator will submit an Environmental, Social, Health and Safety (ESHS) Monitoring Report on a monthly basis to the Owner summarizing its performance for the prior month and year to date.

2. OPERATION ENVIRONMENTAL AND SOCIAL MANAGEMENT/ MONITORING PLANS

This section presents the minimum requirements for each of the 15 individual environmental and social management plans.

2.1 Operation Worker Induction Training and Code of Conduct

2.1.1 Purpose and Objective

The purpose of this training and the Code of Conduct is to establish minimum expectations regarding the training and behavior of the Operator's personnel, especially in terms of health and safety, protection of the environmental, and interactions with local residents.

2.1.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to worker induction training and Code of Conduct:

- Potential conflicts between workers and local residents
- Impacts to the physical and biological environment
- Risks to worker health and safety

2.1.3 Operator Minimum Requirements

The Operator shall prepare a **Worker Induction Training and Code of Conduct Plan**. This plan shall include at least the following minimum requirements.

Operation Worker Induction Training

The Operator is responsible for providing appropriate H&S and environmental and cultural sensitivity training to its workers, as described below:

- All new project personnel shall receive appropriate H&S training during their induction (i.e., within their first week of work). The training shall be conducted by an experienced and qualified H&S professional. The H&S training shall involve a detailed review of the Operator's Occupational Health and Safety Management Plan (see Section 2.8), a detailed description of the H&S risks

each employee will be exposed to given their work assignment, identification of the appropriate personal protective equipment (PPE), and the proper use of the PPE. The Occupational Health and Safety Management Plan provides additional requirements relative to ongoing and refresher H&S training (e.g., daily pre-work tailgate discussions). All personnel will be provided with the necessary PPE.

- All new project personnel shall receive appropriate environmental and cultural sensitivity training during their induction (i.e., within their first week of work). The training shall be conducted by an experienced and qualified environmental science professional and a social science professional. This training shall involve a description of the sensitive environmental and cultural setting of the Project (e.g., Makalu Barun National Park, Barun Dovan) and the potential presence of threatened and endangered species. New personnel shall be informed about these species and what actions they should take if they were to encounter any of these species, or wildlife in general. New personnel will also receive training regarding the customs and practices of the indigenous people and the Operator's requirements regarding any interactions with local residents.

Workers' Code of Conduct

The Operator is required to prepare a Workers' Code of Conduct, which will apply to Operator's personnel to ensure compliance with the Operator's environmental and social obligations. The Operator shall base its Code of Conduct on the World Bank's template. The following requirements shall be included in the Operator's Code of Conduct:

- Demonstrate respect for local customs and traditions. Workers visiting the local communities or interacting with local residents shall follow appropriate standards of dress and personal hygiene and must behave in a manner consistent with the Code of Conduct. Fighting (physical or verbal), creating nuisances, or disturbances in or near local villages is prohibited.
- Awareness raising and prevention of gender-based violence (GBV) and sexual exploitation and abuse and sexual harassment or intimidation. Acts of any form of violence including physical or verbal, directed toward anyone and in particularly toward female workers or female residents of the local villages, or other women, and children will not be tolerated.
- Comply with all laws and regulations of Nepal.
- Do not engage in any hunting, fishing, poaching, wildlife trading, logging, collection of firewood, clearing of vegetation, and collection of/trade in plants, animals, and non-timber forest products (NTFPs).
- Do not possess any illegal substances, abuse alcohol, carry firearms, or consort with prostitutes.
- Do not defecate in open areas or water bodies, but only use provided toilets and waste disposal facilities.

This Code of Conduct shall be reviewed and approved by the Owner prior to the initiation of operation. The Code of Conduct shall be available to local communities at the project administrative office. All new project personnel shall receive appropriate training in the Workers' Code of Conduct during their induction (i.e., within their first week of work).

The Operator shall retain documentation demonstrating that all project employees, have received the required H&S training, environmental and cultural sensitivity training, and Code of Conduct training.

Employee Grievance Mechanism

The Operator shall also establish an employee grievance redressal mechanism (GRM) to enable workers to file complaints in accordance with the requirements of ESS 2. The Operator shall inform its employees of the GRM at the time of recruitment and make it easily accessible to them. The mechanism shall involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any

retribution. The mechanism shall also allow for anonymous complaints to be raised and addressed. The mechanism shall not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for GRMs provided through collective agreements. The European Bank for Reconstruction and Development's *Employee Grievance Mechanism Guidance Note* (EBRD 2017) can be used as a reference for the development of this mechanism.

General

The Operator shall retain documentation demonstrating that all project employees have received the required H&S, environmental and cultural sensitivity, and Code of Conduct training and have been informed about the grievance procedure.

2.1.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Induction Training, Workers' Code of Conduct, and Employee Grievance Mechanism. Establish an extended SEA/SH GRM at the project level, in parallel with the overall UAHEP GRM, which includes a child-friendly procedure.
- Monitor to ensure that all workers receive the induction training and sign the Code of Conduct.
- Monitor the Operator's oversight and enforcement of the Code of Conduct.
- Review the Operator's reporting on training and grievances.
- Supervise, support and link/coordinate the GBV service provider with the focal point from the project GRM, SEA/SH GRM and Workers' GRM.

2.1.5 Monitoring Requirements

Each prime Operator will monitor its performance and report monthly on the following metrics:

- Number of employees receiving environmental and cultural sensitivity training
- Number of employees receiving H&S training
- Number of new employees receiving and signing the Workers' Code of Conduct
- Number of worker grievances received and a summary of the grievances, the number of grievances resolved and pending, and the average time period from receipt of the grievance to its resolution.
- Conduct internal monitoring and evaluation of the SEA/SH GRM to ensure that protocols are followed in a timely manner, including referring complaints to the service provider to review and addressing SEA/SH complaints.
- Conduct regular monitoring and evaluation (M&E) of progress on SEA/SH activities, including reassessment of risks as appropriate.

2.2 Water Quality Management Plan

2.2.1 Purpose

The purpose of the Water Quality Management Plan (WQMP) is to minimize risk to surface and groundwater quality from project operation activities, and to ensure that the Project complies with Nepal's water quality regulations and the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management) and Environmental, Health, and Safety General Guidelines' wastewater and ambient water quality requirements (World Bank, April 30, 2007, Section 1.3).

2.2.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to water quality:

- Domestic wastewater
- Industrial stormwater runoff from the batching plant, quarry, crusher, spoil disposal areas, worker camps, parking areas, fabrication shops, maintenance yards, and fuel depot
- Seepage from the tunnel portals and spoil disposal areas

2.2.3 Operator Minimum Requirements

The Operator shall prepare a **Water Quality Management Plan**. The Operator shall be fully responsible for any contamination to the existing water quality within the project site. This plan shall include at least the following minimum requirements.

Domestic Wastewater

- Provide a wastewater treatment facility (e.g., retain the package wastewater treatment plant from the construction phase or install a septic system) at each Owner's camp to treat domestic wastewater prior to discharge to a receiving water. The wastewater treatment facility will be designed to meet Nepal's water quality standards and the WB EHS guidelines, whichever are stricter.
- Ensure that the effluent discharge locations for all wastewater treatment plants are downstream from all sites used by local residents for potable water.
- Maintain the wastewater treatment facilities in accordance with manufacturer specifications and conduct daily monitoring of effluent water quality.
- Prohibit any open defecation, and any washing, bathing or urination in any water courses or springs.
- Provide a sufficient number of toilets facilities (separate toilets for men and women, typical standard is 1 toilet per 15 workers) at each work site. Regularly clean out these toilets and dispose of waste at the wastewater treatment facility described below.
- Prohibit the discharge of any untreated wastewater to any receiving waterbody.

Seepage from Tunnels and Spoil Disposal Areas

- All seepage from the tunnel portals and from spoil disposal areas shall be directed to a stormwater pond to allow the settling of any suspended material before discharge to a watercourse.

Storm Drainage

- Provide stormwater basins downslope from the two Owner's camps, switchyard, water treatment plants, and parking areas to allow for pollutants to settle out and to moderate stormwater runoff.
- Provide oil/water separators for drainage from any vehicle maintenance areas.
- Provide alternative source of water to any households sourcing potable water downstream from Project discharges (e.g., provide a piped water supply sourced from upstream of project facilities).
- Conduct regular monitoring and inspection of storm drainage, retaining walls, and slopes along project roads, facilities, and transmission lines, provide prompt maintenance for any damage, failures, or evidence of erosion, and stabilize/restore any identified eroding areas using appropriate vegetative or structural stabilization measures.
- Properly manage and divert uphill drainage around spoil disposal facilities.

- Conduct regular monitoring and inspection of the spoil disposal areas, especially for the first five years after construction and during and after each monsoon season.
- All stormwater ponds shall be routinely maintained and cleaned out, with any deposited sediments disposed of in an approved upland location.
- Provide immediate maintenance and corrective action as needed.

2.2.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of Water Quality Management Plan.
- Monitor Operator performance (see Section 2.2.5 below) and ensure that any water quality-related grievances are addressed by the Operator in a timely manner and measures put into place to prevent future similar grievances.

2.2.5 Monitoring Requirements

Each prime Operator will monitor its performance and report monthly on the following metrics:

- Wastewater treatment plant effluent volume and quality (i.e., fecal coliforms, dissolved oxygen, biological oxygen demand [BOD], pH, phosphorus as phosphate, total suspended solids, total oil and grease, and other parameter required by the Government of Nepal) from each of the treatment plants on a daily basis
- Number of grievances filed related to water quality and their resolution
- Monitor water quality (i.e., fecal coliforms, dissolved oxygen, biological oxygen demand [BOD], pH, phosphorus as phosphate, total suspended solids, total oil and grease, and other parameter required by the Government of Nepal) in the project reservoir, two locations in the diversion reach (one upstream and one downstream from the Barun River confluence), and at the access road bridge on a monthly basis

2.3 Hazardous Materials Management Plan

2.3.1 Purpose

The purpose of the Hazardous Materials Management Plan (HMMP) is to minimize risk to the environment and public safety relating to the transport, storage, handling, use, leaks, and spills of hazardous materials (e.g., diesel fuel, other petrochemicals, paints, solvents, oils, grease, herbicides, pesticides), and to ensure that the Project complies with the hazardous materials management requirements of the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management) and Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 1.5).

2.3.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to hazardous materials:

- Health effects from hazardous material exposure
- Accidental spillage or leakage into the river or local streams
- Contamination of ground water seeps/springs

2.3.3 Operator Minimum Requirements

The Operator shall prepare a **Hazardous Materials Management Plan**. This plan shall include at least the following minimum requirements.

Transport, Storage, Handling and Use of Hazardous Materials

The Operator shall provide a method statement detailing the hazardous materials that will be used during operation, as well as the transport, storage, handling, and use procedures and requirements for each hazardous material.

- Use an approved transport company for transporting hazardous materials to the project site. Trucks shall have appropriate safety measures in place, including use of safety placards or other indication of the material being transported, carry spill response materials on the vehicle, and have emergency contact information in place. The transport company shall have a spill prevention and response plan in place. Drivers shall receive training in safe driving techniques and procedures to be followed in the event of an accident or spill.
- Maintain an inventory of all hazardous materials stored on site. A Material Safety Data Sheet (MSDS) should be available at the operation office for each hazardous material.
- Locate hazardous material/waste storage facilities at least 50 m from any perennial stream or waterbody.
- All hazardous material/substances shall be stored on site in a manufacturer recommended container, within a covered or enclosed structure, with an impervious liner (e.g., concrete pad or plastic liner), that is secure (e.g., fenced, locked, and/or with security guard and restricted entry), and with appropriate secondary containment sufficient to store the volume of the largest hazardous material container.
- No underground storage tanks are allowed.
- Hazard signs indicating the nature of the stored materials (MSDS) shall be displayed on the storage facility or containment structure.
- Provide spill kits at all work areas where hazardous materials are used.
- Provide dry chemical or other type of fire extinguishers suitable for the type of hazardous material stored on-site.
- During servicing/repair of equipment or vehicles, a suitable drip tray shall be used to prevent oil/grease spills onto the soil, especially in case of emergency repairs.
- Leaking equipment shall be repaired immediately or be removed from the site to facilitate repair. Check storage tanks and vehicles for leaks on at least a weekly basis.
- Empty fuel or oil drums shall not be stored on site.

Spill Prevention and Response Plan

The Operators shall each prepare a Spill Prevention and Response Plan describing the methods to prevent and respond to hazardous material spills. The “Prevention” part of the plan shall include the measures listed above relative to hazardous material transport, storage, handling, and use. The “Response” part of the plan shall include at least the following measures:

- The person who identified the leakage/spillage shall immediately check if anyone is injured and then inform the Operator’s ESHS office.
- The Operator shall ensure that all injured persons, if any, are treated and assess the nature of the substance that has spilled/leaked.

- Whenever the accidents/incidents generate serious environmental pollution risks, with the potential of resulting in serious environmental pollution problems (e.g., spillage/leakage of hazardous materials, large scale spillage/leakage, or spillage/leakage into the nearby water bodies which are used for irrigation/potable water) or health hazard to workers or the public, the Operator shall immediately notify UAHEL.
- The Operator shall take immediate action to stop the spillage/leakage and divert the spilled/leaked liquid to a nearby non-sensitive area.
- The Operator shall arrange maintenance staff with appropriate protective clothing to clean up the spilled material. This may be achieved through covering the area with sawdust (if the quantity of spillage/leakage is small), or sand bags (if the quantity is large), and/or using a shovel to remove the topsoil (if the spillage/leakage occurs on bare ground).
- Spilled hazardous materials must not be flushed to local surface drainage systems. Instead, government approved clean-up and disposal procedures shall be carried out.
- Depending on the nature and extent of the spill, evacuation of the area may be necessary. The Spill Response Plan should include procedures, communication, and approval protocols to address this.
- The Operator shall prepare a report with root cause analysis for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective and preventative actions. The incident report shall be submitted to UAHEL for review and comment and shall be maintained in the records.
- Workers shall receive training and conduct periodic exercises so that they understand the emergency response procedures in the event of a spill or leak.

2.3.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Hazardous Materials Management Plan.
- Monitor Operator performance (see Section 2.3.5 below).
- Review Operator's Incident Report and Root Cause Analysis.

2.3.5 Monitoring Requirements

Each prime Operator will monitor its performance and report monthly on the following metrics:

- Inventory of all hazardous materials used or stored at the site for the Project
- Number and volume of accidental spills and leaks and their resolution

2.4 Waste Management Plan

2.4.1 Purpose

The purpose of the Waste Management Plan (WMP) is to minimize risk to the environment and public safety relating to the storage, transport, and disposal of solid and hazardous waste, and to ensure that the Project complies with the waste management requirements of the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management), and the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 1.6).

2.4.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to waste:

- Soil and water contamination from improper waste management and disposal
- Litter from domestic solid waste
- Rodents and pests attracted
- Worker and community health

2.4.3 Operator Minimum Requirements

The Operator shall prepare a **Waste Management Plan**. This plan shall include at least the following minimum requirements:

- Establish a management system to ensure proper collection, segregation, and disposal of solid, medical, and hazardous waste so that there is no contaminated surface runoff or public health issues associated with the waste and the waste is appropriately disposed of.
- Develop and implement a worker and community awareness training program to ensure that these groups are aware of potential risks associated with different types of waste materials, safety precautions that should be applied, and notification procedures in the case of any leaks, spillage, or other emergencies.

Solid Waste Management

- The Operator shall ensure that all facilities are maintained in a neat and tidy condition and no litter or dumping shall be allowed within the project area or by project employees.
- Measures shall be taken to reduce the potential for litter and negligent behavior with regard to the disposal of all refuse. At all places of work, the Operator shall provide litter bins, containers, and refuse collection facilities for later disposal.
- Solid waste may be temporarily stored on site in a designated area. The storage area shall have a cover to avoid direct contact with precipitation, a berm to avoid direct contact with surface runoff, and a fence to prevent wind-blown litter. Waste storage containers shall be covered, tip-proof, weatherproof, and scavenger proof, and shall not attract wildlife.
- The Operator shall identify and demarcate disposal areas clearly indicating the specific materials that can be deposited in each waste container. Waste containers shall be strategically placed in visible locations easily identified and marked. For example, recycle, organic waste, unusable waste, hazardous waste, paper, and glass, etc.
- Recyclable materials shall be collected and separated on-site from other waste. Collected recyclable material shall be re-used or sold to a waste collector for recycling.
- Employees shall be educated on the segregation of waste with demarcated bins for recyclables and perishables placed in common and work areas.

Disposal of Solid Waste

- A landfill is not currently proposed, so all waste shall be hauled away to a-government approved disposal site in Khandbari or another acceptable site for which the Operator obtains approval from the local government and UAHEL. The waste transporter shall provide a transport manifest documenting appropriate disposal.
- Burning solid waste in open air conditions shall be strictly prohibited.
- Solid waste shall not be buried at the project site.

- Domestic waste shall be transported off site-at least once a week in covered containers or trucks by an environmental sanitary authority or by a licensed waste collector for ultimate disposal in an approved landfill.

Management and Disposal of Hazardous Waste

The Operator shall carry out the following activities:

- All hazardous waste (e.g., waste oils, grease, solvents, acids and alkalis, paint) shall be properly stored, handled, and disposed of or recycled in accordance with the environmental standard, regulation and management policies of Nepal, and the producers of the material.
- Only appropriately trained and authorized personnel shall handle hazardous waste.
- Hazardous waste shall be stored separately from other waste in a secure facility removed from active work areas with posted warning signs. Storage facilities shall meet the same siting and design requirements for hazardous materials, including a cover facility, impervious floor, secondary containment, and a berm to prevent contact with surface runoff, and appropriate placards.
- Under no circumstances shall the spoiling of any other hazardous waste be allowed on the site, over embankments, in borrow pits or any burying, in water bodies, on agricultural land, or in sensitive areas.
- Used oil, lubricants, cleaning materials, and other similar waste from the maintenance of vehicles and machinery shall be collected in holding tanks and sent back to the supplier or removed from site by a specialist oil recycling company for disposal at an approved hazardous waste site.
- The transportation of hazardous waste off the site shall be done in cooperation with an approved and authorized waste transport company.
- The waste transport company shall provide disposal certificates to the Operator, who shall retain them for future inspection/monitoring by UAHEL.

2.4.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Waste Management Plan.
- Ensure that waste-related grievances are addressed by the Operator in a timely manner and measures put into place to prevent future similar grievances.
- Monitor Operator performance (see Section 2.4.5).

2.4.5 Monitoring Requirements

Each prime Operator will monitor its performance and report monthly on the following metrics:

- Number of grievances filed related to waste management and their resolution
- Volume of waste generated broken down by solid waste, recyclables, and hazardous waste
- Volume of various types of waste transported off-site for ultimate disposal and location of disposal sites

2.5 Air Quality Management Plan

2.5.1 Purpose

The purpose of the Air Quality Management Plan (AQMP) is to minimize the degradation of ambient air quality and the risk to local residents and workers' health from project operation activities, and to ensure that the Project complies with Nepal's air quality regulations and the World Bank's Environmental and

Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management) and Environmental, Health, and Safety General Guidelines air emission and ambient air quality requirements (World Bank, April 30, 2007, Section 1.1).

2.5.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to air quality:

- Fugitive dust from unpaved roads
- Emissions from project vehicles and back up diesel generators

2.5.3 Operator Minimum Requirements

The Operator shall prepare an **Air Quality Management Plan** to control fugitive dust and vehicle emissions. The Plan shall include at least the following minimum requirements:

- Provide manufacturer-specified maintenance of vehicles and any back-up diesel generators.
- Vehicle speed shall be restricted to 20 kilometers per hour (km/hr) at site, including the project access road, to minimize potential for dust generation in the surroundings.
- Spray water as needed on any dirt roads to reduce wind-induced erosion. The water spray operation shall be carried out at least twice a day (morning and afternoon) on dry and windy days. The frequency of water spray near local communities shall be increased as needed.
- Prohibit burning and open fires.
- Machinery shall be turned off when not in use.
- All stockpiled materials shall be kept in an enclosure or covered with impervious sheeting to reduce dust emissions.
- Use low Sulphur diesel fuel for diesel-powered equipment and vehicles to the extent available.
- Regular (monthly) maintenance of all vehicles in accordance with manufacturer specifications shall be undertaken mandatorily.

2.5.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator’s Air Quality Management Plan.
- Monitor Operator performance (see Section 2.3.5 below).

2.5.5 Monitoring Requirements

Each prime Operator will monitor its performance and report monthly on the following metrics:

- Number of grievances filed related to air quality and their resolution.

2.6 Noise Management Plan

2.6.1 Purpose

The purpose of the Noise and Vibration Management Plan (NVMP) is to minimize the impacts of operation noise on local residents and wildlife, and to ensure that the Project complies with the noise requirements of the World Bank’s Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management), and the World Bank’s Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 1.7).

2.6.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to noise:

- Vehicular noise
- Night-time noise

2.6.3 Operator Minimum Requirements

The Operator shall prepare **a Noise Management Plan**. This plan shall include at least the following minimum requirements.

- Provide regular maintenance of equipment and vehicles in accordance with manufacturers' specifications and lowest noise levels possible.
- Limit night-time vehicle traffic between the powerhouse and headworks area.
- Prohibit night-time deliveries to the headworks area.

2.6.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Noise Management Plan.
- Monitor Operator performance (see Section 2.6.5 below).

2.6.5 Monitoring Requirements

The Operator will monitor its performance and report monthly on the following metrics:

- Conduct noise monitoring in Rukma, Namase, Hema, Sibrun, Jijinkha, and Chongrak quarterly for the first year after commencement of operations to confirm that noise levels are in compliance with the WB criteria. If monitoring indicates that noise levels are exceeding the WB criteria, then the Operator will apply adaptive management measures to reduce noise levels to within the WB criteria.
- Number of grievances filed related to noise and their resolution.

2.7 Spring Management Plan

2.7.1 Purpose

The purpose of the Spring Management Plan is to minimize impacts to springs on which local residents rely for their water supply, and to ensure that the Project complies with the ecosystem services requirements of the World Bank's Environmental and Social Framework (ESS 3: Resource Efficiency and Pollution Prevention and Management – Water Use).

2.7.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risk and impact related to springs:

- Change in the volume of flow in the springs and streams
- Change in the quality of water in the springs and streams

2.7.3 Operator Minimum Requirements

The Operator shall prepare a **Spring Management Plan**. This plan shall include at least the following minimum requirements:

- Monitor and document water yield and water quality in springs in project-affected springs and streams on a monthly basis for the first two years of operation to detect any project impacts.

2.7.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Spring Management Plan.
- If monitoring indicates that the Project has resulted in a reduction of flow in a spring or stream to the extent that sufficient water is no longer available to meet community needs, or that the Project has resulted in contamination of the spring such that it is no longer suitable for its traditional uses, the Owner will:
  - Provide a permanent alternative source of water to the affected households or villages. This water should be provided at no cost to affected households.
  - Provide power to replace any reduction in micro-hydropower generation or mill operation, at no cost to the affected households.

2.7.5 Monitoring Requirements

The Operator will monitor its performance and report monthly on the following metrics:

- Volume of flow and water quality in the springs and streams located within the Project's Direct Impact Area, or downstream from the Direct Impact Area, monthly for two years after commencement of operation
- Number of grievances filed related to springs and community water sources and their resolution.

2.8 Occupational Health and Safety Plan

2.8.1 Purpose

The purpose of the Occupational Health and Safety Plan (OHSP) is to implement all reasonable precautions to protect the health and safety of project workers, and to ensure that the Project complies with the occupational health and safety requirements of the World Bank's Environmental and Social Framework (ESS 2: Labor and Working Conditions), the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Sections 2.0 and 4.2), as well as the Workers' Accommodation: Processes and Standards (IFC and EBRD 2009).

2.8.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to occupational health and safety:

- Workers are subjected to inadequate (including unsafe or unhealthy) living conditions
- Workers are subjected to inadequate (including unsafe or unhealthy) working conditions

2.8.3 Operator Minimum Requirements

The Operator shall prepare an **Occupational Health and Safety Plan**. This plan shall include at least the following minimum requirements to address matters regarding the health and wellbeing of workers during the operation phase.

- The OHS Management Plan shall reference and adopt an accepted international standard such as the American National Standards Institute (ANSI) A10, US Occupational Safety and Health Administration (OSHA), UK Health, Safety, Environment (HSE) Construction Code of Practice, or Australia/New Zealand OHS Standards.
- The OHS Plan should have the minimum management structure:
  - Objective
  - Policy and compliance with the law and other requirements
  - Applicable safety standards
  - Disciplinary policy
  - Rules and responsibilities for Operators and employees
  - First aid, OHS services and personnel
  - Competent person
  - Hazard identification
  - Monitoring and reporting
  - Incidents reporting and investigation
  - Permission system for hazardous works
  - Alcohol and drugs policy/programs
  - Training

Worker Health and Living Conditions

General Requirements:

- Provide education and training to the workers on basic personal hygiene; the prevention of diseases, including respiratory diseases, water and food borne diseases such as diarrhea, and communicable diseases such as tuberculosis and COVID-19; and on HIV/AIDs symptoms and counselling and treatment services.
- Implement an awareness program for workers and local communities on the prevention, detection, screening, and diagnosis of sexually transmitted diseases, especially with regard to HIV/AIDS. The program shall also include information on alcohol abuse, GBV, SEA, and human trafficking.
- The Owner's camps shall be autonomous, adequate for the number of workers in each camp, and not rely on local/public facilities for accommodations, healthcare, sanitation, cooking, recreation, and other infrastructure or services.
- Worker accommodation and living conditions shall meet at least the minimum requirements identified in the IFC/EBRD's Workers' Accommodation: Processes and Standards (IFC and EBRD 2009). These standards include building construction; housing; general health, safety, and security; fire safety; electricity, plumbing, water, and sanitation; general living facilities (e.g., drainage, heating, ventilation, and air conditioning [HVAC], water, wastewater, and solid waste); rooms/dormitory facilities (e.g., bed arrangement, storage facilities); sanitary and toilet facilities (e.g., toilet facilities, showers/bathrooms, and other sanitary facilities); canteen, cooking, and laundry facilities; medical facilities; and leisure, social and telecommunication facilities). The Operator shall provide basic hygiene supplies to all workers (e.g., soap, laundry detergent).
- Separate accommodation, toilet, and shower/bathroom facilities shall be provided for men and women. Notices shall be displayed outside each block of latrines and urinals, in the language understood by the majority of the workers stating "For Men Only" or "For Women Only", as the case may be. Such facilities shall be conveniently accessible and kept in a clean and hygienic condition.

Latrines shall also be constructed in areas that are likely to be visited frequently by the operation workers. The latrines shall be located at a distance of at least 50 meters away from residential areas and watercourses. If septic tank systems are used for any residential labor camps, the seepage pits shall be located at a safe distance from water sources to avoid contaminating them. Wastewater shall not be disposed into water bodies without treatment.

- Operation and maintenance – The Operator is responsible for providing appropriate maintenance to ensure these facilities comply with IFC/WB worker accommodation standards throughout the operation period.
- Appropriate areas shall be designated for smoking. NO SMOKING signs shall be placed in areas where smoking is prohibited, for example, in the dormitories and medical facilities.

Worker Safety and Working Conditions

The Operator is responsible for ensuring safe working conditions for its employees. OHS Plan shall include the following elements

- Describe the potential health and safety hazards based upon the specific project works/activities.
- Describe the procedures and equipment that are technically appropriate to deal with such works/activities.
- Describe all major responsibilities and authorities relating to the implementation of the OHS Management Plan.
- Describe the specific project supervision methods (including audits, documentation and record-keeping, on-site monitoring and medical surveillance) to be implemented to ensure that the plan is completely and properly implemented.
- Describe the specific health and safety training that will be provided to any persons involved with the works and the minimum levels of training required.
- Describe the emergency response procedures that will be implemented.
- Describe the estimated cost, time schedule and assigned responsibility for implementing each component of the plan.

General requirements:

- Provide all personnel with the proper personal protective equipment (PPE), such as safety boots, safety glasses, helmets, hearing protection, gloves, dust masks, and/or respirators, and enforce their use.
- Carry out health screening and fitness test of all workers at the time of recruitment. This health screening shall be undertaken in keeping with the work profiles of the workers. The fitness test shall screen for communicable diseases and any health risks that may create issues in undertaking the task assigned. In addition to this, regular annual health check-ups shall be undertaken for all workers.
- Provide safety training and regular refresher training and daily “tailgate” talks on safety issues. The Operator shall maintain records for each employee to document the H&S training that they have received.
- Notify and provide training to all appropriate personnel of any changes to the OHS Plan per the Management of Change process.

Special requirements:

- Workers working in the following situations shall receive specialized training H&S training:
  - Underground or confined spaces

  - Working at heights
  - Working with hazardous materials
  - Working in or over watercourses
- This specialized training shall ensure the workers are aware of the potential hazards of working in these areas, understand the safety precautions required, and understand the proper use of any specialized PPE.

2.8.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Occupational Health and Safety Plan.
- Monitor Operator performance (see Section 2.8.5 below).

2.8.5 Monitoring Requirements

The Operator will monitor its performance and report monthly on the following metrics:

- Number of near misses, lost time injury rate, and any fatalities
- Number of staff receiving H&S training or refreshers
- Number of staff working who have not received H&S training
- Summary of worker grievances relating to occupational H&S
- Summary of status of accommodation facilities against the benchmarks

2.9 Community Health and Safety Plan

2.9.1 Purpose

The purpose of the Community Health and Safety Management Plan (CHSMP) is to implement all reasonable precautions to protect the health and safety of nearby communities and villages, and to ensure that the Project complies with the requirements of the World Bank's Environmental and Social Framework (ESS 4: Community Health and Safety), Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 3.0), as well as the World Bank's Guidance Note for Borrowers on ESS 4: Community Health and Safety (World Bank, June 2018).

2.9.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to community health and safety:

- Changes in the physical, biological, and social conditions may impact individual health status, especially vulnerable people such as the elderly, children, and people with pre-existing health conditions.
- Physical and economic displacement and social and economic shocks caused by dramatic and rapid changes taking place in local villages may affect the psychology and mental well-being of local residents.
- Potential introduction of communicable and infectious diseases (e.g., COVID-19) due to in-migration of workers
- Potential conflicts between workers and local residents
- Introduction of vehicular traffic in an area unfamiliar with traffic safety measures
- Unsafe or inappropriate use of hazardous materials

- Hazards associated with water intakes, gates, and spillways in the headworks area
- Sudden and rapid changes in water levels downstream from the powerhouse during peaking operations
- Potential for project-related emergencies (e.g., dam safety)

2.9.3 Operator Minimum Requirements

The Operator shall prepare a **Community Health and Safety Management Plan**. This plan shall include at least the following minimum requirements. Please note that the following community health and safety risks are covered in separate management plans:

- Water quality and wastewater treatment – see Water Quality Management Plan
- Transport of hazardous materials – see Hazardous Materials Management Plan
- Water availability – see Spring Management Plan
- Traffic safety – see Traffic Management Plan
- Security personnel – see Security Personnel Management Plan
- Emergency preparedness and response – see Emergency Preparedness and Response Plan
- Dam safety – see Emergency Preparedness and Response Plan

Other Community Health-related Requirements

- Develop a communicable disease (e.g., COVID-19) management plan that describes safety precautions, requirements for worker testing before coming to workers' camps and periodically thereafter, visitor testing requirements and safety requirements, and procedures to put in place in the event that a worker tests positive for COVID-19 or other communicable disease.

Other Community Safety-related Requirements

- Keep unauthorized persons from entering project facilities.
- Authorized persons shall be limited to the Operator's and the Owner's personnel or other individuals approved by the Operator or Owner. There should be a sign-in/sign-out procedure for site visitors. Those regularly visiting the site (e.g., NEA staff; site monitors) should receive OHS training and be permitted to travel without an escort. Occasional visitors should receive OHS orientations and only be allowed into the site with a project escort.
- Implement a Community Health and Safety Management Plan (see Appendix C – ESMP), including a community education and awareness program focusing on project operational safety risks, installing and maintaining appropriate safety equipment, and providing alarms and signage to alert downstream water users of changing flow conditions.
- Conduct periodic stakeholder engagement surveys and closely monitor grievances during the first two years of project operations to document any unanticipated project impacts on downstream water uses and users and implement an adaptive management program to mitigate these impacts if necessary.
- Provide community education and awareness training/seminars on project related safety risks, including vehicular traffic, hazardous materials, and security personnel and use of the grievance mechanism.
- Install safety fencing and warning signage to control public access at high risk areas, including the tunnel and cavern portals, quarry, power plants, headworks site, crusher and batching plants, and spoil disposal areas.

- Adopt a policy on GBV, SEA, and trafficking in persons and collaborate with law enforcement agencies for investigation of any violations of the law.

2.9.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Community Health and Safety Management Plan.
- Community health-related actions: The Project will support the rural municipality to preserve traditional crop/seed varieties and encourage continuation of their production and consumption of traditional food items.
- Community safety-related actions: Set up an extended SEA/SH GRM at the project level, in parallel with the overall UAHEP GRM, which includes a child-friendly procedure.
- Provide funding to a local service provider/NGO to provide counselling and other support related to GBV.
- Monitor Operator performance (see Section 2.9.5 below).

2.9.5 Monitoring Requirements

The Operator will monitor its performance and report monthly on the following metrics:

- Number of workers receiving health screening for pre-existing communicable diseases, including COVID-19
- Number of workers testing positive for any communicable diseases
- Number of health and safety education and awareness training sessions provided
- Number of incidents of any trafficking in persons, GBV, or SEA by project employees
- Number of grievances filed by the community relating to interactions with project workers
- Monitoring of the SEA/SH GRM to ensure that protocols are followed in a timely manner, including referring complaints to the service provider to review and addressing SEA/SH complaints
- Regular M&E of progress on SEA/SH activities, including reassessment of risks as appropriate

2.10 Traffic Management Plan

2.10.1 Purpose

The purpose of the Traffic Management Plan (TMP) is to minimize the risk of traffic accidents and resulting injuries and fatalities to both workers and the public, as well as wildlife, to maintain safe and continuous pedestrian access to community facilities, and to ensure that the Project complies with the traffic safety requirements of the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 3.4) as well as the World Bank's Good Practice Note on Road Safety (World Bank, October 2019).

2.10.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to traffic:

- Vehicular traffic accidents and wildlife strikes
- Speeding of vehicles

2.10.3 Operator Minimum Requirements

The Operator shall prepare a **Traffic Management Plan**. This plan will apply to the access road and the transportation corridor to the project site. The plan will cover motorized vehicles, parking, and pedestrian movements. The Operator shall:

- Provide proper maintenance and replace any damaged pavement markings, pedestrian crossing markers, signs (informational, directional, and hazard, including school crossing and village entrance signage), and lighting.
- Ensure all project-related vehicles comply with designated speed limits:
  - Vehicles moving within the project site shall be limited to 20 km/hr
  - Vehicles travelling along the Koshi Highway shall be limited to 30 km/hr or the posted speed limit.
  - Monitor vehicles speeds using GPS trackers and recorders.
  - Incorporate penalties in transport subcontracts for non-compliance with vehicle speed limits.
- Establish driver candidate minimum employment requirements, including:
  - Possess a valid license to drive the type/class of vehicle required.
  - Have an accident-free driving record.
- Pass an eye chart exam.
- Provide driver-safety training.
  - The Operator shall ensure that all drivers of project vehicles as well as suppliers and their delivery drivers receive driver safety training, including defensive driving instructions, and are clearly informed of the safety risks in the project area and the importance of safe driving.
  - Ensure that all project drivers are aware of specific project procedures and restrictions (e.g., respected speed limits, prohibition on the use of mobile phones, prohibition on the use of alcohol or drugs; limits on night-time driving; limits on hours of driving; accident/incident reporting requirements; and disciplinary actions).
- Ensure project vehicles are safe to operate:
  - Provide regular maintenance for all vehicles, including inspection of tires, breaks, lights, and warning signals.
  - Ensure all vehicles are equipped with seat belts, first aid kits, and communication devices (e.g., phone, radio) so that any accidents can be reported immediately.
  - Conduct random vehicle safety inspections.
- Provide vehicular traffic safety education and awareness training for all residents in the project area at six month intervals for the first year of operation and in local schools.
- Conduct random alcohol and drug testing of drivers.
- Limit night-time vehicle traffic between the powerhouse and headworks areas.

2.10.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator’s Traffic Management Plan.
- Monitor Operator performance (see Section 2.10.5 below).

2.10.5 Monitoring Requirements

Each prime Operator will monitor its performance and report monthly on the following metrics:

- Number of community traffic safety education and awareness training sessions conducted
- Number of employees completing driver safety training
- Average daily traffic through the road tunnel (e.g., between the headworks and powerhouse areas)
- Number of traffic incidents (including wildlife strikes) and pedestrian injuries
- Average traffic speeds of project vehicles based on GPS monitors
- Results of random alcohol and drug testing of drivers
- Number of grievances filed related to traffic and their resolution

2.11 Security Personnel Management Plan

2.11.1 Purpose

The purpose of the Security Personnel Management Plan (SPMP) is to minimize the risk to project workers and local communities related to the use of security personnel by UAHEL or the Operator, and to ensure that the Project complies with the World Bank's Good Practice Note for Borrowers on Assessing and Managing the Risks and Impacts of the Use of Security Personnel (World Bank, October 2018).

2.11.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to security personnel.

- The Project will deploy security personnel (both private as well as public) to prevent trespassing, vandalism, theft, sabotage of project property etc.
- The use of security personnel will create an inconvenience for local residents
- There is potential for the use of excessive force against local community by security personnel deployed by the Project.

2.11.3 Operator Minimum Requirements

The Operator shall prepare a **Security Personnel Management Plan**. The Operator is responsible for maintaining the safety and security of all Operator personnel and visitors to project facilities and for avoiding the use of force against the public. This plan shall include at least the following minimum requirements:

- Prepare a Security Risk Assessment identifying the key security risks to the Project.
- If the Security Risk Assessment indicates that security personnel are required, prepare a Security Management Plan to manage risks to the security of project-affected communities and project workers that could arise from the use of security personnel.
- The use of force by direct or contracted workers in providing security should be avoided except when used for preventive and defensive purposes in proportion to the nature and extent of the threat.
- Ensure that the Project is compliant with IFC Performance Standard 4 and the UN Voluntary Principles on Security and Human Rights (http://www.voluntaryprinciples.org/).
- Make reasonable inquiries/background checks to verify that any security personnel to be hired for the Project are not implicated in any past wrongdoings such as allegations of past abuses,

inappropriate use of force, or criminal activities. These checks will be documented and maintained for each of the security personnel screened. No individual for whom there is credible evidence of wrongdoings shall be hired.

- The security agency shall give preference in hiring to local candidates with required qualification, and diversity shall be maintained in hiring by including women.
- In case that a third-party security service provider is engaged by the Operator, the Operator shall ensure that the private security agency complies with the Companies Act of Nepal and the Labour Act Nepal.
- Develop standard operating procedures for security guards, and conduct trainings as per the International Code of Conduct for private security providers.
- Train security personnel in the appropriate use of force and appropriate conduct toward workers and affected communities.
- Require security personnel to act within the applicable Nepali law and any requirements established by UAHEL and/or the World Bank
- Keep unauthorized persons off the project site. Authorized persons shall be limited to the Operator's and the Owner's personnel or other individuals approved by the Operator or Owner.
- The security service provider will allow external audits and inquiries into any credible allegations of abuse or wrongdoing.
- Security personnel will only be authorized to carry weapons with prior approval by UAHEL. The use of weapons will be only for preventive and defensive purpose.

2.11.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Security Risk Assessment (SRA) and Security Personnel Management Plan (SPMP).
- Monitor performance of the Operator and its sub-Operator providing security (see Section 2.11.5 below).
- Review all allegations of unlawful or abusive acts by security personnel, take action to prevent recurrence, and, where necessary, report unlawful and abusive acts to the relevant authorities.
- Enter into a memorandum of understanding (MoU) with any public security force to follow the Project's Policy on Security, commit to the proportional use of force, and agree to other requirements including disciplinary measures, training, and incident follow-up.

2.11.5 Monitoring Requirements

The Operator will monitor its performance and report monthly on the following metrics:

- Number and type of site visitors within the reporting period
- Number and nature of security incidents
- Report immediately on any use of force by security personnel
- Confirmation that all security guards have received the required training
- Number of security guards, if any, authorized to carry arms
- Number of security-related grievance filed

2.12 Labour Management Plan

2.12.1 Purpose

The purpose of the Labour Management Plan (LMP) is to protect project workers' rights, and to ensure that the Project complies with the requirements of the World Bank's Environmental and Social Framework (ESS 2 – Labour and Working Conditions) as well as the Labour Management Procedures for the Project.

2.12.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to the potential labor risks associated with the Project include:

- Potential use of child labor or forced labor
- Violation of recognized labor rights including freedom of association and collective bargaining of project workers

2.12.3 Operator Minimum Requirements

The Operator shall prepare a **Labour Management Plan**. This plan shall include at least the following minimum requirements:

- Document that the Operator has adopted a Labour Policy that expressly prohibits child labor, forced labor, and the discrimination of workers, and commits the Operator to the fair treatment of workers, equal opportunity, especially for women and people with disabilities, and the recognition of labor rights, including freedom of association and collective bargaining. The Operator shall not make decisions relating to the employment or treatment of the Operator's personnel on the basis of personal characteristics unrelated to inherent job requirements.
- The Operator shall not employ or engage a child under the age of 14. No workers below the age of 18 will be allowed by the Operator to undertake any work which is hazardous.
- The Operator shall adopt a human resources policy and plan to ensure that workers have access to clear and understandable information regarding their rights, as they pertain to labor and working conditions.
- The Operator shall recognize workers' organizations, as per law or any alternative forums which are constituted by workers to protect their rights regarding working conditions and terms of employment and express their grievances on these issues.
- The Operator shall not discriminate or retaliate against the Operator's personnel who participate, or seek to participate, in workers organizations and collective bargaining or alternative mechanisms.
- The Operator will provide minimum wages, as per applicable laws, and shall inform all workers about any deductions applicable to their wages and the conditions of such deductions, in accordance with the applicable laws, during their recruitment process.
- The Operator will keep a record of all workers engaged by them and make it available to the Project for periodic labor audits.
- The Operator shall have a GRM to allow employees to raise workplace concerns. The Operator's personnel shall be informed of the GRM at the time of engagement/contracting, and the measures put in place to protect them against any reprisal for its use. The GRM shall not impede access to other judicial or administrative remedies that might be available, or substitute for grievance mechanisms provided through collective agreements.

2.12.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Labour Management Plan (LMP).
- Monitor Operator performance (see Section 2.12.5 below).

2.12.5 Monitoring Requirements

Each prime Operator will monitor its performance and report monthly on the following metrics:

- Total number of employees (i.e., signed contracts), disaggregated by:
  - Gender
  - Country of Nationality
  - "Local" employees (i.e., number from Bhotkhola and Makalu Rural Municipalities)
  - Age (below 18, over 18)
  - Persons with disabilities
- Any incidents of child or forced labor
- Standard contract terms and conditions of employment
- Number and nature of any labor-related grievances

2.13 Cultural Heritage Management Plan

2.13.1 Purpose

The purpose of the Cultural Heritage Management Plan (CHMP) is to preserve and protect both tangible and intangible cultural heritage from adverse impacts associated with operation of the Project in accordance with the World Bank's Environmental and Social Framework's requirements (ESS 8). Cultural heritage and archaeological resources include all tangible heritage as listed in Nepal's Ancient Monument Preservation Act, 2013 (1956 AD), as well as other tangible and intangible resources, as defined under WB ESS 8.

2.13.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key project risks and impacts related to cultural heritage resources during the operation phase:

- Impact on local indigenous people's culture due to presence of in-migrant workers with different cultural background
- Increased noise levels in close proximity of cultural sites, disturbance during festivals, cultural gatherings, and traditional ceremonies
- Increase in the number of non-local workers and potential change in demographics resulting from increased connectivity may potentially have impacts on existing cultural and traditional norms of the community, distinct cultural and religious practices, language and respect for local culture and traditions, traditional knowledge and lifestyle, rituals, and cultural practices.

2.13.3 Operator Minimum Requirements

The Operator shall prepare a **Cultural Heritage Management Plan**. This plan shall include at least the following minimum requirements:

- The Operator will avoid disruption of festivals, community rituals, and gatherings, in consultation with communities.
- The Operator will organize training and awareness program for employees and workers on local cultural sensitivities and ensure implementation of the Workers' Code of Conduct (see Section 2.2).
- The Operator will hold regular consultations with the local communities to notify them of project activities.
- The Operator will carry out maintenance and updating of a central list of tangible cultural heritage around the project areas to avoid accidental damage.

2.13.4 Owner Responsibilities

While the Operator manages the direct impacts on the cultural heritage sites from project activities, the Project will do the following to manage impacts on intangible aspects of cultural heritage. The intangible cultural heritage is to be protected from the risk of "cultural fading" due to exposure to other cultures introduced by the Project.

UAHEL will be responsible for the following actions:

- Establish an Ethnographic Museum and Culture Centre (EMCC) at a location in consultation with local communities. Following activities will be coordinated from this EMCC.
  - Establish a Handicraft and Local Produce Market (HLPM).
  - Provide financial support for publication of books in indigenous people's languages.
  - Support setting up of a community radio center.
  - Promote the Lama education system, including shamanistic/faith healing traditions, by providing assistance to Lamas and other traditional practitioners to record those ritual practices and obtain intellectual property rights where appropriate.
- Restore dilapidated cultural sites involving an experienced cultural heritage conservation agency. The conservation agency will train local masons and artisans/craftsmen in conservation techniques to transfer the know-how.
- Improve connectivity and infrastructure for devotees at existing sacred places such as Jalpa Devi Temple in Tungkhalin and other devithans in Namase/Hema and Hatiya by providing financial assistance and construction materials to committees taking care of these cultural sites.
- Monitor Operator performance (see Section 2.13.5 below).

2.13.5 Monitoring Requirements

Each prime Operator will monitor its performance and report monthly on the following metrics:

- Number of grievances filed related to cultural heritage resources

2.14 Emergency Preparedness and Response Plan

2.14.1 Purpose

The purpose of the Emergency Preparedness and Response Plan (EPRP) is to help protect workers and local residents from unplanned events that could result in injury or death, and to ensure that the

Project complies with the emergency preparedness and response requirements of the World Bank's Environmental, Health, and Safety General Guidelines (World Bank, April 30, 2007, Section 3.7).

2.14.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts related to emergency preparedness and response plan:

- Risks to community health and safety and potential damage or loss of physical assets due to natural disasters and project-related emergencies

2.14.3 Operator Minimum Requirements

The Operator shall prepare an **Emergency Preparedness and Response Plan**. This plan shall address all reasonably foreseeable emergencies that may occur at the Project, including flooding, glacial lake outburst floods (GLOF), dam break, sudden unexpected release of water from the dam or powerhouse, earthquakes, fires, landslides, tunnel collapse, hazardous gas concentrations in the tunnels, drowning, traffic accidents, and similar events. This plan shall include at least the following minimum requirements:

- For each of the emergency situations, the Management Plan shall describe the:
  - Operator's command structure for responding to the emergency
  - Measures the Operator will take to prevent the emergency from occurring, if possible
  - Monitoring the Operator will conduct in order to detect developing emergency conditions (e.g., monitor flow in the river, real-time gas monitoring system in the tunnel)
  - Equipment the Operator will ensure is available and well-maintained at the Operation site
  - Alarms, including both visual and auditory alerts, to notify personnel and the public of emergency conditions
  - Communication procedures and equipment that the Operator shall use for notifying its personnel, emergency responders, nearby and downstream residents, the Owners, and local and national government officials of impending or actual emergency conditions
  - Training exercises and drills the Operator will conduct to ensure workers are aware of and prepared in the event of each type of emergency
  - Awareness and other training for local residents so they know how to protect themselves in the event of an emergency
  - Evacuation plans for its personnel as well as nearby or downstream residents
  - Rescue procedures
  - Records the Operator will maintain onsite documenting the training exercises and drills it has conducted
  - Detailed procedures the Operator will follow in the event of each type of emergency
  - Conditions under which the Project can return to normal operations and the procedures to document those conditions
  - Incident reporting and close out requirements
  - Measures the Operator will take to document lessons learned from training exercises, drills and actual emergencies
- The Operator shall prepare this Emergency Preparedness and Response Management Plan in consultation with appropriate Nepali central, district, municipal, and ward officials.

- Once the plan has been approved by UAHEL, the Operator will hold information meetings with each of the local villages to ensure local residents are familiar with the plan and emergency procedures.

2.14.4 Owner Responsibilities

UAHEL will be responsible for the following actions:

- Review and approval of the Operator's Emergency Preparedness and Response Plan,
- Coordinate with Chinese government to develop a cross-border approach for an early warning system to improve management of geohazards, sediment, and water resources.
- Monitor Operator performance (see Section 2.14.5 below).

2.14.5 Monitoring Requirements

Responsible monitoring operator will monitor its performance and report monthly on the following metrics:

- Number of community information meetings held
- Number, type, and severity of emergencies that occur
- Number of worker and community injuries and fatalities

2.15 Project Decommissioning Plan

2.15.1 Purpose

The purpose of the Project Decommissioning Plan is to minimize environmental and social risks and impacts associated with project closure and decommissioning and removal of project facilities in accordance with the World Bank's ESS. As decommissioning is not expected for at least 50 years, this management plan does not need to be prepared prior to commencement of project operations.

2.15.2 Key Project Risks and Impacts

The UAHEP ESIA identifies the following key operation phase project risks and impacts associated with project decommissioning:

- Impacts on water quality and aquatic habitat associated with the release of sediments deposited in the reservoir
- Increases in water discharges and air emissions
- Nuisance impacts associated with the use of explosives, and increased noise, vibration, fugitive dust and traffic
- In-migration of workers and associated influx, and the potential for increased conflicts with local residents
- Occupational health and safety risks associated with demolishing project facilities
- Economic impacts to the local villages resulting from the loss of local employment and demand for local services
- Uncertainty regarding future use of project lands

2.15.3 Operator Minimum Requirements

To be determined in the plan.

2.15.4 Owner Responsibilities

To be determined in the plan.

2.15.5 Monitoring Requirements

To be determined in the plan.

Prepared for:

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Annex C3: Biodiversity Management Plan

January 2024

Disclaimer: *This Upper Arun Hydro-electric Project's draft Environmental and Social Impact Assessment (ESIA) was prepared by UAHEL broadly following Good International Industry Practices (GIIP) as those required under the Bank's Environmental and Social Framework (ESF).*

The review of this ESIA is a key part of the Bank's due diligence process and is currently ongoing. This draft ESIA may still contain gaps to fully address all pertinent E&S issues in the project. Any gaps will be covered through supplemental studies, assessments, and/or plans that will be completed in a reasonable timeframe to ensure compliance with the ESF.

For the benefit of potentially project affected people (PAP) and other interested stakeholders, and in alignment with the Bank's Policy on Access to Information this draft ESIA is being disclosed as soon as it became available. This disclosure, however, should not be considered as a final clearance of the ESIA by the World Bank.

CONTENTS

List of Tables

1. INTRODUCTION

1.1 Project Outline

Upper Arun Hydro-electric Limited (UAHEL), a subsidiary of the Nepal Electricity Authority (NEA), proposes to construct the Upper Arun Hydroelectric Project (UAHEP or Project) on the Arun River, in Bhotkhola and Makalu rural municipalities, in Sankhuwasabha District, Koshi Province, in eastern Nepal. The UAHEP dam site will be located on the Arun River close to Chepuwa Village on the right bank and Rukma Village on the left bank at a narrow gorge about 350 m upstream from the Arun River's confluence with Chepuwa Khola waterfall. The proposed UAHEP underground power plant site would be located on the left bank of the Arun River, close to village of Sibrun, about 750 m upstream from the confluence of the Arun River with Leksuwa Khola. The final design provides for an installed capacity of 1,040 MW, a 100 meter (m) high dam with a reservoir at elevation 1,640 meters above sea level (masl; all elevations in this ESIA reference masl) and an annual average energy generation of 4,513 GWh.

ERM has used the framework outlined by the World Bank (WB) in its Environment and Social Standards (ESS) and the World Bank's Biodiversity Offsets User Guide when developing the biodiversity approach for the Project.

1.2 Applicable Standards, References and Documents

The relevant standards applicable to this project are:

- World Bank (WB) Environment and Social Standards (ESS)
- International Finance Corporation (IFC) Performance Standards (PS) – in particular, IFC PS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources
- European Investment Bank (EIB) Standard 3: Biodiversity and Ecosystems

ERM has undertaken an initial biodiversity offsets assessment based on the guidance contained in the Business and Biodiversity Offset Program (BBOP) resource documents:

- World Bank's Biodiversity Offsets: A User Guide (World Bank 2016)[1]
- Biodiversity Offset Design Handbook (BBOP 2012a)[2]
- Resource Paper: No Net Loss and Net-Gain Calculations in Biodiversity Offsets (BBOP 2012b)[3]

1.3 Objectives

The objectives of this BMP are to outline practical steps to assist UAHEL to meet the obligations required by WB ESS 6. The policy outlines the associated procedures and actions for biodiversity management within the project area.

The following objectives apply in relation to the management of biodiversity and ecosystem services:

- Reduce the impacts of the Project on biodiversity values to first avoid, then minimize where possible and then restore, and, as a last resort, offset impacts.
- Ensuring no net loss where natural habitats are converted or degraded and net gains where critical habitats are converted or degraded.
- Respect the requirements of legally protected and internationally recognized areas of high biodiversity values by ensuring that any activities undertaken are consistent with the area's legal

[1] World Bank. 2016. *Biodiversity Offsets: A User Guide*. Washington, D.C.: World Bank. https://openknowledge.worldbank.org/handle/10986/25758 License: CC BY 3.0 I

[2] Business and Biodiversity Offsets Programme (BBOP). 2012a. *Biodiversity Offset Design Handbook*. Washington, D.C.: BBOP.

[3] Business and Biodiversity Offsets Programme (BBOP). 2012b. *Resource Paper: No Net Loss and Loss-Gain Calculations in Biodiversity Offsets*. Washington, D.C.: BBOP.

protection status and management objectives. Assess and manage the value of nature for people at the project sites in conjunction with the community.

- Assess and manage critical habitats and natural habitats within UAHEL controlled and managed areas in line with WB ESS 6 requirements.
- Adopt practices that are practical and easily implementable, while meeting the objectives of sustainably managing biodiversity.
- Compensate for residual impacts to biodiversity values through biodiversity offsets.
- Work with local communities and key stakeholders to restore biodiversity values.

1.4 Structure of this BMP

The BMP includes the following components:

- **Section 1: Introduction** – outlining biodiversity mitigation actions to reduce impacts to biodiversity within the project area during construction and operation
- **Section 2: Biodiversity Monitoring and Evaluation Plan (BEMP)** – outlining the requirements to monitor and assess the effectiveness of management measures and instigate corrective actions
- **Section 3: No-net-loss/Net Gain Assessment** – outlining the requirements to achieve a no-net-loss of biodiversity values by compensating for residual impacts due to the Project, including recommendations for the preparation of a Biodiversity Offset Strategy
- **Section 4: Outline of a Biodiversity Offset Strategy** –describing the priority species requiring management within the Arun watershed to achieve no-net-loss/net gain outcomes
- **Section 5: Outline of Additional Conservation Action (ACA)** – to specifically promote and enhance the conservation aims and effective management of the Makalu Barun National Park (MBNP) Buffer Zone and associated Important Bird Area (IBA)
- **Appendices** – outlining the requirements to implement the actions within the BMP

2. BIODIVERSITY MANAGEMENT AND EVALUATION PLAN

2.1 Application

This Biodiversity Management Plan (BMP) applies to activities during both construction and operation of the UAHEP within the project area.

2.2 Biodiversity Management Actions

Biodiversity management actions are proposed in the ESIA prepared for the Project and included in the Environmental and Social Commitment Plan (ESCP). These mitigations and specific actions are to occur within the concession areas to reduce the impacts to biodiversity values during the operation of the facilities. The actions are to occur for the life of the project operations. The tasks, mitigation actions and responsibilities are outlined in ***Table 2.1***.

2.3 Monitoring and Evaluation

Monitoring and evaluation measures are to be implemented for all of the biodiversity mitigation actions and are outlined in ***Table 2.2***.

2.4 Roles and Responsibilities

To ensure the ownership of actions, each measure has been assigned to a particular designation within UAHEL.

2.5 Plan Review and Update

The BMP is to be reviewed and updated as required with consideration of changes to project operations and areas where refinement is required. This is in line with the Adaptive Management approach under WB ESF ESS 6. Any major changes to the BMP must be approved by UAHEL and the World Bank prior to implementation.

Table 2.1 Biodiversity Management Plan

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
Terrestrial Biodiversity							
1.	Worker impacts	■ Preparation of standard worker employer agreements/Code of Conduct that include relevant clauses prohibiting hunting/ poaching/illegal trade in wildlife and plants/ illegal logging during employment ■ The Project Owner shall provide training to staff and workers on all rules, regulations, and information concerning restrictions related to unauthorized clearing of vegetation, as well as the punishment that can be expected if any staff or worker or other person associated with the Project violates Nepali laws or the Code of Conduct.	■ Entire project site	■ Contractor	■ UAHEL	■ Workers' Code of Conduct	■ During construction and operation

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
2.	Loss of terrestrial habitat during construction phase	■ All areas to be cleared are to be appropriately marked prior to clearance. Clearing vegetation outside of designated areas will be prohibited.	■ Construction sites in natural habitats	■ Contractor	■ UAHEL	■ Annex C3-A Wildlife Shepherding Protocol	During construction and operation
		■ Training is to be provided to all staff and contractors on the requirement to not clear outside of designated areas.	■ Staff and contractors operating within the project area	■ Contractor	■ UAHEL	■ Annex C3-B Biodiversity Induction Training Procedure	
		■ Prohibit the burning of cleared vegetation: - In community forests, trees shall be cut and deposited in accordance with the agreement with the Community Forest User Groups. - Any invasive plant species found shall be segregated and disposed of as solid waste.	■ Project footprint	■ Contractor	■ UAHEL		

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ The access road can be used by local people, but safety considerations and speed limits of 20 km/h should be enforced. Checkpoints should be used to manage access and inspect vehicles for wood and timber products taken from areas of natural habitat within the project area.	■ Access road at project boundary	■ Contractor	■ UAHEL	■ Annex C3-B Biodiversity Induction Training Procedure	
		■ A community program is to be established with adjacent landowners to socialize the restrictions on access to reduce the collection of timber and non-timber forest products from areas of natural habitat within the project area and areas under the control of the Sponsor.	■ Areas of natural habitat within project area	■ UAHEL	■ UAHEL	■ Annex C3-D Biodiversity Community Engagement Procedure	
		■ Satellite imagery is to be used to assess the losses/gains in vegetation within the		■ UAHEL with guidance from a qualified terrestrial	■ UAHEL	■ Annex C3-G Site Rehabilitation Plan	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		Ecologically Appropriate Area of Analysis (EAAA). Where induced clearing of natural habitat occurs within the EAAA, the Biodiversity Offset Management Plan is to be updated within 5 years of operations if required (and “as appropriate” after that) to take into account any additional losses to ensure the long-term achievement of no-net-loss.		ecologist with experience on assessing no net loss/net gains		■ Annex C3-H Invasive Alien Species Management Plan	
		■ Land rehabilitation will be undertaken using native species on area disturbed during construction. This includes the restoration of all temporarily disturbed natural habitat that will not support permanent facilities. A site nursery is to be established to propagate flora for this purpose. Additionally project plans to plant		■ UAHEL	■ UAHEL, DFO, MBNP, DNPWC	■ Annex C3-G Site Rehabilitation Plan	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		bamboo and fruit bearing plants as food source for red panda and other wild animals.					
3.	Disturbance and/or displacement of fauna during construction and operation phases	■ A *Fauna Shepherding Protocol* is to be used in the project area to ensure that any fauna have vacated the area prior to any clearance work.	■ With natural habitat within the project area	■ Contractor	■ UAHEL	■ Annex C3-A Wildlife Shepherding Protocol	
		■ Training is to be provided to all staff and contractors on any threatened species that are likely to be encountered during construction and operation, including measures related to fauna rescue outlined within the *Fauna Shepherding Protocol*	■ All staff and contractors within the project area	■ Contractor	■ UAHEL	■ Annex C3-B Biodiversity Induction Training Procedure ■ Engineering design of the lighting strategy	
		■ Noise attenuation is to be used during construction activities. Aboveground night time (20:00–5:00			■ UAHEL	■ Annex C3-B Biodiversity Induction Training Procedure	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		hours) construction is prohibited inside Buffer Zone area unless emergency				■ Engineering design of the lighting strategy	
		■ Permanent and temporary lighting is to utilize timers where possible to avoid unnecessary light at night-time. Cowls and directional lighting is to be used to not focus towards areas of critical habitat.	■ Temporary construction areas lit at night in the project area	■ Contractor	■ UAHEL	■ Annex C3-B Biodiversity Induction Training Procedure ■ Engineering design of the lighting strategy	
4.	Barriers, fragmentation and edge effects – habitat	■ Micro siting of project infrastructure (such as workers' camps and lay down areas) away from areas of natural habitat is required to avoid edge effects and fragmentation.	■ Minor project infrastructure within the project area	■ UAHEL Contractor	■ UAHEL	■ Use of the natural habitat map layer when defining final alignment of the Project to avoid areas of natural habitat ■ Annex C3-A Wildlife Shepherding Protocol ■ Annex C3-B Biodiversity Induction Training Procedure	During construction and operation

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ Where possible, to reduce the impacts of habitat fragmentation, areas between existing fragmented forest patches are to undergo revegetation efforts. Revegetation efforts should ensure the use of suitable native flora species. A nursery is to be established for this purpose to grow local indigenous vegetation.	■ Natural habitat patches within the project area		■ UAHEL	■ Annex C3-G Site Rehabilitation Plan ■ Annex C3-H Invasive Alien Species Management Plan	
		■ Fence areas, where practicable, between patches of natural habitats adjacent to project areas to promote natural restoration and prevent further damage from anthropogenic impacts (e.g., walking tracks).	■ Areas adjacent to minor project infrastructure construction sites		■ UAHEL	■ Use of the natural habitat map layer when defining final alignment of the project to avoid areas of natural habitat ■ Annex C3-G Site Rehabilitation Plan	
		■ Where possible, reduce perimeter lengths of proposed clearing areas to reduce the extent of microclimate impacts.	■ Project infrastructure construction sites		■ UAHEL	■ Annex C3-G Site Rehabilitation Plan ■ Use of the natural habitat map layer when defining final alignment of the	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
						project to avoid areas of natural habitat	
		■ Where possible, suppress vegetation underneath the transmission line (rather than clearing), to avoid it acting as a barrier for fauna. ■ Avoid clearing of shrub and herb layers within the transmission line right-of-way (RoW) to minimize potential barrier effects for fauna movement and retain cover for fauna. Clear only trees higher than 3 m to avoid interference with the transmission line.	■ Transmission line route during operation		■ UAHEL	■ Annex C3-G Site Rehabilitation Plan ■ Use of the natural habitat map layer when defining final alignment of the Project to avoid areas of natural habitat	
		■ For the four mammal critical habitat species, Wildlife Road Underpasses suitable for Himalayan black bear, clouded leopard, spotted linsang and arboreal bridges for red	■ Along access road, service roads, and other infrastructure (see ESIA Figure 7.18 for locations)		■ UAHEL	■ Building wildlife-friendly road crossings in line with map presented in ESIA Figure 7.18	■ During construction

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		panda will be included in the access road design. ■ These wildlife-friendly road crossings can also be used to facilitate the movement of small mammals, reptiles and amphibians. Crossings will also allow the passage of small-medium sized mammals (e.g., marten, mongoose, squirrel, otter, small cats, wild boar, civet, fox, porcupine – see ESIA Table 6.30) and herptiles. These crossing will be designed as an open bottom box culvert with a minimum dimension of 4m high x 6 m wide, as per the standards, regardless of hydrology requirements. These culvert boxes are suitable for the largest mammals such as Himalayan black bears in the project area.					

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		These crossings will also include placing low-rise wildlife fencing (approximately 50 cm high) along both sides of the road for 25 m to direct small animals and herpetofauna to the wildlife crossing, and posting warning signage for vehicles to watch for wildlife. Provide overhead cableway crossings for arboreal wildlife species (e.g., monkeys).					
5.	Degradation of terrestrial habitat during the construction and operation phase	■ Fencing and hoarding is to be used where minor project infrastructure (such as buildings) is adjacent to natural habitat patches, where practicable, to reduce impacts on adjacent flora.	■ Areas around minor project infrastructure	■ Contractor	■ UAHEL	■ Annex C3-B Biodiversity Induction Training Procedure	Prior to and during construction and operation

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ A worker and sub-contractor education program will be implemented to inform personnel about the prohibition on collecting timber and non-timber forest products and the importance of natural habitat for the conservation of significant species. The education program is to be conducted within 3 month of commencement of construction, with refresher consultation at 6 monthly intervals until the end of the construction phase.	■ Workers and contractors within the project area		■ UAHEL	■ Worker employment agreements including requirements related to taking of timber and forest products ■ Annex C3-B Biodiversity Induction Training Procedure	
		■ The access road can be used by local people, but safety considerations and speed limits of 20 km/h should be enforced. Checkpoints are to be used to manage access and inspect vehicles for wood and	■ Access road entrances at project boundary	■ Contractor	■ UAHEL	■ Annex C3-B Biodiversity Induction Training Procedure ■ Annex C3-D Biodiversity Community Engagement Procedure	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		timber products taken from areas of natural habitat within the project area.					
		■ A community program is to be established with adjacent landowners to socialize the restrictions on access to reduce the collection of timber and non-timber forest products from areas of natural habitat within the project area and other areas. The education program is to be conducted within 3 month of commencement of construction, with repeats at 6 monthly intervals until the end of the construction phase.	■ Villages within the EAAA	■ UAHEL	■ UAHEL	■ Annex C3-B Biodiversity Induction Training Procedure ■ Annex C3-D Biodiversity Community Engagement Procedure ■ Inclusion of biodiversity related materials in the community livelihood restoration program	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ Land rehabilitation using native species of flora will be undertaken in areas disturbed during construction. A site nursery is to be established to propagate flora for this purpose. Land rehabilitation in each disturbed area is to commence within one (1) year of the completion of construction activities associated with the project component.	■ Construction sites within the project area	■ Contractor	■ UAHEL	■ Annex C3-G Site Rehabilitation Plan ■ Annex C3-H Invasive Alien Species Management Plan	
		■ Invasive alien species management is to occur in areas of natural habitat during construction and operation. An invasive species management plan is to be prepared and incorporated into the Biodiversity Management Plan for the Project.	■ Natural habitat within the project area	■ Contractor, UAHEL	■ UAHEL	■ Annex C3-H Invasive Alien Species Management Plan	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ A fire management strategy is to be prepared in conjunction with the local authorities to reduce the risk of fire during construction and operation. The fire management strategy is to take into account prevention of fire starting and measures to control fires within natural habitats.	■ Natural habitat within the project area, particularly along the transmission line	Contractor	■ UAHEL	■ Preparation of a fire management strategy with local authorities prior to construction	
6.	Mortality events during the construction phase and operation phase	■ All vehicles are to maintain a speed of a maximum of 20 km/hr within the project area to reduce the risk of fauna strikes.	■ All project access roads	■ UAHEL and Contractor	■ UAHEL, MBNP, DFO	■ Speed limits applied for all roads within the project area during construction ■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements including requirements related to hunting and poaching ■ Annex C3-E Injured Wildlife Protocol	During construction and operation

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ Provide training to drivers within the project footprint to inform them of speed limits and make them aware of potential wildlife crossing of the transportation corridor (i.e., the project access road) and access road, and to provide procedures for avoiding and reporting wildlife strikes. ■ Require reporting of all wildlife strikes.	■ Throughout project footprint and along transportation corridor	Contractor	UAHEL		
		■ Prohibit hunting and poaching for bush meat and wildlife trade. ■ The Contractor shall provide training to workers and sub-contractors on all rules, regulations, and information concerning restrictions related to hunting and poaching. ■ Hunting and poaching will be prohibited for	■ Workers and contractors within the project area	■ Contractor	■ UAHEL, MBNP, DFO	■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements/ Workers' Code of Conduct including requirements related to hunting, poaching and trade in wildlife ■ Section 2 UAHEL Biodiversity and	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		project staff, workers, all contractors, and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal for repeat offenders.				Ecosystem Services Policy ■ Annex C3-D Biodiversity Community Engagement Procedure	
		■ Controlled access will be implemented at all work sites within the project area. Vehicle inspections will occur for fauna and flora. Where inspections identify species in vehicles, details of the matter will be provided to the appropriate regulatory authority.	■ Access road entrances at project boundary	■ Contractor	■ UAHEL, DFO, MBNP	■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements including requirements related to hunting and poaching ■ Annex C3-D Biodiversity Community Engagement Procedure	
		Impacts on fauna from clearing:	■ Natural habitat within the	■ Contractor	■ UAHEL		

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ Clearance should be undertaken in accordance with the *Wildlife Shepherding Protocol*	project area cleared			■ Annex C3-A Wildlife Shepherding Protocol ■ Annex C3-E Injured Wildlife Protocol	
		Transmission line impacts to avifauna:	■ Transmission line		■ UAHEL	■ Avian Power Line Interaction Committee – Reducing Avian Collisions with Power Lines, (Annex C3-I)	
		■ The engineering design will incorporate the requirements of the Avian Power Line Interaction Committee – Reducing Avian Collisions with Power Lines (APLIC 2012)		■ Design Consultant			Prior to the completion of the transmission line
		As a minimum, the following measures are to be applied to transmission lines: ■ Implement the requirements of the Avian Power Line Interaction Committee – Reducing Avian Collisions with Power Lines (APLIC 2012).		■ Design Consultant	■ UAHEL		

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ Install visibility enhancement objects such as marker balls, bird deterrents, and bird flight diverters on the earth wire in areas with a high bird population to increase line visibility to birds and reduce bird-line collisions. ■ Ensure the conductors are separated by more than the length of the wingspan of the largest bird found in the area (i.e., Himalayan griffon) in order to eliminate the potential for bird electrocution on the towers (>3m) and isolate areas where birds are resting or nesting. ■ Limit tree clearing to those required to meet safety standards between the conductors and trees.		■ Contractor ■ Design Consultant ■ Contractor			
Aquatic Biodiversity							

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
7.	Loss of aquatic habitat	■ Revegetation and shoreline protection will be undertaken at the full supply level of the dam on steep bank slopes to prevent erosion.	■ Full supply level of the reservoir	■ UAHEL	■ UAHEL , DFO	■ Annex C3-C Sediment and Erosion Control Procedure ■ Annex C3-G Site Rehabilitation Plan	During construction and operation
		■ Development and implementation of the aquatic component of the invasive alien species management plan so that aquatic invasive species such as water hyacinth (*Eichhornia crassipes*) are controlled and removed if detected within the lake.	■ Reservoir zone	■ Contractor, UAHEL	■ UAHEL	■ Annex C3-H Invasive Alien Species Management Plan	
		■ Local authorities are to be liaised with regarding fishing within the reservoir and the introduction of any non-native species clearly prohibited.		■ UAHEL		■ Implementation of a fishing ban during the construction phase (as outlined in the ESMP, Appendix C to the ESIA) ■ Annex C3-D Biodiversity Community Engagement Procedure	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		■ Sediment control measures will be employed at the toe of the dam and sediment removed, as required, on a regular basis.		■ UAHEL	■ UAHEL	■ Annex C3-C Sediment and Erosion Control Procedure	
		■ Sediment flushing procedures have been developed and will be implemented during project operations. Fine sediments covering the river bottom might be very harmful to macroinvertebrates and fish. It is important to do the flushing during peak rainfall and over a time span that allows the lowest possible negative effects to river ecology. The Project's sediment management strategy has been developed and integrated into the Project's overall operations plan.		■ UAHEL	■ UAHEL Dam operation Supervising Engineer	■ Annex C3-C Sediment and Erosion Control Procedure	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
8.	Degradation of aquatic habitat in the diversion reach	■ Provide a year-round minimum flow of 5.41 m^3/s. ■ Flush sediment in accordance with the sediment management strategy. Sediments should only be flushed during high flow periods when there is sufficient flow to transport sediment through the diversion reach. ■ Consult with local stakeholders regarding any residual impacts on social/cultural uses of the diversion reach. ■ Introduce allochthonous matter or nutrients to the diversion reach to maintain the river's productivity and enhance fish populations.	■ UAHEP dam	■ UAHEL ■ UAHEL ■ UAHEL ■ UAHEL	■ UAHEL		Commence provision of EFlow as soon as diversion tunnel is closed

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
9.	Degradation of aquatic habitat downstream from the UAHEP powerhouse	■ Ensure tributary streams maintain habitat connectivity with the Arun River during project peaking, especially during the critical spring spawning period, as some fish species in the Arun River use the tributaries for spawning. Provide adaptive management measures such as channel improvements or ramping rates to maintain fish access to important spawning tributaries like Ikhuwa Khola and Leksuwa Khola.	■ Downstream from the powerhouse	■ UAHEL	■ UAHEL		Before initiation of construction

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
10.	Degradation of aquatic habitat in small tributary streams	■ Prohibit the washing of vehicles in local streams. ■ Avoid the disturbance of riparian vegetation within 25 m of any streams when withdrawing water.	■ Tributary streams within the project footprint	■ Contractor ■ UAHEL, Contractor	■ UAHEL , ■ UAHEL, DFO		
11.	Effects on fish movement and migration	■ No fish passage facility or fish hatchery is proposed. ■ Preserve the integrity of existing warm water tributaries between Arun-3 HEP dam and UAHEP dam to support a naturally reproducing and sustainable population of the migratory fish in this river segment.	■ Dam site	■ UAHEL ■ UAHEL	■ UAHEL ■ UAHEL		During construction and operation
12.	Impacts from fish impingement and entrainment	■ Install a trashrack/ screens at the headrace intake with a clear spacing between the bars of 2.5 cm and ensure the intake approach velocities are below 0.5 m/s in order	■ UAHEP dam	■ Contractor	■ UAHEL		

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		to reduce the risk of entrainment and impingement.					
13.	Water quality degradation during construction phase	■ A *Sediment and Erosion Control Strategy* has been prepared and is included within the BMP.	■ All construction sites	■ UAHEL , Contractor	■ UAHEL	■ Annex C3-C Sediment and Erosion Control Procedure ■ Engineering design for sediment and erosion control measures	During construction and operation
		Engineering designs (as outlined in the detail design project report) are to be prepared for: ■ Drainage and sediment control for roads and tracks ■ Requirements for permanent and temporary stream crossings ■ Sediment and erosion control design for major earthworks (dam, coffer dam, powerhouse construction sites) ■ Soil stabilization measures for earth		■ Design Consultant	■ UAHEL	■ Engineering design for sediment and erosion control measures	

SN	Impact	Required Mitigation	Location	Responsible for Implementation	Responsible for Monitoring	Implementation Action Reference	Timing
		spoil piles and embankments ■ Soil stabilization measures for steep slopes ■ Shoreline stabilization measures during inundation ■ Bed and bank stabilization measures for all instream works					
		■ Vegetation within the inundation zone is to be removed prior to inundation according to a *Biomass Removal Procedure*. The development of the plan is to be coordinated with local authorities, including the harvesting of commercial timber and forest products. Biomass is to be managed in accordance with local Nepalese laws and regulations governing organic waste disposal.	■ Inundation zone	■ Contractor	■ UAHEL	■ Annex C3-F Biomass Removal Procedure	

Table 2.2 Biodiversity Monitoring and Evaluation Plan

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
1.	■ Wildlife Shepherding Protocol	UAHEL	Records are to be kept and regularly reviewed (6 monthly basis) during construction on the application of the Fauna Shepherding Protocol.	Ongoing throughout construction	Not applicable	Along project boundary	Incident reports maintained	Records kept for all clearing events undertaken
			Regular checks are to occur along all project boundaries during construction to ensure compliance with clearing within marked boundaries.	Prior to commencement of clearance works		Within project area	Species records maintained	Marked boundaries in the field and maintained
2.	■ Biodiversity Induction Training Procedure	UAHEL	Records are to be kept and regularly reviewed (6 monthly) for implementation of the workforce training program for fauna/flora awareness.	Prior to commencement of works and for all new workers	Number of workers trained	Not applicable	Training attendance records maintained	All staff and workers trained and training material to be reviewed and updated regularly
			Where collection of wood and timber products is detected within the project area records are to be	Prior to commencement of works and for all new workers	Wood and timber product collection	All disturbed areas within construction sites	Monitoring and incident reports maintained	Number of incidents of staff breaching

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
			kept and reported to the appropriate regulatory authority for action.					Workers' Code of Conduct
3.	■ Soil Erosion and Sediment Control Procedure	UAHEL Supervising Engineer and Contractor	Records are to be kept and regularly reviewed (3 monthly basis) during construction on the application on the implementation of the *Sediment and Erosion Control Strategy.* Results from water quality monitoring are to be reviewed to identify elevated levels of total suspended solids (TSS) from construction areas.	Ongoing throughout construction	Contaminated runoff	Within and around project area	Monitoring and incident reports maintained	Compliance with relevant water quality standards for surface waters
4.	■ Biodiversity Community Engagement Procedure	UAHEL	A regular social engagement (12 monthly) survey is to be conducted to gauge the socialization of conservation measures, including the revegetation program.	Yearly	Not applicable	Not applicable	Minutes of meetings maintained	Engagements to be held with adjacent landowners with successful re-establishment of habitats, with usage by

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
								endemic bird trigger species
5.	■ Injured Wildlife Protocol	UAHEL	Records are to be kept and regularly reviewed (3 monthly) for implementation of the Injured Wildlife Protocol.	Prior to commencement of works and during construction and operation	Number of workers trained	Not applicable	Training attendance records maintained	All staff and workers trained Number of injured animals identified and cared for
6.	■ Biomass Removal Procedure	UAHEL Supervising Engineer and Contractor	Monitoring of the application of the biomass removal procedure. Monitoring is to consist of the area and amount of biomass removed within the Inundated area.	Monthly during biomass removal	Area cleared and tonnes of biomass removed	Within inundation zone	Monitoring reports maintained	Biomass managed and disposed of appropriately according to government requirements
7.	■ Site Rehabilitation Plan	UAHEL	Monitoring of rehabilitation success/failure is to occur on all replanting sites. Monitoring is to consist of regular inspections (3 monthly) to determine plant establishment. Where plant	Monthly during construction and within 12 months of operation period	Species, abundance, distribution, re-establishment success of species	Within project area	Monitoring reports maintained	All disturbed areas successfully re-established with habitat values and rehabilitated with native

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
			establishment is determined to have failed, reestablishment is to occur.					indigenous species.
8.	■ Invasive Species Management Plan	UAHEL Supervising Engineer and Contractor	Records are to be kept and regularly reviewed (3 monthly basis) during construction on the application on the implementation of the *Invasive Species Management Plan.* Monitoring is to include inspections of the site on a monthly basis during construction in areas of natural habitat to identify and eradicate any invasive species.	Ongoing throughout construction	Species, abundance and GPS locations of invasive species discovered	Natural habitat areas	Monitoring and incident reports maintained	Zero introductions of invasive species into natural habitats
9.	■ Engineering design for the transmission line will incorporate the requirements of the Avian Power Line Interaction	UAHEL Supervising Engineer and Contractor	An engineering design must be prepared and approved in accordance with the relevant Guidelines prior to construction.	During operations	Preparation of an appropriate engineering design for the transmission line	Not applicable	Engineering design completed and approved	Completion of engineering design prior to construction in compliance to relevant international standards

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
	Guidelines Reducing Avian Collisions with Power Lines, as well as Install visibility enhancement objects such as marker balls, bird deterrents, and bird flight diverters on earth wires in areas with a high bird population to increase line visibility to birds and reduce bird-line collisions. ■ Ensure that the conductors are separated by more than the length of the wingspan of the largest bird found in the area (i.e., Himalayan griffon) in order to		Regular inspection of the transmission line routes (3 monthly) during construction is to take place to identify any fauna mortality that has occurred. Where patterns in species mortality or conservation significant species are identified, advice from a suitably qualified person should be sought to alter implementation of mitigation measures to reduce future potential impacts. Monitor for bird carcasses during the first three years of project operation and provide adaptive management measures (e.g., additional targeted visibility enhancement measures) if appropriate.	On commencement of construction and maintenance during operation	Installation of all required mitigations; avifauna species mortality	Transmission line route	Avifauna mortality reports maintained	Installation of all required mitigations during construction All avifauna reports submitted and reviewed to identify any trends in mortality

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
	eliminate the potential for bird electrocution on the towers (likely >3m) and isolate areas where birds are resting or nesting.							
10.	■ Use of natural habitat map layer when defining final alignment of the Project to avoid areas of natural habitat	UAHEL Supervising Engineer and Contractor	Application of the natural habitat layer when siting final project component layouts.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
11.	■ Lighting strategy	UAHEL Supervising Engineer and Contractor	Preparation of a lighting strategy to avoid unnecessary light at night-time. Cowls and directional lighting are to be used to not focus towards areas of critical habitat.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
12.	■ Engineering design for soil erosion and	UAHEL, Supervising Engineer and Contractor	An engineering design must be prepared and approved for soil erosion and stabilization	Prior to construction	Preparation of an appropriate engineering design	Not applicable	Engineering design completed and approved	Completion of engineering design prior to construction in

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
	stabilization structures		structures. Standards are contained within the ESCP.					accordance with international standards and best practice listed in sediments and erosion control procedure
13.	■ Implementation of a fishing ban during the construction phase (as outlined within the ESMP)	UAHEL Supervising Engineer and Contractor	Preparation of guidelines and approach to implement the fishing ban	Prior to inundated area filling	Number of persons detected fishing within the reservoir	Inundation zone	Monitoring and incident reports maintained	All fishing prohibited for 5 years in the inundated area
14.	■ Worker employment agreements	UAHEL Supervising Engineer and Contractor	Preparation of standard worker employer agreements that include relevant clauses prohibiting hunting/ poaching/ illegal logging during employment	Prior to construction	Number of employees detected undertaking illegal logging, hunting or poaching	Not applicable	Monitoring and incident reports maintained	All workers trained and employment contracts issued with requirements
15.	■ Inclusion of biodiversity related actions in the community	UAHEL Supervising Engineer and Contractor	Inclusion of relevant materials into the community livelihood restoration plan	Prior to construction	Not applicable	Within and around project area	Access records and incident	Appropriate materials prepared and included in the

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
	livelihood restoration program						reports maintained	livelihood restoration plan
16.	■ Access control requirements in the ESMP	. Contractor	Records are to be kept and regularly reviewed (3 monthly) of all personnel entering and exiting the project area through checkpoints, for poached flora/fauna.	Ongoing throughout construction	Not applicable	Within and around project area	Access records and incident reports maintained	Operation of the vehicle checkpoints Review of all data obtained during vehicle checks
17.	■ Fauna/flora monitoring and evaluation	UAHEL	Preparation of a fauna and flora monitoring strategy to apply to impact species within the project area to apply during construction and operation	Prior to construction	Not applicable	Not applicable	Not applicable	Fauna/flora monitoring and evaluation plan prepared prior to construction
18.	■ Fish monitoring and evaluation	UAHEL	Methods to be determined in collaboration with fish expert, to include at least monitoring of fish populations due to establishment of aquatic barriers and include eDNA monitoring of	During construction and operation	Native fish species relative abundance and density	At least three locations within the UAHEP reservoir and at least 2 locations upstream from the reservoir, 3	Monitoring reports maintained	No statistically significant decrease in native fish populations occurs

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
			aquatic species after a baseline has been established prior to the start of construction of the dam: ■ Fish population monitoring upstream and downstream from the dam to confirm a naturally reproducing population of all native fish species is occurring and no statistically significant decrease in native fish populations occurs. ■ Monitoring will involve standardize use of cast and drift nets combined with electrofishing and eDNA monitoring. ■ If monitoring indicates that the native fish			locations in the dewatered section, and 2 locations downstream from the UAHEP powerhouse and one location downstream from the Arun 3 Hydropower Plant.		

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
			populations upstream and downstream from the dam have been reduced, the Project will provide adaptive management by either implementing spawning habitat improvements upstream and/or implement a trap and haul fish passage program. The trap and haul program should only be done if the Arun-3 HEP fish hatchery is not constructed or as a last resort given the likely introduction of hatchery fish into otherwise native fish waters.					
			■ Monitor the downstream reach	First year of operations, especially during	Number of fish captured per	Areas believed to be sensitive	Monitoring reports maintained	Number of incidents of fish stranding

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
			for fish, fry, and macroinvertebrate stranding potentially resulting from project peaking operations ■ If fish stranding is determined to be having a population level impact, adaptive management measures will be implemented, such as channel improvements (e.g., remove rock to allow connectivity between pools and the river channel) or establishment of ramping rates to allow fish to escape from isolated pools.	fish upstream (March to May) and downstream (September to November) migration periods	meter of shoreline	to flow fluctuations		
19.	■ Sediment deposition	UAHEL	■ Monitor sediment deposition in the diversion reach for	Annually during the dry season for first 5 years	Sediment deposition in terms of depth,	In identified depositional areas and	Annual reporting	Sediment depth and location in

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
			consistency with sediment transport model predictions. If sediment deposition is exceeding those predictions and impacting the suitability of aquatic habitat in the diversion reach, then the sediment management strategy will be "fine-tuned" to improve sediment transport and reduce sediment deposition in the diversion reach.	of project operation	underlying habitat, and soil texture	visual survey for other areas of significant deposition		depositional areas
20.	■ Red panda, Himalayan black bear, clouded leopard, and spotted linsang monitoring	UAHEL	Coordinate with MBNP to track poaching and vehicle strikes of red panda, clouded leopard, spotted linsang, and Himalayan black bear.	Ongoing throughout construction	Number of red panda, Himalayan black bear, clouded leopard, and spotted linsang injured or killed from	Project Direct Impact Area (DIA) within MBNP Buffer Zone	Maintain incident reports	Quarterly reporting

S/N	Monitoring Measure	Responsible Person for Ensuring Action Implementation	Means of Verification that Commitment Has Been Met	Monitoring/Inspection/Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
					poaching and vehicle strikes			

3. NO NET LOSS/NET GAIN ASSESSMENT

3.1 Residual Impacts

As part of the application of the mitigation hierarchy, there is a requirement to identify residual impacts that cannot be avoided or mitigated and hence require some form of compensation to achieve no-net-loss (for impacts to natural habitats) and net gain (for impacts to critical habitats).

The Project aims to enhance benefits and mitigate impacts on biodiversity. The Project has reduced Project-wide adverse biological impacts through avoidance and design, including reducing the need for natural habitat clearing across the project area. Mitigation measures have been prepared to further reduce impact to biodiversity. However, residual Impacts may result from the project construction and/or operation phases.

The ESIA has identified a number of habitats and threatened species within the project area where residual impacts remain following avoidance and mitigation. The species and habitat values are assessed below to identify specific residual impacts that require to be offset.

3.1.1 Habitat Residual Impacts

Terrestrial Habitats

The Project will affect both terrestrial natural and critical habitats. Measures to achieve no net loss for natural habitat and net gain for critical habitat are described below.

Natural Habitats

The project will result in the permanent loss of terrestrial natural habitats, including an estimated 195.3 ha of natural habitat within the Direct Impact Area. This natural habitat consists primarily of forest and to a much lesser extent shrubland, natural grassland, and rock/scree. This natural habitat loss will impact several threatened species that are not critical habitat triggers and are listed in ***Table 3.1***. The WB ESF ESS 6 requires no net loss of natural habitat, which is defined herein as achieving no net loss of native forest habitat within the EAAA measured on a per hectare basis. This will require the establishment of similar forest habitat on currently modified habitat within the Project's EAAA.

When residual impacts remain despite best efforts to avoid, minimize and mitigate impacts, and where appropriate and supported by relevant stakeholders, mitigation measures should include a biodiversity offset, adhering to the principle of "like-for-like or better." The offset should ensure the maintenance of habitats for and individuals of the species mentioned in ***Table 3.1*** and is proposed in ***Table 4.1***.

Critical Habitats

As per WB ESF ESS 6, the project EAAA includes areas determined to be critical habitat for several threatened species and the project proponent is obliged to identify and assess potential project-related adverse impacts and apply the mitigation hierarchy, so as to prevent or mitigate adverse impacts from projects that could compromise the integrity, conservation objectives, or biodiversity importance of such an area. Forest patches in the EAAA have also been assessed as critical habitat for the following species:

- Red panda (*Ailurus fulgens*) – IUCN (EN) and Nepal Red-List (EN)
- Clouded leopard (*Neofelis nebulosa*) – IUCN (VU) and Nepal Red-List (EN
- Himalayan black bear (*Ursus thibetanus*) – IUCN (VU) and Nepal Red-List (EN)
- Spotted linsang (*Prionodon pardicolor*) – IUCN (LC) and Nepal Red-List (EN)

The Chinese pangolin (*Manis pentadactyla*) does not occur in the wider project area. The Project's mitigation strategy should, therefore, be designed to achieve a net gain of those biodiversity values for which the critical habitat was designated. This should include mitigation measures (as presented in

Chapter 7.2 of this ESIA) and a terrestrial biodiversity offset, adhering to the principle of "like-for-like or better", and target the critical habitat trigger species. This is described in ***Table 4.1***.

Aquatic Habitats

The Project will affect aquatic natural habitats. Measures to achieve no net loss for natural habitat are described below.

Natural Habitats

The Project will result in the conversion of 5.2 ha of existing lotic natural habitat to lacustrine habitat (reservoir area), the potential degradation of 20.8 ha of aquatic natural habitat within the diversion reach, and the potential degradation (water level fluctuations) of approximately 40 ha of aquatic natural habitat downstream from the powerhouse as a result of Project peaking operations.

The Project is likely to impact on aquatic natural habitat that contains threatened species and migratory species such as the common snow trout (*Schizothorax richardsonii)* (IUCN VU).

The Project also has the potential to affect aquatic habitat connectivity, including the UAHEP dam serving as a barrier to upstream fish migration and the Project's diversion reach and peaking operations potentially affecting fish connectivity and access to tributary streams that are important for spawning.

In addition to avoidance and minimization of impacts to such aquatic habitats, and to ensure no net loss of biodiversity values, appropriate actions that ensure the maintenance of aquatic habitats and the species inhabiting them are required. These actions are described in ***Table 4.1***.

3.1.2 Species Residual Impacts

ERM has identified 13 priority conservation significant species that may be impacted by the Project (***Table 3.1***). These species include internationally and nationally critically endangered and endangered species, and restricted range/endemic species. Management of these species needs to be undertaken as part of achieving no net loss outcomes within the project area during construction and operation. ***Table 3.2*** describes the residual impact assessment for priority conservation significant species.

Table 3.1 Priority Conservation Significant Species

S/N	Common Name	Scientific Name	IUCN Listing	Nepalese Listing	Endemic/ Restricted Range	Migratory
1.	*Schizothorax richardsonii*	Common snow trout	VU	VU	No	Yes
2.	*Taxus wallichiana*	Himalayan yew	EN	-	No	No
3.	*Aquila nipalensis*	Steppe eagle	EN	VU	No	No
4.	*Sasia ochracea*	White-browed piculet	LC	CR	No	No
5.	*Yuhina bakeri*	White-naped yuhina	LC	CR	No	No
6.	*Stachyris chrysaea*	Golden babbler	LC	EN	No	No
7.	*Tickellia hodgsoni*	Broad-billed warbler	LC	EN	No	No
8.	*Ailurus fulgens*	Red panda	EN	EN	No	No
9.	*Ursus thibetanus*	Himalayan black bear	VU	EN	No	No

S/N	Common Name	Scientific Name	IUCN Listing	Nepalese Listing	Endemic/ Restricted Range	Migratory
10.	*Neofelis nebulosa*	Clouded leopard	VU	EN	No	No
11.	*Prionodon pardicolor*	Spotted linsang	LC	EN	No	No

Notes: LC = Least Concern; VU = Vulnerable; EN = Endangered

Table 3.2 Residual Impact Assessment

Species Group	Species	Residual Impact Assessment	Mitigation Strategy	Residual Impact
Birds of prey	■ Steppe eagle (*Aquila nipalensis*)	■ Bird of prey species are vulnerable to direct mortality events and injury via potential collision with project infrastructure (transmission lines). ■ Bird of prey species could be disturbed or displaced by project noise, vibration or light impacts. ■ Bird of prey individuals could be injured or killed during vegetation clearing associated with the Project.	■ Transmission line routed parallel to the Arun River and on steep slopes where the lines are embedded in the forest to minimize the risk of collision. ■ Ensure that conductors are separated by more than the length of the wingspan of the largest bird found in the area (i.e., Himalayan griffon) in order to eliminate the potential for bird electrocution on the towers. ■ Engineering design for the transmission line will incorporate the requirements of the Avian Power Line Interaction Guidelines – Reducing Avian Collisions with Power Lines (Annex C3-I, APLIC 2012[4]). ■ Annex C3-E Injured Wildlife Protocol	■ Temporary disturbance impacts during construction ■ No loss of individuals anticipated likely
Forest birds	■ Broad-billed Warbler ■ White-browed piculet	■ The project area and surrounding areas will become more accessible due to the construction access tracks and project infrastructure. Furthermore, there will be a significant increase in human	■ A Workers' Code of Conduct will be strictly enforced that will prohibit the collection of firewood, clearing of vegetation, and collection of or trade	■ Residual bird mortality collisions with transmission lines despite having visual warnings ■ Noncompliance with the Code of Conduct resulting in hunting or loss of habitat through collection of

[4] Avian Power Line Interaction Committee (APLIC). 2012. *Reducing Avian Collisions with Power Lines*. Washington, D.C.: Edison Electric Institute and Avian Power Line Interaction Committee.

Species Group	Species	Residual Impact Assessment	Mitigation Strategy	Residual Impact
	■ White-naped yuhina ■ Golden babbler	presence in the local area due to the construction and operation of the Project. These changes will likely increase the rate of induced clearing and hunting/poaching pressure. ■ The Project will impact on potential forest bird habitat. ■ Forest bird species are vulnerable to direct mortality events and injury via electrocution and collision with the project infrastructure (transmission lines) and vehicles. ■ Forest bird species could be disturbed or displaced by project noise, vibration or light impacts. ■ The Project could introduce and/or proliferate invasive species at the project site. ■ Forest birds could be injured or killed during vegetation clearing associated with the Project.	in plants, animals, or non-timber forest products. ■ Engineering design for the transmission line will incorporate the requirements of the Avian Power Line Interaction Guidelines – Reducing Avian Collisions with Power Lines (Annex C3-I, APLIC 2012[5]) ■ Noise attenuation is to be used during construction activities. Night-time construction is to be avoided to the extent possible. ■ Permanent and temporary lighting is to use timers where possible to avoid unnecessary light at night-time. Cowls and directional lighting are to be used to not focus towards areas of critical habitat. ■ Implementation of Invasive Species Management Plan ■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements including requirements related to hunting and poaching	firewood, clearing of vegetation, and collection or trade in animals or non-timber forest products

[5] *Ibid*.

Species Group	Species	Residual Impact Assessment	Mitigation Strategy	Residual Impact
			■ Annex C3-E Injured Wildlife Protocol ■ Annex C3-D Biodiversity Community Engagement Procedure ■ Annex C3-A Wildlife Shepherding Protocol	
Non-volant mammals	■ Red panda (*Ailurus fulgens*)	■ The project area and surrounding areas will become more accessible due to the construction access tracks and project infrastructure. Furthermore, there will be a significant increase in human presence in the local area due to the construction and operation of the Project. These changes will likely increase the rate of induced clearing in red panda habitat. ■ There are no direct impacts to habitat for the red panda. ■ The Project could introduce and/or proliferate invasive species into the habitat of red panda. ■ The use of open fires for cooking and heating by work crews could pose a risk to the surrounding natural habitat, particularly in the dry season with the accumulation of vegetation material, once dried, also posing a further fire hazard to the surrounding natural	■ A community program will be established with adjacent landowners to socialize the restrictions on access to reduce the hunting of fauna and collection of non-timber forest products. A worker environmental awareness program will also be implemented as part of worker induction, to inform personnel about the prohibition on collecting timber and non-timber forest products and the importance of natural habitat for the conservation of red panda. ■ A Fire Management Plan will be strictly implemented, with open fires being prohibited at workers' camps to reduce the risk of fire during construction and operation. ■ Implementation of Invasive Species Management Plan **For chance encounters with Red Panda in the project site.**	Project terrestrial EAAA ■ Noncompliance with Code of Conduct resulting in loss of habitat through collection of firewood, clearing of vegetation, and trade in plants or non-timber forest products in red panda habitat

Species Group	Species	Residual Impact Assessment	Mitigation Strategy	Residual Impact
		habitat, which includes red panda habitat.	■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements including requirements related to hunting and poaching ■ Annex C3-E Injured Wildlife Protocol ■ Annex C3-D Biodiversity Community Engagement Procedure ■ Annex C3-A Wildlife Shepherding Protocol	
	■ Himalayan black bear (*Ursus thibetanus*)	■ The project area and surrounding areas will become more accessible due to the construction access tracks and project infrastructure. Furthermore, there will be a significant increase in human presence in the local area due to the construction and operation of the Project. These changes will likely increase the rate of hunting/poaching pressure. ■ Fauna such bears may pose a particular risk to human/wildlife conflict. These conflicts may result in revenge attacks against these species.	■ A worker environmental awareness program will be implemented as part of the worker induction training to inform field personnel about potential wildlife risks for Himalayan black bear, and appropriate preventative measures and responses in the event of a wildlife encounter. ■ A maximum vehicular speed of 30km/hour for vehicle use associated with the Project, other than on designated Nepal highways, will be enforced to reduce impacts on mortality of Himalayan black bear.	Project terrestrial EAAA ■ Mortality and injury of humans caused by accidental encounters with bears not visible in vegetation or at night, especially when garbage is accidentally left in the open ■ Mortality of individual bears from vehicle strikes, poaching for trade in bear parts, and retaliatory killings

Species Group	Species	Residual Impact Assessment	Mitigation Strategy	Residual Impact
		■ These species may be attracted to the project site via food scraps and other forms of edible garbage inappropriately disposed of by the workforce. ■ Increased vehicular traffic could result in vehicle strikes.	■ Proper disposal of food scraps and other forms of edible garbage, which shall be removed from the site to prevent incursion of bears into the construction areas. ■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements including requirements related to hunting and poaching ■ Annex C3-E Injured Wildlife Protocol ■ Annex C3-D Biodiversity Community Engagement Procedure ■ Annex C3-A Wildlife Shepherding Protocol	
	■ Clouded leopard (*Neofelis nebulosa)*	■ The project area and surrounding areas will become more accessible due to the construction access tracks and project infrastructure. Furthermore, there will be a significant increase in human presence in the local area due to the construction and operation of the Project. These changes will likely increase the rate of hunting/poaching pressure. ■ Increased vehicular traffic could result in vehicle strikes	■ A worker environmental awareness program will be implemented as part of the worker induction training to inform field personnel about potential wildlife risks for clouded leopard, and appropriate preventative measures and responses in the event of a wildlife encounter. ■ A maximum vehicular speed of 30km/hour for vehicle use associated with the Project, other	Project terrestrial EAAA ■ Mortality and injury of humans caused by accidental encounters with clouded leopards not visible in vegetation or at night ■ Mortality of individual clouded leopards from vehicle strikes

Species Group	Species	Residual Impact Assessment	Mitigation Strategy	Residual Impact
			than on designated Nepal highways, will be enforced to reduce impacts on mortality of clouded leopard. ■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements including requirements related to hunting and poaching ■ Annex C3-E Injured Wildlife Protocol ■ Annex C3-D Biodiversity Community Engagement Procedure ■ Annex C3-A Wildlife Shepherding Protocol	
	■ Spotted linsang (*Prionodon pardicolor*)	■ The project area and surrounding areas will become more accessible due to the construction access tracks and project infrastructure. Furthermore, there will be a significant increase in human presence in the local area due to the construction and operation of the Project. These changes will likely increase the rate of hunting/poaching pressure. ■ Increased vehicular traffic could result in vehicle strikes.	■ A worker environmental awareness program will be implemented as part of the worker induction training to inform field personnel about potential wildlife risks for spotted linsang, and appropriate preventative measures and responses in the event of a wildlife encounter. ■ A maximum vehicular speed of 30km/hour for vehicle use associated with the Project, other than on designated Nepal highways,	Project terrestrial EAAA ■ Mortality of individual spotted linsang from vehicle strikes

Species Group	Species	Residual Impact Assessment	Mitigation Strategy	Residual Impact
			will be enforced to reduce impacts on mortality of spotted linsang. ■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements including requirements related to hunting and poaching ■ Annex C3-E Injured Wildlife Protocol ■ Annex C3-D Biodiversity Community Engagement Procedure ■ Annex C3-A Wildlife Shepherding Protocol	
Plants	■ Himalayan yew (*Taxus wallichiana*)	■ The Himalayan yew is found at elevations above 2,300 m, so the Project should have no direct impacts on this species. ■ The project area and surrounding areas will become more accessible due to the construction access tracks and project infrastructure. Furthermore, there will be a significant increase in human presence in the local area due to the construction and operation of the Project. These changes will likely increase the rate of induced clearing and plant collection pressures.	■ A Workers' Code of Conduct will be strictly enforced that will prohibit the collection of firewood, clearing of vegetation, and collection of or trade in plants, animals, or non-timber forest products. ■ A worker environmental awareness program will be implemented as part of the worker induction to inform personnel about the prohibition on collecting timber and non-timber forest products, these programs will describe the Maire's yew and the East Himalayan yew.	■ Potential for the species to be collected for firewood and herbal medicines

Species Group	Species	Residual Impact Assessment	Mitigation Strategy	Residual Impact
Fish	■ *Tor putitora* ■ *Schizothorax richardsonii*	■ No direct impacts to habitat for *Tor putitora.* Indirect impacts have been assessed as insignificant. ■ The project area and surrounding areas will become more accessible due to the construction access tracks and project infrastructure. Furthermore, there will be a significant increase in human presence in the local area due to the construction and operation of the Project. These changes will likely increase the rate of induced clearing and hunting/poaching pressure. ■ The Project will impact on approximately 92 ha of potential freshwater fish habitat. ■ The Project could introduce and/or proliferate invasive species at the project site. ■ These species are vulnerable to degradation of water sources from project impacts (e.g., hazardous material spills and sedimentation). ■ Several of these species will have their migratory routes disrupted due to project infrastructure.	■ A worker environmental awareness program will be implemented as part of the worker induction training to inform field personnel about potential wildlife risks, and appropriate preventative measures and responses in the event of a wildlife encounter. ■ Implementation of Sediment and Erosion Management Plan ■ Implementation of Invasive Species Management Plan ■ Annex C3-B Biodiversity Induction Training Procedure ■ Worker employment agreements including requirements related to hunting and poaching ■ Annex C3-E Injured Wildlife Protocol ■ Annex C3-D Biodiversity Community Engagement Procedure	■ In-migration of workers may result in increased sportfishing for *Tor putitora* downstream from Arun-3 HEP. Nepal has very strict laws with regard to sportfishing for Tor putitora: one needs a local guide, permit, special hooks that do not harm the fish, and the fish has to be returned live to the river. Overfishing risk has been assessed as insignificant. ■ Loss of habitat prior to adaptive management of EFlows and management of peaking and conversion of lotic to lacustrine habitat ■ Loss of habitat connectivity between the Arun River and its important tributaries

3.2 Provisional Residual Impact Assessment Results

3.2.1 Natural Habitats

Habitat offsets will be sufficient to compensate for loss of terrestrial and aquatic biodiversity values. Based on the assessment, the following impacts are considered residual and will be required to be compensated through measures to achieve no net loss:

- A total of 195.3 ha of natural habitat will be impacted and will need to be offset, in combination with the mitigation measures presented in Chapter 7.2 of this ESIA, to achieve no net loss.
- Residual impacts to aquatic fauna are predicted, including migratory fish: *Schizothorax richardsonii, Labeo dero, Neolissochilus hexagonolepis, Schizothoraichthys progastus, and Psilorhynchus pseudecheneis.*
- The conversion of 5.2 ha of riverine natural habitat within the reservoir zone to lotic habitats.

3.2.2 Critical Habitats

The Project triggers critical habitat for four species. Achieving net gain outcomes through ACAs will be required to compensate for residual impacts on these species and the MBNP. These are described in further detail below.

- The Project will affect the Himalayan black bear (*Ursus thibetanus*) and there is the potential for residual impacts, including individual bear mortality from vehicle strikes, hunting, poaching for animal parts, and retaliatory killings, despite proposed mitigation measures. Therefore, ACAs will be required to demonstrate the required net gain outcome.
- The Project will affect the Himalayan red panda (*Ailurus fulgens*) (IUCN EN); Himalayan black bear (*Ursus thibetanus*) (IUCN Nepal EN); clouded leopard (*Neofelis nebulosa*) (IUCN Nepal EN), and spotted linsang (*Prionodon pardicolor*) (IUCN Nepal EN). There are no direct impacts to these species due to the Project, but there is the potential for indirect impacts through hunting or poaching for animal parts by project workers. ACAs will, therefore, be required to demonstrate the required net gain outcome.
- Critical habitat has also been identified for the golden mahseer (*Tor putitora*) (IUCN EN) in the lower portion of the Ecologically Appropriate Area of Analysis (EAAA), but outside the project area. No direct impacts to this species are envisaged, as the project Direct Impact Area is upstream from known golden mahseer habitat and the Arun-3 HEP will not provide fish passage, thereby preventing the upstream migration of golden mahseer into the UAHEP DIA. The Project has the potential for indirect impacts through increased sports fishing by project workers, despite the proposed mitigation measures. The indirect impacts on golden mahseer have been assessed as insignificant (see above).
- The MBNP is a legally protected area of high biodiversity value. The Project will disturb 41.5 ha of the MBNP Buffer Zone and permanently convert 16.1 ha of the MBNP land and water for the dam, reservoir, and short portions of the access road/bridge. The Project will also indirectly affect the MBNP as a result of in-migration of construction workers, potential influx, and increased demand for ecosystem services. The MNBP Buffer Zone is not considered critical habitat pursuant to the World Bank's standards for Legally Protected Areas, as this area is classified as IUCN VI. Terrestrial areas of the MBNP contain populations of four critical habitat (CH)-qualifying species, however, so these areas are considered critical habitat and offsets will be required to demonstrate the required net gain outcome.
- The Project will also permanently impact on approximately 66 ha of aquatic natural habitat. Although proposed mitigation will significantly reduce the significance of these impacts, residual impacts will remain. Therefore, offsets will be required to demonstrate the required no net loss and net gain outcome.

4. OUTLINE OF BIODIVERSITY OFFSET STRATEGY

4.1 Purpose and Scope

This BMP concludes that biodiversity offsets are likely to be required to achieve a no net loss of natural habitat, and net gain of critical habitat for the UAHEP. Biodiversity offsets are designed to compensate for the residual biodiversity losses due to the Project. While offsets are typically seen as setting aside land for long-term conservation, many activities and approaches can work as offsets.

Offsets are defined as (see BPOP Principles on Diversity Offsets, BBOP 2012c[6]; see also IFC 2019[7]; World Bank 2016[8]):

> *Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people's use and cultural values associated with biodiversity.*

This BMP recommends that a Biodiversity Offset Strategy be developed through the involvement of a competent offset specialist, with clear offsetting targets, taking into consideration both habitat offsets and species offsets, based on published conservation recommendations and in consultation with IUCN Species Survival Commission (SSC) Species Specialists. This chapter identifies potential offset options for consideration in the Biodiversity Offset Strategy.

4.2 Summary of Legal and Other Obligations

The WB ESS 6 requires that standards are met in relation to natural, modified, and critical habitats. These standards are outlined in ***Table 4.1***.

Table 4.1 Relevant WB ESF ESS 6 Biodiversity Offset Standards

Habitat Classification	Required Standard
General	Clause 16. A biodiversity offset will be designed and implemented to achieve measurable, additional, and long term conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity. In the case of an offset used as mitigation for residual adverse impacts on any area of critical habitat, a net gain is required. The design of a biodiversity offset will adhere to the "like-for-like or better" principle and will be carried out in alignment with Good International Industry Practice (GIIP).
Modified Habitat	Clause 20. The Borrower will avoid or minimize impacts on such biodiversity and implement mitigation measures as appropriate.
Natural Habitat	Clause 22. (a) There are no technically and financially feasible alternatives; and (b) Appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, to achieve no net loss and, where feasible, preferably a net gain of biodiversity over the long term. When residual impacts remain despite best efforts to avoid, minimize

[6] Business and Biodiversity Offsets Programme (BBOP). 2012c. *The BBOP Principles on Biodiversity Offsets.* Washington, D.C.: BBOP. https://www.forest-trends.org/wp-content/uploads/2018/10/The-BBOP-Principles_20181023.pdf

[7] International Finance Corporation (IFC). 2019. *Guidance Note 6. Biodiversity Conservation and Sustainable Management of Living Natural Resources*. Washington, D.C.: IFC.

[8] World Bank Group. 2016. *Biodiversity Offsets: A User Guide.* World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/25758 License: CC BY 3.0 I.

Habitat Classification	Required Standard
	and mitigate impacts, and where appropriate and supported by relevant stakeholders, mitigation measures may include biodiversity offsets adhering to the principle of "like-for-like or better.
Critical Habitat	Clause 24. (a) No other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value; (b) All due process required under international obligations or national law that is a prerequisite to a country granting approval for project activities in or adjacent to a critical habitat has been complied with; (c) The potential adverse impacts, or likelihood of such, on the habitat will not lead to measurable net reduction or negative change in those biodiversity values for which the critical habitat was designated; (d) The project is not anticipated to lead to a net reduction in the population of any Critically Endangered, Endangered, or restricted-range species, over a reasonable time period; (e) The project will not involve significant conversion or significant degradation of critical habitats. In circumstances where the project involves new or renewed forestry or agricultural plantations, it will not convert or degrade any critical habitat; (f) The Project's mitigation strategy will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated; and (g) A robust and appropriately designed, long term biodiversity monitoring and evaluation program aimed at assessing the status of the critical habitat is integrated into the Borrower's management program
Legally Protected Areas	Clause 26 The Borrower will meet the requirements of paragraphs 13 through 25 of this ESS, as applicable. In addition, the Borrower will: (a) Demonstrate that the proposed development in such areas is legally permitted; (b) Act in a manner consistent with any government recognized management plans for such areas; (c) Consult and involve protected area sponsors and managers, project-affected parties including indigenous peoples, and other interested parties on planning, designing, implementing, monitoring, and evaluating the proposed project, as appropriate; and (d) Implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area.

4.3 Biodiversity Offset Definition

As a result of this assessment, the programs outlined will be implemented by UAHEL to address the residual impacts identified at Section 3.3. The biodiversity offset definition and rationale are described in ***Table 4.2***.

Table 4.2 Biodiversity Offset Definition

S/N	Value Requiring Offset	Proposed Biodiversity Offset	Rationale
1.	No net loss of terrestrial natural habitat	■ The Project will result in the loss of 95.58 ha of terrestrial natural habitat. A larger offset area may need to be selected to compensate for contingencies in the implementation of the afforestation described below. This	The afforestation program required by the Nepal Government will compensate for losses of biodiversity values to achieve no net loss (based on the expected offset ratio). Planting of trees from

S/N	Value Requiring Offset	Proposed Biodiversity Offset	Rationale
		offset area should involve a mix of species in vegetation types similar to those impacted, with natural and modified within the offset area to be clearly delineated. Especially bamboo should be planted, as this is the main food of the red panda. ■ From this delineation, habitat condition and potential gains possible for each vegetation type assessed (BBOP 2012b[9]) should be predicted across a suitable offset period. The habitat hectares method is suggested for this. Net loss will be demonstrated if the habitat hectares achieved in the offset after a suitable offset period, discounted by the afforestation (after gains are achieve across a suitable afforestation period) described below, is equal to the impacted area with habitat within adjusted by habitat condition. ■ An afforestation program will be implemented. It is estimated that 351,648 trees will need to be planted . To compensate for this loss, 95.32 ha of land needs to be purchased on which 151,328 trees will be planted. Further 174.74 ha of government land needs to be obtained on which 200,340 trees will be planted on a 1:25 basis (i.e., plant 25 saplings for each tree cleared) for Buffer Zone forest and 1:10 saplings for community and government forest) in accordance with Nepal's Forest Clearance Guidelines. Within the Sankhuwasabha, Terhathum, and Taplejung districts, a collective area of 3,932.8 hectares of barren land has been identified, of which 219.78 ha will be planted with a total of 351,648 trees over a 5 year period. Afforestation measures are to achieve no net loss of natural habitat in accordance with WB ESF ESS 6, and will target areas with high biodiversity values. The program is to be led by	the same forest community types within degraded areas of the Makalu Barun National Park and adjacent community forests will achieve the outcome of "like for like or better". It is anticipated that the same species mix (being species listed as priority conservation significant species) are likely to inhabit the areas proposed for afforestation. To compensate for uncertainties in the success of afforestation, a larger offset area should be chosen.

[9] Business and Biodiversity Offsets Programme (BBOP). 2012b. *Resource Paper: No Net Loss and Loss-Gain Calculations in Biodiversity Offsets*. Washington, D.C.: BBOP.

S/N	Value Requiring Offset	Proposed Biodiversity Offset	Rationale
		UAHEL in conjunction with the Department of Forest and Soil Conservation. Areas to target for planting are to include: areas of degraded forest within the Makalu Barun National Park; and community forests within the EAAA. ■ The afforestation area needs to be delineated into natural and modified habitat and vegetation types within. This is necessary to assess habitat condition for each vegetation type and likely gains across the afforestation period. For each vegetation type adjusted by its habitat condition, gains needs to be predicted from afforestation after a suitable afforestation period ■ It is recommended that the afforestation area be nested in a larger offset area so that common management action and monitoring and evaluation is possible. Offset metrics for monitoring and evaluation: ■ Monitoring of gains through improvement of habitat condition, e.g., canopy cover, plant species diversity in quadrat plots for determined time milestones across the afforestation and offset periods. This is to assess satisfactory progress against the no net loss objective. ■ Monitoring should target CR, EN, and similarly related birds from baseline surveys of forest birds indicative of habitat quality. This should at least include the priority conservation species mentioned in ***Table 3.1*** which are: – White-browed piculet – White-naped yuhina – Golden babbler – Broad-billed warbler This monitoring should be carried out by a qualified ornithologist with long experience in Nepal's birds.	

S/N	Value Requiring Offset	Proposed Biodiversity Offset	Rationale
2.	No net loss of aquatic natural habitat	■ Take actions to ensure a sustainable, naturally reproducing native fish population in the approximately 32 km long reach of the Arun River between the Arun-3 HEP dam and the UAHEP dam. This will require preservation of key spawning habitat in this reach, including Ikhuwa and Leksuwa kholas. ■ Conduct monitoring of the reservoir and identify opportunities for habitat enhancements that take advantage of the increased water depths and incrementally warmer water. The reservoir could serve as a refuge for some fish from cold winter water temperatures. ■ Conduct monitoring of the diversion reach and identify opportunities for habitat enhancements that take advantage of the reduced river velocities and turbidity. For example, the Arun River may become suitable for spawning for the common snow trout and other native species spawning. In fact the Arun River is already a suitable spawning habitat for the common snow trout, as the aquatic ecology survey has confirmed. ■ Conduct monitoring and implement adaptive management measures to ensure connectivity in the reach downstream from the powerhouse subject to fluctuating flows from peaking operations, which may include channel improvements and possibly adaptation of ramping rates if stranding proves to be a significant issue. No net loss metric for monitoring and evaluation: ■ Metrics to assess no net loss of aquatic habitat will need to be developed in more detail as part of a Biodiversity Monitoring Plan. These metrics (e.g., catch per unit effort for native species) will be developed with a fish expert. eDNA monitoring is strongly recommended.	Inundation of 5.2 ha of lotic habitat to lacustrine habitat impacting on a few species adapted for lotic habitats. Also degradation of aquatic habitat in the 16.45 km long diversion reach and area downstream from the UAHEP powerhouse subject to water level fluctuations from project peaking operations.

S/N	Value Requiring Offset	Proposed Biodiversity Offset	Rationale
3.	Net gain for red panda (*Ailurus fulgens),* clouded leopard (*Neofelis nebulosa)* and spotted linsang (*Prionodon pardicolor)*	■ Identify forest patches with Red Panda outside Makalu-Barun National Park. ■ Document threats facing these species, e.g., habitat loss, especially bamboo for red panda, etc. The threat analysis has been conducted by a suitably qualified international or national expert with experienced with these species within Nepal. ■ Extend enforcement of MBNP framework to these forest patches to control poaching and habitat loss through unsustainable extraction of forest produce. ■ Undertake community liaison for intelligence gathering, minimization of conflict, and sustainable use of forest produce. ■ **Mitigation measures** to achieve net gain in biodiversity for these four critical habitat species and no net loss for their habitats: The Project will mitigate the risks to these four critical habitat species and achieve net gain by minimizing terrestrial natural habitat loss and reducing natural habitat fragmentation. ■ Additional mitigation measures are required to ensure net gain for the four mammal critical habitat species. Key measures are proposed, including the development of a number of wildlife crossing infrastructure, such as underpasses and arboreal bridges to be included in the design of the access road to minimize wildlife road kills. Other measures include the reduction of human-wildlife conflict, which involves the use of wildlife fencing. Also the upgrading of veterinary facilities and the of livestock safety measures, such as vaccination of livestock, are proposed for the benefit of the local communities in order to obtain their cooperation with regard to wildlife protection. In order to protect natural and critical habitat in the wider project area there is a need to regulate the	These species are present at higher altitudes within the Makalu Barun National Park and at the project sites. Management of the species within and outside the Park to reduce threats and monitor populations to assist in achieving net gain values (based on an existing scenario of little to no management).

S/N	Value Requiring Offset	Proposed Biodiversity Offset	Rationale
		harvesting of forest and non-timber forest products, such as wood, honey and herbal plants. ■ Natural habitat restoration will be undertaken in order to compensate for the losses caused by the UAHEP encompasses land acquisition for afforestation, as mentioned above, as well as fencing to protect the plantation from damage by livestock, forest fire control measures by providing tools to control fires, and, when necessary, providing water sources for wildlife when existing water sources are damaged by construction activities. Promote alternative energy, such as energy efficient cooking stoves and cardamon dry stoves, to reduce pressure on natural forests. In addition, there is a need to strengthen law enforcement to control poaching by anti-poaching units, control feral dogs, which attack wildlife and transmit diseases, and control invasive species to protect the four critical habitat species and other wildlife of conservation importance. ■ Wildlife research, such as preparation of the MBNP Management Plan and its implementation; preparation of biodiversity profiles; and biodiversity monitoring activities involving biodiversity surveys and camera trappings to check the effectiveness of proposed actions, will need to be carried out. ■ These recommended measures collectively aim to conserve the four critical habitat species and their environments while minimizing project-related impacts and are expected to achieve net gain for these four critical mammal species. ■ It is also important to improve the working conditions of the rangers of the MBNP and its Buffer Zone, the Bhotkhola Rural Municipality and the Division Forest Office by providing them with the right tools, improving	

S/N	Value Requiring Offset	Proposed Biodiversity Offset	Rationale
		some park infrastructure, such as repairing posts, and creating some new infrastructure and providing some vehicles to increase their presence in the field facilitating their monitoring and management functions. Actions proposed here are aimed at reducing the impact of the UAHEP through multiple approaches, such as building the capacity of the above mentioned institutions to carry out afforestation activities and wildlife monitoring and to deal with environmental and social concerns and challenges posed by the UAHEP. The proposed actions also include programs that will protect wildlife species of conservation interest by including these conservation actions in the operational plans of community forests, building local capacity in biological monitoring, and providing alternatives in the form of technical know-how to reduce pressure on forest resources as well as improve habitats and wildlife connectivity. Offset metric for monitoring and evaluation ■ Quantification of patrolling effort and number of seizures of illegal wildlife products ■ Improvement of quantity and quality of foraging habitat ■ Increase in species numbers, as established through scientifically designed and implemented population surveys carried out by a qualified mammal ecologist	
4.	Net gain for Himalayan black bear (*Ursus thibetanus)*	■ Document threats facing this species, e.g., habitat loss, illegal hunting for bear gall bladders, retaliatory killing of Himalayan black bear due to conflict with humans etc. ■ Identify forest patches outside Makalu Barun National Park with Himalayan black bear to serve as potential offset sites. ■ Extend enforcement of MBNP framework to forest patches where the	

S/N	Value Requiring Offset	Proposed Biodiversity Offset	Rationale
		Himalayan black bear is known to occur to control poaching through the implementation of anti-poaching units. and habitat loss through unsustainable extraction of forest produce. ■ Create and train community-based vigilance group in coordination with MBNP management and Buffer Zone Management Committee (BZMC) to watch over and control damage to crops and livestock in known human-bear conflict affected areas. ■ Provide awareness campaigns to affected and nearby buffer zone community forest user groups (BZCFUG) to raise awareness of the harmful effects of, and legal provisions associated with, wildlife poaching, and the measures to reduce human-bear conflict. ■ Additional key mitigation measures will be implemented to ensure net gain for the Himalayan black bear and its habitats. These mitigation measures are the same as proposed above for the red panda, clouded leopard, and spotted linsang. Offset metric for monitoring and evaluation: ■ Quantification of patrolling effort and number of seizures of illegal wildlife products ■ Improvement of quantity and quality of foraging habitat ■ Increase in species numbers, as established through scientifically designed and implemented population surveys carried out by a qualified mammal ecologist	

Notes: EN = Endangered; CR = Critically Endangered

4.4 Biodiversity Offset Management Period

The proposed offset management period equates to the concession agreement period provided to the Project.

4.5 Next steps

Table 4.3 outlines next steps recommended to define the biodiversity offset components as outlined in ***Table 4.2***. Ultimately UAHEL will be responsible for executing these steps, but with the support of a BOMP specialist and advice from the UAHEP Environmental and Social Panel of Experts.

Table 4.3 Recommended Approaches to Achieve Net Gain Requirements

S/N	Action	Person Responsible	Deadline
1.	Prepare a Biodiversity Offset Strategy to incorporate detailed requirements for the management, monitoring, and evaluation of biodiversity offsets as defined below.	UAHEL	Prior to initiation of project construction
2.	Work with the Department of Forest and Soil Conservation and Department of National Park and Wildlife Conservation to define the required afforestation programs, including: defining the required offset ratio; defining the areas targeted for replanting; and defining work programs and funding to implement the afforestation program. As recommended above this should be nested within a larger offset area, where vegetation types within are delineated, and habitat condition assessed and gains estimated from the literature. The latter is to ensure that the afforestation within a larger offset area ensures no net loss of biodiversity values	UAHEL	During construction phase

5. OUTLINE OF ADDITIONAL CONSERVATION ACTION

The Project occurs within the MBNP Buffer Zone and associated IBA. Additional conservation actions are, therefore, required to promote and enhance the conservation aims and effective management of the area. Unlike offsets, ACAs can be a broad range of activities that are intended to benefit biodiversity, where the effects or outcomes can be difficult to quantify. The ACA definition and rationale are described in ***Table 5.1***.

Table 5.1 Additional Conservation Action Definition

S/N	Value	Additional Conservation Action	Rationale
1.	MBNP	Coordinate with the Department of National Parks and Wildlife Conservation, the MBNP staff, and conservation NGOs, such as Bird Conservation Nepal, to determine appropriate ACAs, which could involve proportionally expanding the MBNP or providing financial support to allow for more effective management of the park. Some ACAs options could include: ■ Provide support to MBNP and the Department of National Parks and Wildlife Conservation for the implementation of the MBNP Management Plan. ■ Coordinate with MBNP to identify sites within the park to provide afforestation at a ratio of , 1:10 as required by the procedural guidelines for Construction of Infrastructure in Protected Areas, 2024	The MBNP Management Plan states that the objective of Buffer Zone management is “to achieve balance between biodiversity conservation and sustainable livelihood” (MBNP and its Buffer Zone Management Plan, 2020). Consultation and coordination with various stakeholders, such as protected area sponsors and managers, should be undertaken to understand the key ACAs required to help effectively conserve and manage the MBNP.

ANNEXES

Annex C3-A: Wildlife Shepherding Protocol

Title	Wildlife Shepherding Protocol
Document Reference	UAHEL BMP Annex C3-A WSP
Objective	A document outlining the steps to be undertaken as part of a responsible wildlife shepherding protocol

Wildlife Shepherding Team Requirements

All personnel involved will be briefed on the details of this plan and their respective roles before field activities begin. Personnel will also be equipped with mobile communication devices on the field to ensure that lines of communication are maintained during field activities and that the appropriate persons (e.g., veterinarians, wildlife handlers) are able to respond to exigencies in a timely manner.

Table A.1: Wildlife Shepherding Protocol

Step	Activity Description
General approach to wildlife shepherding (scheduled during daylight hours only i.e., 8 am to 6 pm)	
1	Installation of barriers (if required), which will function as a drift fence to guide target terrestrial fauna in the intended direction of movement and as a barrier to prevent wildlife displacement onto adjacent roads.
2	Systematic pattern of walking through the site, starting from the area furthest from and then gradually moving towards the identified refuge area, in order to shepherd wildlife in an intended direction of movement towards adjacent refuge habitats.
3	In conjunction with (2), the site will be carefully surveyed to check for the presence of target fauna species and any active dens.
4	Site inspection by an ecologist to ensure that no target fauna and active dens remain.
5	Closing of gaps in the barriers (if required) as soon as practicable to prevent target terrestrial fauna from returning to the site.
*To note	Steps (2) and (3) to be carried out repeatedly over a course of up to three weeks for a site no larger than twenty hectares.
General approach for target fauna encounters	
Highly mobile fauna for which a passive shepherding approach is expected to be effective	
6a	Personnel to remain in place to allow fauna to move on their own accord. Generation of mild human noise disturbance (e.g., talking loudly) may be used to encourage fauna movement. However, no attempt should be made to capture or handle these species, unless the animal is visibly injured in which case experienced wildlife handlers will carefully capture the animal for immediate veterinary attention. If any individual fauna does not move on its own after sufficient time (i.e., up to one hour) has passed, the area where the individual is located should be GPS-marked and left overnight to provide additional opportunity for the individual to move on its own accord. Personnel shall return to the GPS-marked location on the following day to inspect the area. This process will be repeated until the individual has moved.
Fauna for which a passive shepherding approach is expected to be unsafe and/or ineffective in guiding the individual fauna to move in an intended direction	

Step	Activity Description
6b	A capture-and-release approach will be needed to ensure safe relocation of these fauna from the site prior to construction. Experienced wildlife handlers will carefully capture the animal for subsequent assessment and microchipping (where safe and possible) by a veterinarian. Where sensitive fauna and venomous snakes are concerned, their capture shall only be carried out by designated wildlife handlers who have been trained in the appropriate handling techniques.
Arboreal and aerial species	
Able to continue using remnant habitats on the site during construction, and will not be excluded by the installed hoarding	
7	An ecologist shall inspect the tree for the presence of fauna, inhabited tree hollows, and nests.
8	In the event that the presence of arboreal mammals and herpetofauna, birds and/or bats are detected on the tree, tree felling or transplanting must be postponed until the animal has left the tree on its own accord.
9	In the event that an inhabited tree hollow is identified, tree felling or transplanting must be postponed until the animal has left the hollow on its own accord and the entrance to the hollow has been sealed to prevent re-entry.
10	Tree felling or transplanting shall not occur during the prime breeding season for local avifauna. In any case, if active nests are detected on the tree, nests shall be left undisturbed until nesting activities have been completed (i.e., the young have left the nest). In addition, inactive nests shall be removed to minimize the possibility of a new nesting attempt. Tree felling or transplanting shall occur only when no active nests are present on the tree.
11	Notwithstanding the aforementioned steps, after tree felling has occurred, an ecologist shall thoroughly search the fallen tree for any injured or trapped fauna that may have gone undetected. In the event that injured or trapped fauna are found, immediate veterinary attention shall be administered.

Table A.2: Fauna Species Most Vulnerable to Mortality Events During Land Clearing

S/N	Scientific Name	Common Name	IUCN Listing	Nepalese Law
1.	*Ailurus fulgens*	Red panda	EN	EN
2.	*Ursus thibetanus*	Himalayan black bear	VU	EN
3.	*Panthera pardus*	Common leopard	VU	VU
4.	*Macaca assamensis*	Assamese monkey	NT	VU
5.	*Lutra lutra*	Eurasian otter	NT	NT
6.	*Naemorhedus goral*	Common goral	NT	NT
7.	*Hemitragus jemlahicus*	Himalayan tahr	NT	NT
8.	*Felis bengalensis*	Leopard cat	LC	VU

Notes: LC = Least Concern; VU = Vulnerable; EN = Endangered; NT = Near Threatened

Annex C3-B: Biodiversity Induction and Training Procedure

Title	Biodiversity Induction and Training Procedure
Document Reference	UAHEL BMP Annex C3-B BITP
Objective	A document outlining the steps to educate the workforce regarding the protection of biodiversity values

Application

This Biodiversity Induction and Training Procedure is to be incorporated into UAHEL's induction program for new and old hires. The program is to apply to all personnel and contractors who work at or visit the site. All existing personnel are to be inducted, with a refresher training session conducted every six months. New personnel are to be inducted prior to the commencement of any form of work on site. An attendance register is to be kept of staff's completion of the training and refresher training attended every six months.

UAHEL are to prepare a slide deck in relevant languages for the biodiversity induction and training procedure, i.e., Nepali and the languages of contractors where relevant. The slide deck should include pictures of species and be conducted by suitably qualified persons (preferably engaging local NGOs and government authorities). The components of the induction and training procedure will be regularly updated and improved, and will include the following topics:

- Requirements for the implementation of the anti-illegal logging policy and sanctions for non-compliance
- Requirements for the implementation of the "no-poaching and no-hunting" policy within the project area, and sanctions for non-compliance
- Awareness of biodiversity values that exist in the project area and surrounds, and potential impacts to these values from construction activities
- Individual responsibilities to reduce biodiversity impacts relevant to related procedures outlined in the BMP, i.e., Wildlife Rescue and Reporting Procedure, Sediment and Erosion Control Procedure

Requirements for Implementation of Anti-illegal Logging Policy

All personnel will be briefed on the UAHEL anti-illegal logging policy that must be committed to for all operations:

A "no access" rule is to be applied at all times to prohibit non-authorized personnel, their vehicles and/or any equipment used for illegal logging in all areas under UAHEL control.

The purpose of the policy is to prevent access to illegal loggers accessing via UAHEP project areas and adjacent areas (including protected areas).

Personnel are to be briefed that anyone identified to have participated in illegal logging activities will be dismissed from employment and will not be re-employed at any later date. Personnel should also be made aware of the measures put in place to monitor illegal activity, such as 24-hour vehicle inspections at the entrance of worksites, and that random vehicle inspections will occur on a regular basis. Any staff member or contractor identified of conducting illegal logging will be reported and handed over to relevant authorities for investigation. The species targeted for illegal logging activity inspections are to be determined from the baseline studies as those of conservation significance where the project area is considered to be critical habitat for these species.

Requirements for Implementation of "No-poaching and No-hunting" Policy

All personnel will be briefed on the UAHEL zero tolerance policy on possession of wildlife and forest resources that must be committed to for all operations.

All UAHEL staff and contractors are strictly prohibited from the possession, purchase, trade or collection of wildlife or forest resources that are legally protected under Nepal Law, are CITES-listed, or classed as threatened by the IUCN Red List.

The purpose of the policy is to prohibit the collection of wildlife and forest resources by UAHEL staff and contractors.

Personnel are to be briefed that anyone identified to have participated in the possession, purchase, trade or collection of wildlife or forest resources will be dismissed from employment and will not be re-employed at any later date. Personnel should also be made aware of the measures put in place to monitor illegal activities, such as 24-hour vehicle inspections at the entrance of worksites, and that random vehicle inspections will occur on a regular basis. Any staff member or contractor identified to be involved in activities related to poaching and hunting will be reported and handed over to relevant authorities for investigation.

Awareness of Biodiversity Values that Exist in Project Area and Surrounds

All personnel are to be briefed on flora and fauna species in the project area and surrounds, highlighting the critical habitat species identified during the baseline studies and their conservation status. Personnel are also to be briefed on the importance of conserving these biodiversity values. Photos of the flora and fauna species are to be included in the slide deck.

Individual Responsibilities to Reduce Biodiversity Impacts

Personnel to be briefed on appropriate behaviors in the event of animal encounters, e.g., do not provoke the animal, do not feed the animal, and keep a safe distance from the animal. Individual responsibilities should include those stated in the *Wildlife Rescue and Reporting Procedure* and *Invasive Species Management Procedure*. This includes reporting wildlife encounters on site and carrying out the necessary procedures to prevent the transmission of invasive species.

Lists of relevant species to be considered during application of this procedure are outlined below.

Table B.1: Flora Species Potentially Subject to Timber and Non-Timber Forest Products Collection

S/N	Scientific Name	Common Name	Use
1.	*Rhus javanica*	Chinese galls	Edible
2.	*Choerospondias axillaris*	Nepali hog plum	Edible
3.	*Bauhinia variegate*	Orchid tree	Edible
4.	*Astible rivularis*	Astilbe	Medicine
5.	*Berberis aristata*	Tree turmeric	Edible
6.	*Daphne bholua*	Nepalese paper plant	Fiber
7.	*Rubus ellipticus*	Golden raspberry	Edible
8.	*Thysanolaena maxima*	Tiger grass	Fodder
9.	*Urtica diocia*	Stinging nettle	Fiber
10.	*Paris polyphylla*	Loveapple	Medicine
11.	*Berginia ciliate*	Bergenia	Medicine

S/N	Scientific Name	Common Name	Use
12.	*Viscum album*	Mistletoe	Medicine
13.	*Swerita chiryta*	Chiraita	Medicine
14.	*Girardinia diversifolia*	Himalayan nettle	Fiber
15.	*Lindera nessiana*	Lindera	Medicine
16.	*Cinamomum tamala*	Cinnamon	Edible
17.	*Ficus nerifolia*	Willow leaf fig	Fodder
18.	*Castonopsis indica*	Chestnut	Forage
19.	*Castonopsis tribuloides*	Chinkapin	Forage
20.	*Juglans regia*	Walnut	Edible
21.	*Dioscorea sp.*	Yam	Edible
22.	*Arundinaria maling*	Maling	Edible
23.	*Amomum subulatum*	Hill cardamom	Edible
24.	*Zanthoxylum armatum*	Prickly ash	Edible
25.	*Acorus calamus*	Sweet flag	Medicine
26.	*Diplanzium esculentum*	Vegetable fern	Edible
27.	*Alnus nepalensis*	Alder	Timber
28.	*Schima wallichii*	Needlewood	Timber
29.	*Ficus semicordata*	Drooping fig	Fodder
30.	*Pinus roxburghii*	Chir pine	Timber
31.	*Rhododendrum arboreum*	Nilgiri rhododendron	Fuelwood
32.	*Pinus wallichina*	Blue pine	Timber
33.	*Juniperus sp.*	Juniper	Ornamental
34.	*Sarauria nepalensis*	Bitter-sweet	Fodder
35.	*Cannabis sativa*	Cannabis	Medicine
36.	*Aetremesia vulgaris*	Mugwort	Medicine
37.	*Aconogonum molle*	Thrumbula	Edible
38.	*Agaricus sp.*	Button mushroom	Edible
39.	*Eleocarpus spahericus*	Bead tree	Ornamental
40.	*Quercus glauca*	Ring-cupped oak	Fuelwood
41.	*Elaegnus latifolia*	Oleaster	Edible
42.	*Heracleum nepalens*	Cowparsnip	Medicine
43.	*Evodia fraxinofolia*	Evodia	Edible

Table B.2: Arboreal and Less Mobile Mammals and Herpetofauna Identified Within the Project Area

S/N	Scientific Name	Common Name	IUCN Listing	Nepal Law
1.	*Ailurus fulgens*	Red panda	EN	EN
2.	*Ursus thibetanus*	Himalayan black bear	VU	EN
3.	*Macaca assamensis*	Assamese monkey	NT	VU
4.	*Lutra*	Eurasian otter	NT	EN
5.	*Dremomys lokriah*	Orange bellied Himalayan squirrel	LC	LC
6.	*Semnopithecus schistaceus*	Nepal grey langur	LC	LC
7.	*Macaca mulatta*	Rhesus monkey	LC	LC
8.	*Hylopetes alboniger*	Particolored flying squirrel	LC	LC
9.	*Hystrix brachyura*	Malayan porcupine	LC	DD

Notes: LC = Least Concern; VU = Vulnerable; EN = Endangered; NT = Near Threatened; DD= Data Deficient

Table B.3: CITES Listed Species Detected within the Project EAAA

S/N	Scientific Name	Common Name	CITES Annex
1.	*Gyps bengalensis*	White-rumped vulture	II
2.	*Gyps tenuirostris*	Slender-billed vulture	II
3.	*Sarcogyps calvus*	Red-headed vulture	II
4.	*Aquila nipalensis*	Steppe eagle	II
5.	*Falco cherrug*	Saker falcon	II
6.	*Haliaeetus leucoryphus*	Pallas's fish-eagle	II
7.	*Antigone*	Sarus crane	II
8.	*Aquila heliacal*	Eastern imperial eagle	I
9.	*Grus nigricollis*	Black-necked crane	I
10.	*Manis pentadactyla*	Chinese pangolin	I
11.	*Ailurus fulgens*	Red panda	I
12.	*Cuon alpinus*	Dhole	II
13.	*Moschus chrysogaster*	Alpine musk deer	I/II/NC
14.	*Moschus fuscus*	Black musk deer	I/II
15.	*Moschus leucogaster*	Himalayan musk deer	I
16.	*Aonyx cinereus*	Asian small-clawed otter	II
17.	*Arctictis binturong*	Binturong	III
18.	*Neofelis nebulosa*	Clouded leopard	I
19.	*Panthera pardus*	Leopard	I
20.	*Ursus thibetanus*	Himalayan black bear	I

21.	*Crocodylus palustris*	Mugger	I
22.	*Python bivittatus*	Nepalese python	II

Annex C3-C: Sediment and Erosion Control Procedure

Title	Sediment and Erosion Control Procedure
Document Reference	UAHEL BMP Annex C3-C SECP
Objective	Outline measures to reduce impacts from soil erosion and sediment impacts on waterways

Application

The following sediment and erosion control procedure is to apply to all project area components during construction and operation.

Table C.1: Sediment and Erosion Control Procedure

Objective	Sediment and Erosion Control Procedure
Use of best practices	Reference to the following best practices are to be made for all sediment and erosion control activities: ■ Catchments and Creeks Pty Ltd. 2012. *Erosion and Sediment Control – A Field Guide for Construction Site Managers.* Version 4 April 2012 https://www.austieca.com.au/documents/item/57 ■ NSW Office of Environment and Heritage. 2012. *Erosion and Sediment Control on Unsealed Roads: A Field Guide for Erosion and Sediment Control Maintenance Practices* http://www.environment.nsw.gov.au/resources/stormwater/120410unsealedroads.pdf ■ NSW Government, Sydney Australia and LandCom NSW. 2004. *Managing Urban Stormwater: Soils and Construction*. Sydney, Australia: NSW Government. http://www.environment.nsw.gov.au/resources/water/BlueBookVol1.pdf
Management of roads and batters	■ All roads are to be subject to a detailed engineering design. ■ All disturbed soil surfaces are to be rehabilitated immediately after the contractor completes the work. ■ All road batters are to be designed according to the geological conditions to ensure batter slopes are an appropriate angle. ■ Any fill material used for road construction is to be compacted according to required engineering standards. ■ Roads are to be constructed and cut into the slope to avoid the use of fill batters. Where fill batters are used, they must be stabilized using appropriate sediment and erosion control best practices outlined in the standards above. ■ Excess fill is to be transported to an appropriate fill location. Fill material must not be disposed of over batters. ■ All batter slopes are to be rehabilitated as soon as possible following construction. ■ Water flow must not be diverted onto unstable batter slopes. If water flow is discharged over batters, drop down structures are to be used at all times where water is discharged downslope of roads. All drop down structures are to be armored at the base. ■ All drains are to be armored within 10 meters of a drainage feature crossing. ■ All drainage feature crossings must be designed to convey a storm size of at least 1:10 year event. ■ Soil must not be placed within the bed and banks of a waterway.

Objective	Sediment and Erosion Control Procedure
	■ Surface drainage must be employed on road surfaces to prevent the concentration and flow of water along the road surface. ■ Road drainage must discharge onto stable surfaces. Armoring can be used at discharge points or drop down structures used. ■ Water from road drainage must not be discharged into drainage features.
In-stream works	■ All in-stream works are to be subject to a detailed engineering design. ■ All in-stream works are to occur during periods of low flow. ■ Where appropriate, in-stream sediment control devices are to be used to prevent water entering into construction areas. ■ Stream flow is to be diverted away from construction areas. ■ Disturbance of the bed and banks of the waterway is to be rehabilitated to reduce bed and bank erosion. ■ Appropriate engineering designs must be employed for all in-stream works. ■ Concrete and other wastes must not be disposed of within any waterway.
Erodible soils	All erodible soils are to be identified in the field prior to disturbance Where erodible soils are identified surface stabilization measures are to be used, including (but not limited to): ■ Mulch: Apply to ground or slope surface as an erosion prevention measure that aids in plant growth and revegetation. On steep slopes and critical areas near waterbodies, mulch matting should be used with netting or anchoring to secure it. ■ Matting: Matting or erosion control blankets (ECBs) provide protection against surface runoff. Matting and ECBs should be made of fully biodegradable material. ■ Plastic sheeting: Apply to ground or slope surface as an erosion prevention measure.
Spoil disposal	■ All spoil disposal areas are to be subject to a detailed engineering design – only areas identified in the ESIA and approved by the World Bank and the Nepal Ministry of Forests and Environment can be used for spoil disposal. ■ All spoil disposal areas are to be rehabilitated as soon as practicable using a cover crop and native flora.
Washing vehicles and equipment	■ Strictly no washing of construction vehicles or equipment in nearby waterways. ■ A vehicle and equipment wash area is to be installed in a flat stable area away from waterways. All water from the vehicle and equipment wash area is to be treated and discharged onto a stable area. No discharge water is to be allowed to enter local waterways.
Respond efficiently to accidental spills into waterways and onto roads	■ Develop a response plan to ensure that spills into waterways and onto roads are dealt with on a timely basis. ■ Implement protective and containment procedures to remediate the spill. ■ Spill and mitigation efforts are to be reported and well documented.
Develop staff training program	■ All staff and contractors are to undertake field training on the best practice measures outlined within the procedure, including yearly refresher training.
Monitoring and evaluation	■ A maintenance program should include daily routine checks, repairs and replacements.

Objective	Sediment and Erosion Control Procedure
	■ All measures are to be inspected at least: – On a daily basis in areas of active construction or equipment operation – On a weekly basis in areas with no construction or equipment operation – Within 24 hours of a rainfall event ■ Sediment and erosion control measures must remain in place and be maintained in functional condition until the site is stabilized with vegetation. ■ Inspections are to ensure that there is no runoff onto roads and waterways, where non-compliance will lead to disciplinary action. ■ Inspections are to identify areas that require sediment and erosion control for rectification immediately. ■ Inspection records containing compliance to the procedure, non-compliance and correction actions are to be maintained.

Annex C3-D: Biodiversity Community Engagement Procedure

Title	Biodiversity Community Engagement Procedure
Document Reference	UAHEL BMP Annex C3-D BCEP
Objective	Outline measures to engage the community to conserve biodiversity within the project area

Application

UAHEL is to undertake a Biodiversity Community Engagement Procedure with all local communities to discuss wildlife protection, hunting, poaching, forest production collection, illegal logging, and health and safety requirements. This is to occur on a 6-monthly basis. UAHEL will be required to commit to:

- Continue raising awareness of the conservation value of habitats and species within the project area and surrounds, including any biodiversity offset areas identified at a later stage.
- Encourage local people not to conduct illegal activities and discuss alternatives through proactive community engagement.
- Provide a forum for the communities to ask questions, express their concerns and provide comments. Ensure monitoring of grievances and participation of all the groups of the population, including the most vulnerable ones, to the engagements.
- Update the community on their legal obligations under Nepal law.

Table D.1: Community Access and Engagement Procedure

Objective	Community Access and Engagement Procedure
Government empowerment	■ UAHEL is to engage with the local government, especially conservation authorities, regarding logging and clearing activities within the project area and surrounds. A Memorandum of Understanding is to be prepared with the local government regarding the responsibilities for reporting and enforcement action regarding illegal activities identified by UAHEL staff, consistent with the zero tolerance policy on possession of wildlife and forest resources and anti-illegal logging policy.
Intelligence gathering	■ Engage with the government, especially conservation authorities, and the community as well as outsiders (e.g., poachers, where possible; timber traders; law enforcement officers; forestry officials; truckers and other service providers) to gather information on any illegal activities in the area. ■ Visit the local markets where forest products and wild animals are traded. Understand how the any illegal wildlife trade and/or logging value chain works and who the key players to engage or target are. The surveys are to be conducted discretely by Nepalese locals, so as to avoid suspicion. Based on the intelligence gathered, targeted campaigns should be undertaken in conjunction with the government, especially conservation authorities, to reduce illegal logging and poaching. ■ Map out the information identified above to identify the key stakeholders, where are they located, how they access/use the areas, and how they interact with one another. The level of importance in terms of implementation of the conservation activities listed below to reduce illegal activities.

Objective	Community Access and Engagement Procedure
Raising community awareness of biodiversity values and managing illegal activities	■ Raise awareness of the conservation value of the forest and the surrounding areas through campaigns and workshops, highlighting threatened flora and fauna species. Workshops are to occur on a regular basis and at least every six (6) months. ■ All workshops are to be conducted with representatives of all community members (elders, women, men, youth, hunters, fishers etc.). ■ All villages within the project area are to be subject to community workshops at least once every 5 years. ■ Educate local people not to conduct illegal logging activities and poaching and discuss the regulatory requirements under Nepal law. ■ Conduct education sessions in schools at least once per year on biodiversity, the importance of forest protection and conservation of birds.
Community empowerment	■ Identify people from the community to become “paid volunteers”, i.e., people who genuinely want to protect biodiversity, who will get paid a reasonable stipend by this budget to act as sanctuary patrols for a number of years. ■ Identify/assign ambassadors in each community, who will organize events in local language to educate community members and their kids about the need to protect the forests. Use localized communication methods such as community theatre etc. to make it fun and accessible.
Fostering community inclusiveness	■ Provide a forum for communities to ask questions, express their concerns and provide comments. Ensure the monitoring of grievances and participation of all the groups of the population to the engagements. ■ Update local communities on developments within the Project that might be relevant to them, e.g., UAHEL are to provide sawn timber obtained from the project area to local people.
Packaging biodiversity management into livelihood restoration/alternatives	■ Undertake capacity building which involves providing communities with the information, training, skills, contacts and support needed to manage biodiversity in the area. ■ Community-based nurseries for animal or plant species can be managed with incentives, training and education. ■ Community patrols with restricted access to allowed persons can also be undertaken on site and surrounding areas to look for threats to biodiversity, i.e., snares, poachers, illegal logging activities.
Regular patrols	■ Regular patrols are to occur within the project area to identify illegal activities and community access. ■ Community rangers and wardens are to be trained to guard against poachers and report illegal activities to authorities, with incentives provided. ■ Information is to be provided to government, especially conservation authorities, to follow up on potential enforcement action.
Managing community access	■ Communities are to be briefed on areas that are safe to enter, and no-access zones are to be strictly adhered to. ■ Community access for allowed persons to worksites is to be recorded, and they need to check in and out when they enter or leave the site.

Objective	Community Access and Engagement Procedure
Monitoring and evaluation	■ A regular (yearly) community survey is to be undertaken to gather information on the community's attitudes towards conservation and illegal activities. This survey is to be provided to UAHEL within 1 month of the surveys' completion.

Annex C3-E: Injured and/or Distressed Wildlife Management Protocol

Title	Injured Wildlife Management Protocol
Document Reference	UAHEL BMP Annex C3-E I/DWMP
Objective	Outline the appropriate procedures to undertake when injured and/or distressed wildlife is encountered within the project area

Application

This protocol is to apply in cases where injured and/or distressed wildlife are found within the project area during construction or operation. This protocol applies to small or medium sized wildlife. The protocol related to large wildlife, especially large fauna that could potentially be dangerous when in distress (e.g., Himalayan black bear), should be developed in consultation with, and implemented by, experienced trained personnel. Capture, handling and release of large animals should also be undertaken in line with standard operating procedures as listed in best practice documents (e.g., Cattet, 2017[10]).

Table E.1: Injured and/or Distressed Wildlife Management Protocol

Event	Action
Upon discovery of injured and/or distressed animal	■ Record the date, time, location, condition of animal and circumstances concerning the incident, including photographic evidence wherever possible. ■ Stop work in affected area. ■ Observe from a distance what the animal is doing. ■ If NOT in immediate danger, wait for animal to move off before carrying on with work. ■ If animal is in immediate danger or clear distress, assess feasibility of capture depending on its size, location and safety of capture to both animal and staff. ■ Alert relevant government authorities on incident and arrange a same-day appointment for transfer of animal to them.
Preparation for containment	■ All staff involved in the containment exercise should be equipped with a pair of gloves and towel/gunny sack that is appropriately sized to cover the animal. ■ A vehicle should be immediately ready to transport the animal back to site without delay.
Management of small to medium sized injured animals	■ An adequately sized covered box or cage should be prepared to contain the animal immediately. The bottom of the box/cage should have towels or rags placed at the bottom to protect feet of animals. Use separate boxes for individuals, never place two animals in the same container. ■ Approach the animal from behind slowly and carefully, pausing when needed to let the animal calm down and habituate to human presence ■ When picking the animal up, use a towel to gently wrap around its back (and wings, if bird or bat) and cover the head. Keep voices down to avoid further stress to the animal.

[10] Cattet, M. 2017. *Capture, Handling and Release of Bears Standard Operating Procedure*. Northwest Territories, Canada: Government of the Northwest Territories, Wildlife Care Committee. https://www.enr.gov.nt.ca/sites/enr/files/resources/bears_care_sop.pdf

Treatment of small to medium sized injured animals	■ Pass the animal to the relevant government authorities. ■ If the animal must be kept overnight, place it in a ventilated box with a secure lid. Keep it in a quiet, dark area and do not attempt to feed, handle or release it. Transfer the animal to the forest department staff the following day. ■ Discard all boxes used for transporting injured wildlife to avoid transfer of disease. For cages, clean out thoroughly before re-use. ■ All staff involved in the capture to wash and sterilize their hands immediately upon return from site. ■ All clothes worn during the capture should be washed the same day and not re-worn.
Post-incident	■ Follow up with forest department/ veterinarian on condition of animal and date of release. ■ Senior Environment Executive to investigate further circumstances of incident. ■ Interview workers on site that day and record their observations. ■ Identify potential activities that could have led to animal injury. ■ If injury attributed to project activities, identify corrective actions to avoid future incidents with Process Senior Executive. ■ Record actions formally under BMP Management-of-Change and Incident Reporting System. ■ Process Senior Executive to disseminate actions via email to all staff and share during daily toolbox meetings.

Table E.2: Incident Reporting Form

INCIDENT REPORTING FORM

Submission Details	Name:	Designation:	Date:
Type of Incident	Wildlife Sighting Injury/roadkill Other	Health & Safety	Illegal Activity
Incident Details	Date:	Time:	Location/GPS:
Description of Incident (include photographs if available)			
Eyewitnesses			
Condition of Animal and Suspected Cause of Injury (include photographs if available)			
Action Taken	Action & Date Taken:		Involved Personnel:
Forest Department Staff Contact Details			

INJURED WILDLIFE PROTOCOL

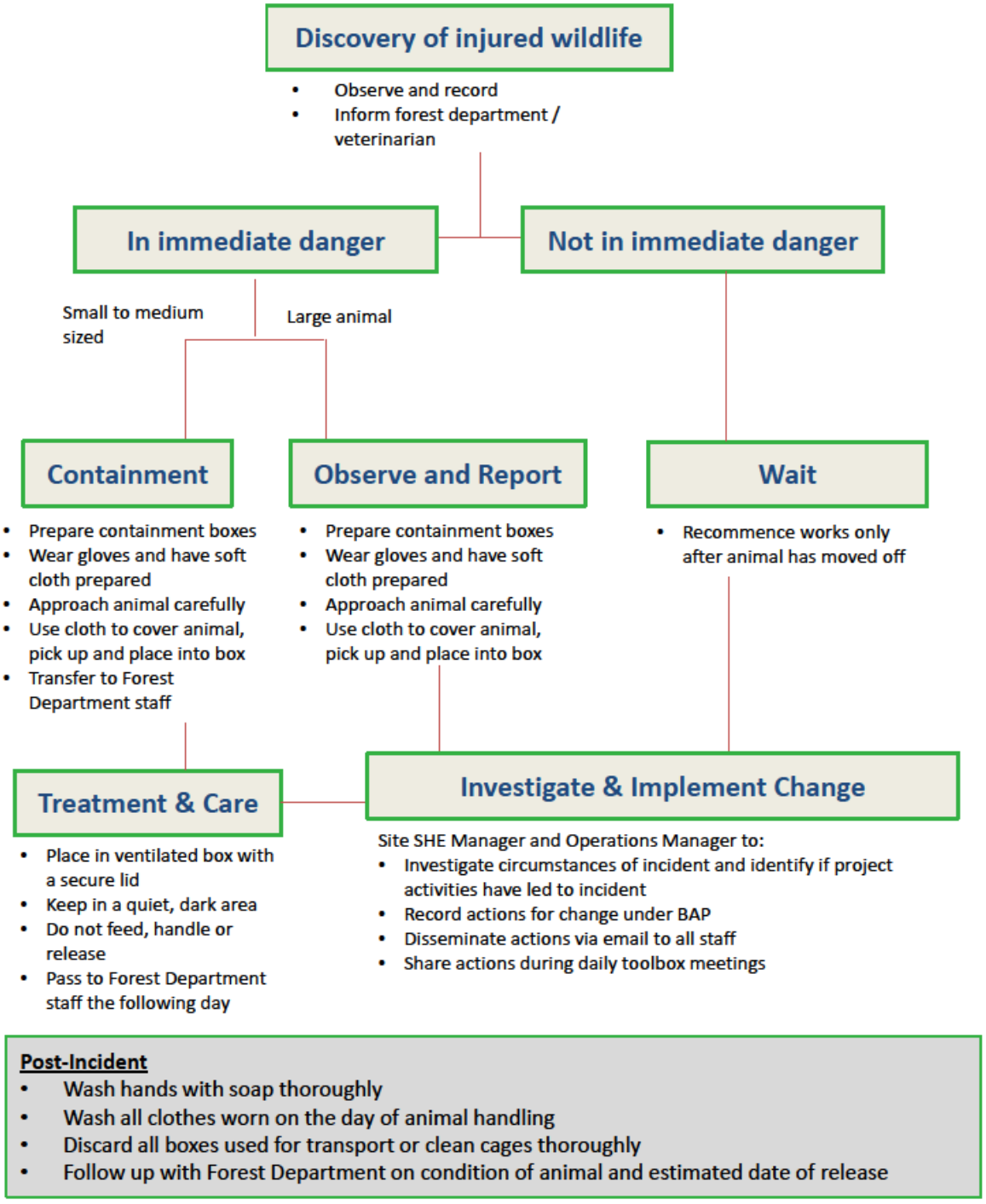


Table E.3: Incident Reporting Communication Chain Form

INCIDENT REPORTING COMMUNICATION CHAIN CONTACT DETAILS		
Designation	**Name & Address (where relevant)**	**Contact Number**
Senior manager		
SHE site manager		
Process senior executive		
Security supervisor		
Forest department warden 1		
Forest department warden 2		
Veterinarian		
Police department officer 1		
Police department officer 2		
Hospital		

Key Steps of Communication

Upon incident occurrence, the SHE Site manager should be notified immediately. The nature of the incident (wildlife sighting/injury, health and safety, illegal activity) and location of the incident should be provided.

Depending on the nature of the incident, the SHE Site manager will escalate the response to the first **responder**:

- Wildlife incidents: The Process Senior Executive will be informed so that he/she can make decisions to halt work or cordon off the affected area.
- Health and safety incidents: The Process Senior Executive will be informed so that he/she can make decisions to halt work or cordon off the affected area.
- For illegal activity incidents: The Security Supervisor will be informed so that he/she can make decisions to secure the site or detain suspects.

Depending on the severity of the incident, the first tier responders together with the SHE Site manager will decide whether there is a need to alert the **second tier of responders**:

- Wildlife incidents: relevant government authorities and/or a veterinarian should be contacted next.
- Health and safety incidents: The hospital will be contacted in the event of a serious injury to make preparations to receive individual.
- For illegal activity incidents: Relevant government authorities may be pulled in if illegal poaching or logging activities are suspected. As a final resort, the police department (**third tier responder**) may be notified if suspects are aggressive or activity is a prosecutable offence.

The SHE Site Manager will direct the incident reporting process.

The incident report will be reviewed by the senior manager and approve any corrective actions that do not have a serious impact on project productivity.

Annex C3-F: Biomass Removal Plan

Title	Biomass Removal Plan
Document Reference	UAHEL BMP Annex C3-F BRM
Objective	Outline methods to undertake biomass removal.

Table F.1: Biomass Removal Plan

Objective	Biomass Removal Plan
Use of best practices	Reference to the following best practice guidelines are to be made for the biomass removal: ■ Evans, A.M. 2008. *Synthesis of Knowledge from Woody Biomass Removal Case Studies*. ■ Asia-Pacific Forestry Commission. 1999. *Code of Practice for Forest Harvesting in Asia-Pacific*. FAO Regional Office for Asia and the Pacific (RAP).
Objectives	**Priority objectives:** ■ Collect the maximum quantity of commercially valuable timber species from the newly created reservoir at full supply level in particular forest areas. ■ Remove as much above ground biomass (with a focus on soft biomass) from the Project reservoir as possible to reduce serious adverse impacts on water quality and the generation of greenhouse gasses. **Other objectives:** ■ Enhance the habitat for viable fisheries management in the reservoir and its tributaries including downstream. ■ Aid access, navigation and other uses of the reservoir. ■ To reduce the long-term production of floating debris and facilitate its management.
Biomass removal options	**Biomass removal options:** ■ Do nothing ■ Partial biomass removal (salvage logging) ■ Complete biomass removal ■ Salvage logging and biomass clearance of the drawdown ■ Fill and flush **Selected biomass removal options:** ■ Salvage logging ■ Residual biomass removal - Lesser value biomass extraction (by local communities) - Biomass clearance

<table>
<tr><th>Objective</th><th>Biomass Removal Plan</th></tr>
<tr><td>Salvage logging management</td><td>
Roles and responsibilities:
<table>
<tr><th>Role</th><th>Responsibility</th></tr>
<tr><td>Coordinate, manage and monitor all salvage logging operations.</td><td>UAHEP Project Team</td></tr>
<tr><td>Undertake salvage logging operations.</td><td>Suitably qualified logging contractor</td></tr>
<tr><td>Ensure salvage logging operations are compliant.</td><td>Ministry of Forests and Environment</td></tr>
</table>
Before undertaking salvage logging, it is important to identify commercial viability proposed removal areas:
■ Highly viable areas
■ Marginally viable areas
■ Non-viable areas.

Commercial viability is to be determined by rapid assessment of commercial tree resources.

Highly viable areas to be subject to commercial harvesting operations. Marginally viable areas to be subject to some commercial harvesting operations (if possible) or subsidized harvesting operations. Non-viable areas to have functional timber stockpiled for either transport to a wood yard or for community collection.

Salvage logging will be undertaken in a manner consistent with the FAO Forest Harvesting Code of Practice (where applicable), IFC EHS Guidelines for Forestry Operations (where applicable) and Ministry of Forests and Environment legislation and guidelines.
</td></tr>
<tr><td>Residual biomass removal management</td><td>
Roles and responsibilities:
<table>
<tr><th>Role</th><th>Responsibility</th></tr>
<tr><td>Coordinate, manage and monitor all biomass removal operations.</td><td>UAHEP Project Team</td></tr>
<tr><td>Undertake biomass removal operations.</td><td>Suitably qualified logging contractor</td></tr>
<tr><td>Ensure biomass removal operations are compliant.</td><td>Ministry of Forests and Environment</td></tr>
</table>
Pre-impoundment biomass removal

■ When salvage logging of a block is complete, local residents will be invited to remove lesser value biomass from the block for a limited period of time.
■ Once the time period for local extraction has past, a contractor engaged by UAHEP Project Team will undertake clearance of residual biomass. As much as practical, lesser value biomass will be removed from the reservoir, and stacked for later use. Remaining biomass will be cut and burned. UAHEP Project Team will engage local residents, as much as possible, to undertake residual biomass clearance and the removal of lesser value biomass.
■ Logging of steep slopes (before impoundment) will be minimized to reduce slope instability and potential erosion and sediment transport.

Pre-impoundment biomass removal

■ Post impoundment biomass clearance can be carried out to reduce erosion and sedimentation. The remaining woody biomass can be burned during the dry season, if necessary.
</td></tr>
</table>

Objective	Biomass Removal Plan
	Lesser value biomass extraction ■ Lesser value biomass material to be used for building materials, firewood, charcoal /biochar production and other recycled products.
Biomass removal techniques	**Biomass Clearance techniques:** ■ Manual cutting/clearing; - Cutting and leaving biomass on site - Cutting and stockpiling/mulching for use by local residents and contractor ■ Pre-impoundment (set up seasonal forest log-boom, collection of floating logs, deploy large barge to allow collection of floating logs); ■ Post-impoundment (carry out on-water floating logs and woody debris collection via boats and land based extraction).

Annex C3-G: Site Rehabilitation Plan

Title	Site Rehabilitation Plan
Document Reference	UAHEL BMP Annex C3-G SRP
Objective	Outline methods to undertake site rehabilitation.

Table G.1: Site Rehabilitation Plan

Objective	Site Rehabilitation Plan
Use of best practices	Reference to the following best practice guidelines are to be made for the rehabilitation process: ■ McDonald, T., Gann, G.D., Jonson, J. and Dixon, K.W. 2016. *International Standards for the Practice of Ecological Restoration – Including Principles and Key Concepts*. Washington, D.C.: Society for Ecological Restoration ■ McDonald, T., Jonson, J. and Dixon, K.W. 2016. "National Standards for the Practice of Ecological Restoration in Australia." *Restoration Ecology* 24: S4–S32. Reference to Annex C3-H: Invasive Alien Species Management Plan is also required to prevent the intentional or accidental introduction of alien, or non-native, species of flora and fauna into areas undergoing rehabilitation.
Plan goals	Plan goals for existing natural habitat: ■ Allow indigenous species to undertake ecological functions (e.g., breeding, foraging) ■ Establish habitat for indigenous species ■ Establish canopy cove ■ Establish a diversity of indigenous tree species
Restoration planting	Restoration priorities include: ■ Significant remnant forest patches (even if degraded) be the target of restoration efforts ■ Promote natural regeneration (e.g., invasive species control) ■ Tree planting to complement protection and assist natural regeneration
Pre-planting Surveys	Undertake a pre-planting survey (baseline) to gather necessary field data in order to maximize rehabilitation success. Field data to be collected includes: ■ Site conditions – Scale of degradation, terrain availability of water, microclimate, soil fertility etc. ■ Scale of restoration efforts – Size of the area covered, number of plants needed etc. ■ Budget available ■ Timeframe – Intensive planting over a short period of time vs. phased planting over many years ■ Availability of technical expertise – In-house experts vs. outsourced experts etc. ■ Availability of human resources – Number of people to be employed directly or under contract ■ Involvement of local community ■ Availability of planting materials from external sources – Availability of suitable species; distance from supplying nurseries to project site etc. ■ Pros and cons of planting from seeds vs. sourcing of plants from external sources etc. ■ Availability of seeds from suitable species (in the case of planting from seeds) – Source of seeds, e.g., project site or nearby areas, technical challenges in seed germination etc.

Objective	Site Rehabilitation Plan
	■ Survivability of seedlings vs. large saplings (in the case of advanced planting materials) – Seedlings usually have lower survival rates compared to saplings due to predation, susceptibility to diseases and competition from grasses and weeds. ■ Feasibility of using machinery – e.g., Machinery for digging large holes, transportation of seedlings/saplings etc. ■ Feasibility of establishing nurseries – Availability of large flat (or gently sloping) areas, distance from water sources etc. In addition to the pre-planting survey, it is recommended that a reference survey is undertaken. The reference survey is be conducted to determine the desired outcome of the project rehabilitation. Reference survey to be undertaken in a nearby area that is considered an undisturbed natural ecosystem.
Succession planting	In areas modified or degraded succession planting is suggested. To promote succession planting in these area ensure: ■ Pioneer plants species are established first; ■ Once juvenile pioneer plants are established, begin planting of climax species under the shade of pioneer plants.
Planting pattern	In areas that have lost most or all of their original tree cover, the Line Planting Method is recommended. Important features of Line Planting Method include: ■ Line direction ■ Line spacing: - Trees should be planted in rows 2–4 m apart. - The planting density should aim for 3,100 regenerates per hectare with an average spacing of 1.8 m.
Species selection	Species used in restoration works should all be indigenous to Nepal. This will include species typical from temperate forest and montane forest habitats in the region. Riparian associated species should be planted along riparian corridors and in areas subject to intermittent inundation. Approximately 30 tree species to be used in the restoration process, which should be sufficient in initiating biodiversity recovery in most tropical forest ecosystems.
Maintenance regime	Rehabilitation management should be conducted in accordance with **Error! Reference source not found.**G.2
Monitoring and evaluation	Regular monitoring will provide up-to-date information on the site conditions, and trigger interventions and/or adjustments to the habitat restoration plan as required. The following monitoring methods should be implemented: ■ Operational monitoring: - This focuses on the activities of the habitat restoration plans, management actions and responsibilities, and to ensure their proper implementation. These activities should be monitored at a high frequency. ■ Strategic and effectiveness monitoring: - This focuses on the objectives of the habitat restoration plan and measures the progress of the activities with respect to these objectives. The measurements shall be indicators pertaining to the objectives, such as vegetation cover and biodiversity. ■ Threats monitoring: - This aims to evaluate the presence of threats that can adversely impact the success rate of habitat restoration. The indicators should be developed from an assessment that identifies potential threats to the plan.

Table G.2: Rehabilitation Maintenance Regime

No.	Activity	Methods	Frequency	Inputs
1	Additional planting to replace dead trees	■ 'In-filling' of gaps with new planting material (seedlings/saplings)	When required	■ Labor ■ Planting materials ■ Machinery and tools
2	Removal of weeds and invasive species	■ Manual remove/slashing/ pressing ■ Use of herbicides in cases of serious infestation ■ See Annex C3-H for additional invasive.	Every three (3) months or when required	■ Labor ■ Machinery and tools ■ Herbicides
3	Protection from encroachment	■ Patrolling ■ Cautioning offenders and potential offenders ■ Reporting to law enforcement authorities if there are criminal activities	Daily	■ Labor ■ Protection equipment ■ Communications equipment
4	Prevention of damage to plants due to wildlife or livestock predation	■ Fencing along the boundary of the project site ■ Nets or other barriers around young seedlings	Installation of fencing at the start of the Project period Daily boundary patrolling to check integrity of fencing	■ Labor ■ Fencing/netting materials
5	Application of fertilizer	■ Organic fertilizers, such as manure, can be used as a cheaper alternative to chemical fertilizers.	Critical period for application is when seedlings/saplings are less than 1.5 m tall	■ Organic or chemical fertilizers
6	Irrigation	■ Depending on the site conditions and budget, the irrigation system could be in the form of drip irrigation, sprinkler system or manual watering.	When required	■ Labor ■ Irrigation/watering system
7	Monitoring	■ Monitoring methods discussed above	Dependent on monitoring method	■ Labor ■ Monitoring equipment

Annex C3-H: Invasive Alien Species Management Plan

Title	Invasive Alien Species Management Plan
Document Reference	UAHEL BMP Annex C3-H IASMP
Objective	Outline measures to manage invasive alien species throughout the construction and operational phase of the Project.

Table H.1: Invasive Alien Species Management Plan

Objective	Invasive Alien Species Management Plan
Use of best practices	Reference to the following best practices are to be made for all invasive species management: ■ International Union for Conservation of Nature and Natural Resources (IUCN), Invasive Species Specialist Group. 2000. *IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species*. Species Survival Commission. ■ McNeely, J.A. (ed.). 2001. *Global Strategy on Invasive Alien Species*. IUCN.
Application of this management plan	The Invasive Alien Species Management Plan applies under these circumstances: ■ Preventing the intentional or accidental introduction of alien, or non-native, species of flora and fauna into areas where they are not normally found can be a significant threat to biodiversity. This means care must be taken in relation to planting of flora and introduction of fauna within project areas, including landscaping and stabilization. ■ All introductions of alien species will be subject to a risk assessment to determine the potential for invasive behavior. The client will implement measures to avoid the potential for accidental or unintended introductions including the transportation of substrates and vectors (such as soil, ballast, and plant materials) that may harbor alien species. In practice, all introductions of potentially invasive species should be avoided. If introduction is to occur, a risk assessment for those species is to be undertaken. ■ For alien invasive species already present within the project area and surrounds, diligence is required so as not to spread them into new areas. So far as practicable, the client should take measures to eradicate such species from the natural habitats over which they have management control. In practice, this means managing invasive species within the project area and the surrounding areas that consist of natural habitat.
Preventing the transmission of invasive species	Terrestrial approach: ■ Rehabilitation of disturbed areas ■ Prevention of further disturbance of natural areas ■ Implementation of best management practices during project construction and operation ■ Vehicle/ machine hygiene maintenance (e.g., regularly pressure-washing vehicles when entering or exiting the project area) ■ Tool/ equipment hygiene maintenance (e.g., regularly cleaning plant material and dirt off tools and equipment when entering or exiting the project area) ■ Personnel hygiene maintenance (e.g., regularly cleaning boots and clothing when entering or exiting the project area) ■ Appropriate treatment of wash water before discharging ■ Appropriate collection of material discarded during hygiene maintenance
Risk assessment for introduced flora	After species are introduced, a risk assessment should be conducted to identify priority invasive species for rapid response.

Objective	Invasive Alien Species Management Plan
and fauna species	The following categories and parameters should be included in the invasive species risk assessments: ■ Parameters that determine entry rate: Mobility, propagule pressure, ability to escape, ability to be controlled ■ Species ecology: Fecundity, longevity, generation time, aggressiveness, predation vulnerability ■ Environmental factors promoting establishment and persistence of species: History of successful invasions in similar habitats, habitat compatibility, detection probability, species manageability, association with humans ■ Population dynamics: Functional population size, juvenile/adult survival probability, population growth rate The assessment of a species' invasion risk can be conducted via the following methods: ■ **Qualitative risk assessment**: Professional judgement by an expert can be used to assess species by their biological characteristics and habitat information. This can be done by assigning the species a numerical value for the parameters assessed, followed by categorizing the species as low, medium or high risk based on the total value. ■ **Quantitative risk assessment**: Model simulations and statistical analyses, such as population modelling, can be conducted to predict the spread of a species over a geographic location to period its associated effects over time. ■ **Semi-quantitative risk assessment**: A combination of a scoring system and quantitative methods can be used to assess the invasion risk of a species.
Early detection of invasive species	■ Efforts should be made to identify invasive species which are immediate threats to the project areas and surrounding natural habitat. ■ Invasive species monitoring to be conducted every six (6) months for both terrestrial and marine environments. ■ Monitoring to be conducted by a suitably qualified ecologist with invasive species detection experience. ■ The following monitoring parameters to be collected and stored: - Locations of patches of high density/concentration of invasive species - Rough extent of patch size of the abovementioned areas - Number of invasive species recorded from surveys - Ecological interactions: utilization of invasive species by native fauna - Geo-referenced photographic evidence The findings of the monitoring should be analyzed to assess if invasive species are proliferating within the project area, followed by appropriate corrective actions.
Eradication of invasive species	Eradication of invasive species to be undertaken when: ■ Establishment of invasive species ■ Proliferation of invasive species Eradication techniques include: ■ Mechanical control (e.g., direct manual removal of species) - Undertaken in sensitive areas (e.g., near drinking waterbodies) ■ Chemical control (e.g., usage of insecticides to eradicate insect pests, herbicides to eradicate weeds) - Undertaken in accordance with safe use and label directions ■ Biological control (e.g., usage of *Bacillus thuringiensis* [Bt] to eradicate insect pests)

Objective	Invasive Alien Species Management Plan
	■ Habitat management (e.g., prescribed burning of invasive vegetation cover) Successful eradication requires prompt response as soon as possible after detection of a small invasive species population. For eradication methods specific to project invasive species..
Rehabilitation areas	Areas where invasive species have been removed must be rehabilitated with native species to prevent the re-establishment of these species as many of them are weedy species that can recolonize bare ground quickly. Actions that can be undertaken in the forested areas include: ■ Indigenous or naturalized species should be used where possible for landscaping, rehabilitation or other on-site needs. ■ Removal of soil layer where seed banks or rhizomes are mostly contained, to remove all presence of invasive species' propagative parts. ■ Replace soil with soil that has been excavated from another part of the project area or treat soil with herbicide or do manual weeding. ■ Plant native seedlings (obtained from site nursery) into soil, adopting an intensive and high density planting pattern. ■ Fertilize the planted saplings with generic fertilizer. ■ Lay mulching (dead plant matter) around the saplings to reduce desiccation and weed growth. ■ Continue weeding regularly. ■ Monitor regeneration of patch.
Containment of invasive species	Containment of invasive species aims to restrict their proliferation by containing them in a defined locality. ■ Prevention and eradication control containment of invasive species. ■ Containment is conducted such that there are planned barriers beyond which the invasive species should not spread, such that the desired habitats do not become colonized or invaded by invasive species. ■ Species that are likely to be successfully contained are those that proliferate slowly over short distances. ■ Valuable habitats and native species can be safeguarded from the potentially adverse impacts of invasive species if they are successfully contained within a well-defined area.

Table H.2: Invasive Flora and Fauna Species

S/N	Scientific Name/ Common Name	Photograph	Key Features
		Animals	
1.	*Achatina fulica*	 https://www.cabi.org/isc/datasheet/2640	*A. fulica* is distinctive in appearance and is readily identified by its large size and relatively long, narrow, conical shell. Reaching a length of up to 20 cm, the shell is more commonly in the size range 5–10 cm. The color can be variable but is most commonly light brown, with alternating brown and cream bands on young snails and the upper whorls of larger specimens. The coloration becomes lighter towards the tip of the shell, which is almost white. There are from seven to nine spirally striate whorls with moderately impressed sutures.
2.	*Acridotheres tristis*	 https://www.cabi.org/isc/datasheet/2994	Common mynas are 23 to 26 cm long, weigh 82 to 143 g and have a wingspan of 120 to 142 mm (Markula *et al.* 2009)[11]. The common myna has a medium to heavy build and a cocoa-brown body color. The head, neck and upper breast of the adult is glossy black with the head sporting an erectile crest. The undertail coverts, tail tip and the outer feathers are white and white bases to the primary feathers produce a white wing patch that is conspicuous in flight.

[11] Markula, A., Hannan-Jones, M. and Csurhes, S. 2009. "Pest Animal Risk Assessment: Indian Myna, *Acridotheres tristis.*" *Environmental Science, Agricultural and Food Sciences, Biology*

S/N	Scientific Name/ Common Name	Photograph	Key Features
3.	*Clarias batrachus*	 https://www.cabi.org/isc/datasheet/88681	*C. batrachus* has an elongated body, broad at the anterior and narrow at the posterior. *C. batrachus* is similar in size and appearance to *C. macrocephalus*, but can be distinguished from the latter species by the shape of the occipital process in the head portion. Dorsal and anal fins are without spines, pectoral fins are strong with fine serrations on both edges, pelvic fins are small and the caudal fin is not confluent with dorsal or anal fin. The mouth is wide and has four pairs of well-developed barbels, with the maxillary barbels reaching to the middle or base of the pectoral fin.
4.	*Clarias gariepinus*	 https://www.cabi.org/isc/datasheet/88683	*Clarias gariepinus* are readily recognized by their cylindrical body with scaleless skin, flattened bony head, small eyes, elongated spineless dorsal fin and four pairs of barbels around a broad mouth. The upper surface of the head is coarsely granulated in adult fishes but smooth in young fish. The body is greyish-black with the underside of the head and body a creamy-white color (Van Oijen 1995)[12], with a distinct black longitudinal band on each side of the ventral surface of the head (which is absent in young fish of less than 9 cm long). Larger fish (more than 9 cm) are mottled with an overall grey-khaki color.

[12] Van Oijen, M.J.P. 1995. "Appendix I. Key to Lake Victoria Fishes other than Haplochromine Cichlids." (pp. 209–300). In: F. Witte and W.L.T. Van Densen (eds.) *Fish stocks and fisheries of Lake Victoria. A Handbook for Field Observations*. Dyfed, Great Britain: Samara Publishing Limited.

S/N	Scientific Name/ Common Name	Photograph	Key Features
5.	*Columba livia*	 https://www.cabi.org/isc/datasheet/87913	Rock pigeons have a grey body with a whitish rump, two black bars on the secondary wing feathers, a broad blank band on the tail, and red feet. The body color can vary from grey to white, tan, and black. Body mass is highly variable ranging from 243 to 359 g (Johnston & Johnson 1989 [13]) and averaging 28 cm in length (Williams & Corrigan 1994[14]). When they take off, their wing tips touch, making a characteristic clicking sound. When they glide, their wings are raised at an angle.
6.	*Corvus splendens*	 https://www.cabi.org/isc/datasheet/15463	A medium sized crow, length 40 cm and weight 245–371 g, with relatively long legs and bill. Grey nape, sides of head and breast, though the shade of grey varies in different races; otherwise glossy black, but juveniles are duller. Bill and legs black, eyes black-brown. Sexes similar though males are somewhat larger.

[13] Johnson, S.G. and Johnston, R.F. 1989. "A Multifactorial Study of Variation in Interclutch Interval and Annual Reproductive Success in the Feral Pigeon, Columba Livia. *Oecologia* 80(1):87-92. doi: 10.1007/BF00789936.

[14] Williams, D.E. & Corrigan, R.M. 1994. "PIGEONS (Rock Doves)." *Prevention and Control of Wildlife Damage Handbook* 69.

S/N	Scientific Name/ Common Name	Photograph	Key Features
7.	*Ctenopharyngodon idella*	 https://www.cabi.org/isc/datasheet/16772	Grass carp is a large elongated fish with almost cylindrical body, round abdomen, and flat head. The mouth is sub-terminal to terminal. The jaws have simple lips; the upper jaw slightly extends over the lower jaw. The fish has no barbels and the eyes are small. The snout is short and its length is less than or equal to the eye diameter. The gill membrane is connected to isthmus and the gill rakers (15–19) are small, short, and widely set or scattered. The dorsal and anal fins are relatively short and the origin of the anal fin is behind the posterior edge of the dorsal fin. The dorsal fin has 3 spines and 7–8 soft rays; the anal fin has 3 spines and 7–11 soft rays.
8.	*Cyprinus carpio*	 https://www.cabi.org/isc/datasheet/17522	The wild forms have an elongated body. The profile index is 3.5 to 4.5, the body width index is 1.4 to 1.8. The domesticated strains are compressed in different extent (profile index can be as low as 2.0, the body width index is above 2.0). The connection between the head and the dorsal part of the body is nearly straight in case of wild carps. A depression can be found in this area in domesticated and feral carp. The head is relatively small (27–32% SL). The lips are thick and can be extended. There are four barbels. The maxillary barbels are shorter than the mandibulary barbels. The wild forms have large scales and yellow-brown, or green-brown coloration on the head, on dorsal and upper-lateral side of the body. The abdominal part can be yellowish or whitish.

S/N	Scientific Name/ Common Name	Photograph	Key Features
9.	*Diaphorina citri*	 https://www.cabi.org/isc/datasheet/18615	The adult is 2.5 mm long, body yellowish-brown, legs greyish-brown. Wings are transparent with white spots or light-brown with a broad, beige, longitudinal band in the center. Mathur (1975)[15] gives a key to the Indian species of Diaphorina, and a detailed description of the adult. The average size of adult females is 3.3 mm long and 1 mm wide; the mean size of adult males is 2.7 mm long and 0.8 mm wide.
10.	*Hemidactylus frenatus*	 https://www.cabi.org/isc/datasheet/80353	*H. frenatus* grows up to 57 mm snout-vent length. It has no eyelids; a vertical pupil; toes and fingers with divided, expanded lamellae; lamellae on the fourth toe extending to the base of the digit; claws on all five digits; uniform white, tan, or gray dorsum, sometimes semitransparent; small and scattered tubercles (if present) that are not restricted to dorsolateral rows; a dark line extending from the snout through the eye to the base of the jaw, and sometimes additional dark lateral lines on the body; the second pair of anterior chin shields in contact with infralabials; smooth caudal scales; rows of enlarged spines circling some portions of the tail; and a whitish belly.

[15] Mathur, R.N. 1975. *Psyllidae of the Indian Subcontinent*. New Delhi: Indian Council of Agricultural Research, New Delhi, p. 429.

S/N	Scientific Name/ Common Name	Photograph	Key Features
11.	*Hypophthalmichthys molitrix*	 https://www.cabi.org/isc/datasheet/79036	Silver carp are large rather heavily built cyprinids, laterally compressed when small but becoming increasingly robust and thick bodied with growth. They are covered with small cycloid scales of a uniform silver coloration. The lateral line curves downwards very markedly in the abdominal region, more or less following the profile of the belly. There are between 95 and 103 scales (some references quote 120) in the lateral line. Small specimens do not have spines on their fins, whereas large specimens have a hard, stiff spine with fine serrations on the posterior margin, at the front end of the pectoral, and moderately strong spines on the dorsal and anal fins. The dorsal fin origin is behind the pelvic fin insertion.
12.	*Hypophthalmichthys nobilis*	 https://www.cabi.org/isc/datasheet/92426	The bighead carp has a disproportionately big head and mouth. It has a deep, laterally compressed body with small, cycloid scales. There are 98–100 scales found in the lateral line, 26–28 scale rows above the lateral line, and 16–17 scale rows below the lateral line. The snout is short and blunt. The eyes are small, projecting downward, and located anteriorly on the head, below the midline of the body. The abdominal keel of the bighead carp is shorter than that of silver carp and it extends from the base of the ventral (pelvic) fin to the anus. The tip of the pectoral fin reaches beyond the origin of the ventral fin (i.e., about one-third to two-fifths of the base of the ventral fin).

S/N	Scientific Name/ Common Name	Photograph	Key Features
13.	*Maconellicoccus hirsutus*	 https://www.cabi.org/isc/datasheet/40171	Crawlers (0.3 mm long) are pink. Immature females and newly matured females have greyish-pink bodies dusted with mealy white wax. The adult female is 2.5–4 mm long, soft-bodied, elongate oval and slightly flattened; on maturation, she begins to secrete sticky, elastic, white wax filaments from her abdomen to form a protective ovisac for her eggs. As her pinkish-grey body fills with salmon-pink eggs it assumes a pink color, but this is often not immediately visible because the entire colony tends to become covered by white, waxy ovisac material.
14.	*Oncorhynchus mykiss*	 https://www.cabi.org/isc/datasheet/71813	*O. mykiss* exhibit an astonishing range of external color, patterns of spots, and size at maturity. Prior to the use of electrophoretic and molecular techniques, many taxonomic distinctions among populations of O. mykiss were devised, using scale counts, spot characteristics, pyloric caeca counts and other morphological measurements.

S/N	Scientific Name/ Common Name	Photograph	Key Features
15.	*Oreochromis mossambicus*	 https://www.cabi.org/isc/datasheet/72085	The tilapias have a continuous dorsal fin, three or more anal spines, a single nostril on each side and the lateral line is interrupted.
16.	*Paratrechina longicornis*	 https://www.cabi.org/isc/datasheet/44709	The crazy ant (*Paratrechina longicornis*) is extremely easy to identify by observing its rapid and erratic movements. The antennae have 12–segments without a club and the scape, the basal segment of the antenna, is extraordinarily long with the apex surpassing the posterior border of the head by at least one-half the scape length. Workers are relatively small (2.3–3 mm). Head, thorax, petiole and gaster are dark brown to blackish and the body often has a faint bluish iridescence. All workers in a colony are monomorphic and have only one node between the propodeum and the gaster. Eyes are elliptical, strongly convex, and placed close to the posterior border of the head.

S/N	Scientific Name/ Common Name	Photograph	Key Features
17.	*Psittacula krameri*		*P. krameri*: Generally pale green; chin black and continuing black across lower cheek; rose-pink collar on hindneck, nape with some blue; tail darker green with central feathers bluish, tipped yellow-green; mantle and back pale green with olive tinge; rump and upper tail coverts slightly brighter; lesser and median upper wing coverts bright green (darker than body); greater coverts dark green; primaries and secondaries dark green with darker (almost black) margin to inner webs; underside of flight feathers grey; underwing coverts yellowish-green. Upper mandible red, tipped black, lower mandible blackish-red. Female lacks black neck and cheek, pink collar and bluish suffusion on neck and has shorter central tail feathers. Immature similar to female but bill slightly paler, iris grayish; male acquires pink collar in third year.

S/N	Scientific Name/ Common Name	Photograph	Key Features
18.	*Pycnonotus jocosus*	 https://www.cabi.org/isc/datasheet/67471	*P. jocosus* is a medium-sized passerine of 18–23 cm in length (body and tail), with a mass of 25–42 g, and a wingspan of 28 cm. It is a highly distinctive slim bird with an erect black/dark brown crest (2 cm in height) that is usually held upright except when in flight, and sometimes curves forward almost over the pointed black bill. It has a dark brown/black head with prominent white cheek patches, red whiskers below each eye and above the white cheek patches, and oval shaped nostrils with bristles. It has a white belly and breast, tan flanks, and red feathers underneath at the base of the long brown tail which has white tips. It has a dark brown to black collar extending down each shoulder. The legs and toes are short with little strength.
19.	*Salmo trutta*	 https://www.cabi.org/isc/datasheet/65308	*Salmo trutta* has a fusiform body with a small pointed head, large mouth, extending mostly after the eye. S. trutta or brown trout get their name from the brown or golden brown hue on their bodies. Body is grey-blue colored with numerous spots, also below the lateral line. Blackish colored on upper part of body, usually orange on sides, surrounded by pale halos.

S/N	Scientific Name/ Common Name	Photograph	Key Features
20.	*Streptopelia decaocto*	 https://www.cabi.org/isc/datasheet/63366	The Eurasian collared-dove is a member of the dove and pigeon family (*Columbidae*), all of which are small to medium-sized birds with short legs and necks and small heads. Most species in *Columbidae* show little variation in color, with the exception of the rock dove (*Columba livia*). *S. decaoto* is a medium to large-sized, stocky dove, approximately 30–33 cm long with a wingspan of 45–55 cm and weighing around 200 g. Overall, they are a pale, sandy gray, with a slight pinkish tinge to the head and breast. Their bills are black, the irises of their eyes are red, and their legs and feet are mauve. Their tails are white when viewed from the underside, and the ends of their tails are squared off (rather than pointed).
Fungi			
21.	*Cronartium ribicola*	 https://www.cabi.org/isc/datasheet/16154	*Heteroecious, macrocyclic. Pycnia caulicolous*, appearing as low yellowish blisters towards the edge of the cankers, becoming irregular, ill-defined and dark colored, gradually destroyed or disrupted by the enlarging aecia, of indeterminate type, subcortical, flat, ca 50 µm deep and 0.5–3 mm diameter. Aecia caulicolous, peridermioid, more or less circular and ca 2–5 mm diameter or transversely elongated and up to 10 x 5 mm, opening irregularly or around the sides; peridia smooth, several cells thick; cells elongated, strongly verrucose. Aeciospores globose to ellipsoid, 16–30 µm diameter

S/N	Scientific Name/ Common Name	Photograph	Key Features
Plants			
22.	*Acacia mangium*	 https://www.cabi.org/isc/datasheet/2325	*A. mangium* is a large tree, to 30 m tall, with a straight bole, which may be over half the total tree height. Trees with a diameter over 50 cm are rare. It may be reduced to a small tree or large shrub of 7–10 m on adverse sites. The bark surface is rough, furrowed longitudinally, and varies in color from pale grey-brown to brown. The lower bole is sometimes fluted.
23.	*Albizia julibrissin*	 https://www.cabi.org/isc/datasheet/4005	*A. julibrissin* is a deciduous, fast-growing tree (sprouts can grow more than 1 m in a vegetative season) from 6 to 12 m high. It has a straight stem (but in nature trees can grow with multiple trunks) and a wide, spreading crown. The bark is smooth and grey-green, greener in young trees, and has angular and glabrous branches, with many lenticels. Leaves are bipinnate, with 6–12 pairs of leaflets, each divided into 20–30 pairs of ultimate segments, 1 cm long, light green and oblong. The entire leaf is about 20–30 cm long.

S/N	Scientific Name/ Common Name	Photograph	Key Features
24.	*Alternanthera sessilis*	 https://www.cabi.org/isc/datasheet/4404	*A. sessilis* is an annual or perennial herb, of 0.2–1 m high, with strong taproots. The stems are generally prostrate, creeping, often rooting at the nodes, sometimes floating or ascending at the tips, cylindrical and slightly hairy, with numerous, erect branches. The leaves are simple, opposite, shortly petiolate or sessile, broadly lanceolate or spatulate to almost linear, 0.6–5 cm long, and 0.3–1 cm wide. They are attenuated at the base, and the apex is acute to blunt, with entire, glabrous or pilose (thin, fine, articulate hairs) margins. The inflorescences are dense, sessile, silvery-white clusters of compressed spikes in the leaf axils; perianth segments are equal in length, acute, 1.5–2.5 mm long with a short point.

S/N	Scientific Name/ Common Name	Photograph	Key Features
25.	*Arundo donax*	 https://www.cabi.org/isc/datasheet/1940	*A. donax* is a tall, erect, perennial cane- or reed-like grass. One of the largest herbaceous grasses, it can grow to 2-10 m tall. Its root structure is very strong, with the fleshy, almost bulbous, creeping rootstocks (rhizomes) forming compact bundles from which grow the fibrous roots, penetrating deep into the soil. The horizontal rhizomes give rise to many–stemmed, hollow, cane-like clumps allowing it to form large colonies many meters across. These tough, individual stems or culms are divided by partitions at the nodes like in bamboo, each node 12–30 cm in length and can reach diameters of 1–4 cm with walls 2–7 mm thick. They commonly branch during the second year of growth, rarely multiple, just single lateral branches from nodes. The outer tissue of the stem is of a silicaceous nature, hard and brittle with a smooth glossy surface that turns pale yellow when the culm is fully mature.
26.	*Bothriochloa pertusa*		*B. pertusa* is a stoloniferous perennial. Stolons often pink, rooting at the nodes, creeping extensively to form a sward. Nodes bearded. Stems geniculately erect 60–100 cm high. Leaves up 10–30 cm long, 2–5 mm wide, apex acute, mainly crowded at the base of the culms, usually glabrous, but with some scattered hairs. Ligule cilate 1–2 mm long. Inflorescence sub-digitate with up to 12 shortly pedunculate purplish racemes each up to 7 cm long, the lowest longer than the central axis, pilose.

S/N	Scientific Name/ Common Name	Photograph	Key Features
		https://www.cabi.org/isc/datasheet/112761	
27.	*Caesalpinia decapetala*	 https://www.cabi.org/isc/datasheet/10733	*C. decapetala* is a robust and sprawling shrub or climber 0.5–10 m tall, with numerous straight to hooked thorns on the stems. Bipinnately compound leaves are dark green above, paler beneath, up to 30 cm long, with deciduous stipules 8–20 mm long. The leaf rachis is armed with downwardly hooked prickles. Each leaf consists of 3–15 pairs of pinnae, each pinna having 5–12 pairs of leaflets, elliptic-oblong to ovate, rounded at the apex, 10–22 mm long, 4–11 mm wide. Flowers are pale yellow, 25–30 mm diameter, borne in axillary and terminal racemes 10–40 cm long, petals 10–15 cm long and 8–15 mm wide. Fruits are dehiscent pods 6–11 cm long, 2–3 cm wide, containing 4–9 black ellipsoid, flattened, black seeds 8–12 mm long and 6–8 mm wide
28.	*Cardamine flexuosa*	 https://www.cabi.org/isc/datasheet/112949	This is a small flowering plant growing to a height of no more than 30 cm, usually perennial, with few short, erect stems. The leaves pinnate, mostly at the base, each with about 5 pairs of rounded leaflets. Flowers very small, white, 3 – 4 mm across with 6 stamens.

S/N	Scientific Name/ Common Name	Photograph	Key Features
29.	*Chromolaena odorata*	 https://www.cabi.org/isc/datasheet/23248	*C. odorata* is a herbaceous to woody perennial with a bushy habit which forms a very dense thicket about 2 m high, in almost pure stands. This many-branched plant becomes lianescent when it has the opportunity to climb on a support. Isolated individuals start to branch when they reach a height of about 120 cm. After the first year of growth, the plant develops a strong, woody underground storage organ, which can reach a diameter of 20 cm. Stems are terete and become woody. Twigs are slightly striolate longitudinally, pubescent, opposite-decussate. Leaves are simple, opposite-decussate and without stipules.
30.	*Cinnamomum camphora*	 https://www.cabi.org/isc/datasheet/13519	*C. camphora* in open habitats is a large evergreen tree with a stout, uniformly cylindrical bole and dense, symmetrical crown. In its native habitat it attains a height of 20–30 m with wide spreading branches and a trunk 50–100 cm in diameter (Dewey 1897[16]), although in China it can reach up to 50 m tall with a dbh of 300 cm. In India and Nepal the dbh ranges from 50 to 300 cm, and in subtropical eastern Australia up to 200 cm. When young, the bark is green and smooth, later it turns yellow-brown or grey-brown with vertical splitting.

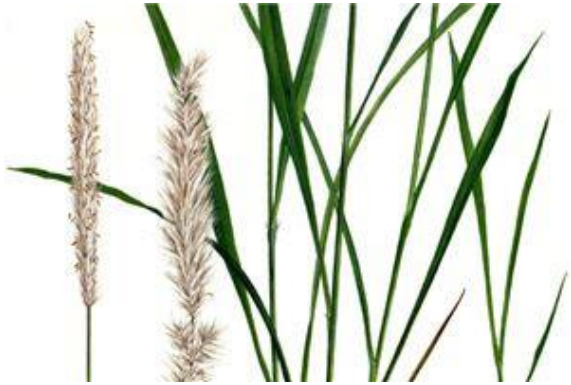
[16] Dewey. L.H. 1897. *The Camphor Tree*. Division of Botany Circular No. 12, U.S. Department of Agriculture.

S/N	Scientific Name/ Common Name	Photograph	Key Features
31.	*Commelina benghalensis*	 https://www.cabi.org/isc/datasheet/14977	*C. benghalensis* belongs to a family with 500-600 species with distinct characteristics. C. benghalensis has creeping stems which assume an ascending position, are 15–40 cm long, branched and rooting at the nodes. The leaves are ovate or elliptical, acuminate, 3–7 cm long, 1–2.5 cm wide with a base narrowed into a petiole. The flowers are subtended by bracts with their edges fused to a length of about 10 mm to form a flattened funnel-shaped spathe, 1.5 cm long and wide. Flowers have three lilac blue petals 3–4 mm long, the lower rather smaller than the two laterals and occasionally white. There are two anterior cells which are two-ovuled.
32.	*Cotinus coggygria*	 https://www.cabi.org/isc/datasheet/47400	*R. typhina* is a large, deciduous shrub to small tree, native to Canada and the USA, which can attain a height of 30–35 feet. Its root systems tend to be shallow and wide-spreading. It has pinnate leaves that can grow 0.3–0.6 m long and are composed of many paired 0.1–0.2 m long leaflets, with a single terminal leaflet. The leaflets are dark-green and smooth above, and pale beneath, except along the midrib, turning bright colors before falling off in the autumn.

S/N	Scientific Name/ Common Name	Photograph	Key Features
33.	*Dalbergia sissoo*	 https://www.cabi.org/isc/datasheet/17808	*D. sissoo* is a medium to large, deciduous, long-lived tree with a spreading crown and thick branches. It attains a height of up to 30 m and a girth of 2.4 m; the bole is often crooked. In Rawalpindi district, Pakistan, it also occurs in the form of a straggling bush at an altitude of 1500 m, clinging to crevices in the sides of sandstone cliffs (Troup, 1921). The bark is thick, rough and grey, and has shallow, broad, longitudinal fissures exfoliating in irregular woody strips and scales.
34.	*Dioscorea bulbifera*	 https://www.cabi.org/isc/datasheet/19295#todistribution	Herbaceous, vigorous, twining, vine with non-spiny stems to 20 m or more in length, freely branching above; internodes round or slightly angled in cross section. Leaves are alternate; blades 9–12.5 × 5.5–11 cm, ovate, chartaceous, glabrous, with 9–11 parallel veins, the apex acuminate to caudate, the base cordate, the margins slightly undulate; petioles (4)12–15 cm long, winged and projecting as a pair of pseudo-stipules surrounding the stem at base; bulbils axillary, rounded, 5–6 cm wide.

S/N	Scientific Name/ Common Name	Photograph	Key Features
35.	*Eupatorium cannabinum*	 https://www.cabi.org/isc/datasheet/114302	*Eupatorium cannabinum* is a perennial herb up to 1.5 meters tall or more and 1.2 meters wide. It lives in moist low-lying areas in temperate Eurasia. It is dioecious, with racemes of mauve flower heads which are pollinated by insects from July to early September. The flowers are visited by many types of insects, and can be characterized by a generalized pollination syndrome. The flower heads are tiny, fluffy and can be pale dusty pink or whitish.
36.	*Hedychium flavescens*	 https://www.cabi.org/isc/datasheet/107733#todistributionDatabaseTable	*H. flavescens* is native to the eastern Himalayas, including Nepal and north-eastern India (Assam, Meghalaya and Sikkim). Herbarium records from India's Central National Herbarium also report localities as far south as Kerala and Tamil Nadu; however, H. flavescens is now widely introduced and naturalized in various tropical countries, and was probably introduced to areas neighboring its native range. In the eastern part of its range, it is often planted around Buddhist shrines.

S/N	Scientific Name/ Common Name	Photograph	Key Features
37.	*Houttuynia cordata*		*Houttuynia cordata* can stand 0.6 m spreading up to 1 m. The proximal part of the stem is trailing and produces adventitious roots, while the distal part of the stem grows vertically. The leaves are alternate, broadly heart-shaped, 4–9 cm long and 3–8 cm broad. Its flowers are greenish-yellow and borne on a terminal spike 2–3 cm long with four to six large white basal bracts. It normally blooms in the summer.
38.	*Hygrophila polysperma*	 https://www.cabi.org/isc/datasheet/28135	*H. polysperma* is an herbaceous rhizomatous perennial aquatic plant with squarish stems that are ascending or creeping. The stems are mostly submerged, and are usually rooted in the substrate, though can also root freely at floating nodes. The submerged stem is very brittle, and can grow over 2 m long. The submerged leaves are opposite along the stem, and are sessile with the bases joined at the nodes by ciliated flanges of tissue. The leaves are elliptic to oblong, light green, sparsely hairy, and usually broader towards the tip.

S/N	Scientific Name/ Common Name	Photograph	Key Features
39.	*Impatiens glandulifera*	 https://www.cabi.org/isc/datasheet/28766	*I. glandulifera* is a tall glabrous annual reaching 50 to 250 cm in height. It is now Europe's tallest annual species. Its stems can be 0.5 to 5 cm in diameter and are sometimes branched in the upper part. Roots are up to 15 cm deep, the plants often forming numerous adventitious roots from the lower nodes. The leaves are opposite, the upper ones sometimes in whorls of three, up to 25 cm long and 7 cm wide, lanceolate to obovate, petiolate and sharply serrated at the edges. The inflorescences are racemes of 2–14 flowers that are 25–40 mm long. Flowers are strongly zygomorphic, their posterior sepal forming a sac that ends in a straight spur. Their colors vary from white to pink and purple.
40.	*Imperata cylindrica*	 https://www.cabi.org/isc/datasheet/28580	*I. cylindrica* is a perennial grass which varies in height (30–150 cm). The culms (above-ground stems) are short, erect and arise from rhizomes (underground stems). The rhizomes are tough, white, commonly 1 m long but can be considerably more, are extensively branched and covered with papery scale leaves at the nodes. Roots are fibrous, emerging from the base of the culm and the nodes on the rhizome. Leaves are stiff, linear-lanceolate, up to 120 cm long and 4–18 mm wide, with a prominent, off-center, whitish midrib, scabrid margin and pointed tip.

S/N	Scientific Name/ Common Name	Photograph	Key Features
41.	*Lespedeza cuneata*	 https://wiki.bugwood.org/Lespedeza_cuneata#DESCRIPTION_AND_DIAGNOSTIC_CHARACTERISTICS	*Lespedeza cuneata* is an aggressive warm-season perennial legume (in the family Fabaceae/Leguminosae). It is a shrubby, copiously branched plant with ascending stems. The plant can reach a height of two meters in loamy soils and has an extensive taproot that can extend up to 120 cm or more. Juvenile plants have only one stem that can have many top branches.
42.	*Leucaena leucocephala*	 https://www.cabi.org/isc/datasheet/31634	A small tree, commonly reaching 3–15 m tall and 10–35 cm in bole diameter; and older trees may reach 20 m tall and 50 cm in diameter. Form varies from shrubby and highly branched in subsp. *leucocephala* to arborescent with a short clear bole to 5 m, upright angular branching and an open, rounded crown in subsp. glabrata. Bark is mid grey-brown with shallow rusty orange-brown vertical fissures; slash reddish. Leaves bipinnate with 4–9 pairs of pinnae per leaf and 13–21 pairs of leaflets per pinna.

S/N	Scientific Name/ Common Name	Photograph	Key Features
43.	*Limnophila sessiliflora*	 https://tropica.com/en/plants/plantdetails/Limnophilasessiliflora(047)/4472	*Limnophila sessiliflora* is a pretty and undemanding plant from South-East Asia. A great alternative to Cabomba, which requires a lot of light. Stems grow fast up to 40 cm tall and become 3–4 cm wide.
44.	*Lotus corniculatus*		The height of the plant is variable, from 5–20 cm, occasionally more where supported by other plants; the stems can reach up to 50 cm long. It is typically sprawling at the height of the surrounding grassland.

S/N	Scientific Name/ Common Name	Photograph	Key Features
45.	*Lygodium japonicum*	 https://www.cabi.org/isc/datasheet/31783	*L. japonicum* is a rhizomatous vine, climbing to 30 m. Rhizomes creeping, with black to reddish-brown hairs. Stipes spaced to 1 cm apart on rhizome. Rachis grooved, pubescent to glabrous, 3–30 m. Pinnae with short stalks, 3–5 cm. Pinnae deltoid shaped, 2–3-pinnate, to ca. 12 cm long, 12 cm wide, usually with a long central lobe, margins lobulate. Costae with scattered hairs, veins and pinnae surfaces typically glabrous, rarely with short hairs. Fertile segments with 3–5 separate lobes, subpalmate, sporangia born on sorophores, each with 4–8 sporangia pairs.
46.	*Macfadyena unguiscati*	 https://keys.lucidcentral.org/keys/v3/eafrinet/weeds/key/weeds/Media/Html/Macfadyena_unguis-cati_(Cats_Claw_Creeper).htm	A long-lived (perennial) woody climber (liana) or creeper that is very rampant and can reach up to 30 m in height. It also develops an extensive, tuberous root system. Younger stems are hairless (glabrous) and green in color, often with reddish-brown or bronze colored tips.

S/N	Scientific Name/ Common Name	Photograph	Key Features
47.	*Microstegium vimineum*	 https://www.cabi.org/isc/datasheet/115603	*M. vimineum* is a straggling or decumbent annual (therophyte) plant, usually 0.6–1.0 m in height. Culms decumbent are up to 1 m long. Leaf sheaths are shorter than internodes, the upper usually enclosing cleistogamous spikelets; leaf blades are narrowly elliptic, 4–9 long and 0.2–1.5 cm wide, pubescent, often sparsely, midvein white, apex acuminate; ligule ca. 0.5 mm. Racemes 1–6, ascending, 4–6 cm; rachis internodes linear-clavate, ciliate, shorter than spikelet. Sessile spikelet 4–5.5 mm; lower glume narrowly lanceolate-oblong, back deeply grooved, puberulous-scaberulous or occasionally hispidulous.
48.	*Mikania micrantha*	 https://www.cabi.org/isc/datasheet/34095	Much-branched, perennial, scrambling, twining, slender-stemmed vine; stems herbaceous to semi-woody, branched, ribbed, sparsely pubescent or glabrous; leaves simple, opposite, glabrous, thin, broadly ovate, shallowly or coarsely toothed, triangular or ovate, tip acuminate, blade 4–13 cm long, 2–9 cm wide, 3–7 nerved; at the junction of the petioles with the nodes, unusual nodal appendages, membranous, up to 5 mm long; petioles tendriliform, 2–9 cm long; inflorescence a corymbose panicle with subcymose branches, 3–6 cm long by 3–10 cm wide; flowers small, white or cream-colored, actinomorphic, 4.5–6 mm long

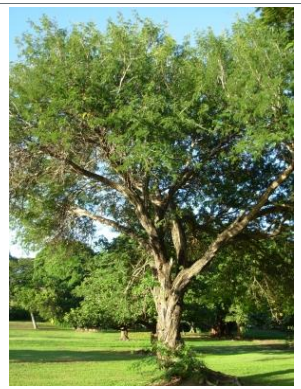
S/N	Scientific Name/ Common Name	Photograph	Key Features
49.	*Neyraudia reynaudiana*	 https://www.cabi.org/isc/datasheet/115785	*N. reynaudiana* is a short-rhizomatous perennial woody grass, typically 2–3 m, but sometimes taller. Culms erect, 3–10 mm diameter, with solid culm internodes. Leaf blades flat, 20–100 cm long, 8–25 mm wide. Leaf-blade surface smooth. Leaf sheaths glabrous. Ligule pilose, 1–2 mm. Inflorescence a dense, open panicle, 30–50 cm long, branches slender and nodding. Spikelets 6–9 mm, with 4–10 florets.
50.	*Paederia foetida*	 https://www.cabi.org/isc/datasheet/38458	*P. foetida* is a perennial (deciduous or evergreen), semi-woody, herbaceous vine that twines upward on supports and creeps across the ground. Its stems are light green, slender, <5 mm diameter, up to 7 m long, with fine, short hairs in lines or glabrous; flexible, climbing by twining on other species or onto its old stems from the previous season; stems creeping along the ground will root at the nodes. Leaves opposite, simple, broadly lanceolate to elongated-ovate, tip pointed, 3–14 cm long, 2–5 cm wide, bases rounded, truncate or heart-shaped. Upper surface medium to dark green, irregularly and sparsely scattered with transparent, bristly hairs; hairs multicellular with pointed tips.

S/N	Scientific Name/ Common Name	Photograph	Key Features
51.	*Panicum repens*	 https://www.cabi.org/isc/datasheet/38670	Culms have bladeless scales at the base. Leaves are in two ranks, bright green to slightly glaucous, stiff, almost erect, 15–20 cm long, about 1 cm wide, tapering gradually to an acute tip, sparsely hairy on the upper surface, smooth and sometimes with a waxy bloom on the lower. Leaf sheaths have long white hairs along the margin. The ligule is a very short membrane, 0.5 mm long, fringed with long white hairs.
52.	*Persicaria perfoliata*	 https://www.cabi.org/isc/datasheet/109155	*P. perfoliata* is a prickly scrambling vine. It can reach a height of 6 m or more through climbing over shrubs and understory trees. The stems are elongated, branched and furrowed with short recurved prickles along the ridges. The thin, papery leaves are triangular, about 3–7 cm long and 2–5 cm wide, glabrous on the upper surface with prickles along the mid-rib on the underside (Zheng *et al.* 2005[17]). The circular, saucer-shaped leafy structures, called ocrea, surround the stem at nodes.

[17] Zheng, H., Wu, Y., Ding, J., Binion, D., Fu, W. and Reardon, R. 2005. *Invasive Plants of Asian Origin Established in the United States and their Natural Enemies*. Volume 2. West Virginia, USA: USDA Forestry Service, p.185.

S/N	Scientific Name/ Common Name	Photograph	Key Features
53.	*Psidium guajava*	 https://www.cabi.org/isc/datasheet/45141	Shallow-rooted shrub or small tree, up to 10 m tall, branching from the base and often producing suckers. Bark smooth, green to red-brown, peeling off in thin flakes. Young twigs four-angled and ridged, pubescent. Leaves opposite, with translucid punstations; petiole 3–10 mm long; blade elliptic to oblong, 5–15 x 3–7 cm, glabrous above, finely pubescent beneath, veins prominent below. Flowers solitary or in two- to three-flowered axillary cymes, about 3 cm in diameter; four to six calyx lobes, 1–1.5 cm long, irregular; petals four to five, white, 1–2 cm long; stamens numerous, 1–2 cm long; ovary 4–5-locular; style 1.5–2 cm long, stigma capitate.
54.	*Ricinus communis*	 https://www.cabi.org/isc/datasheet/47618	An evergreen glabrous, soft-woody shrub or small tree, often grown as annual, 1–5 m tall, with a strong tap-root and prominent lateral roots. Shoots usually glaucous, variously green or red. Occasional glands at nodes, petioles and main axes of inflorescences. Stem and branches with conspicuous nodes and ringlike scars of the bracts. Leaves spirally arranged, dark green when old; stipules 1–3 cm long, united to a sheathing bud, deciduous; petiole round, 3.5–50 cm long; blade peltate, 10–70 cm across, membranous, palmate with 5–11 acuminate, serrate lobes.

S/N	Scientific Name/ Common Name	Photograph	Key Features
55.	*Rottboellia cochinchinensis*	 https://www.cabi.org/isc/datasheet/47782	*R. cochinchinensis* is an erect annual grass that grows up to a height of 4 m or more. The inflorescence is a cylindrical raceme that is 3–15 cm long. The floral units consist of a sessile spikelet, pedicellate spikelet and internode. The pedicel is fused to the swollen floral internode. The spikelets are awnless, 3.5–6 mm long, and 2.5–3 mm wide. The floral units separate and fall as soon as they mature, from the top of the raceme downwards
56.	*Rubus niveus*	 https://www.cabi.org/isc/datasheet/107939#todescription	Shrubs: stems up to 2 cm long, tomentulose when young or glabrous and glaucous, covered with stout, hooked prickles 3–7 mm long, their bases usually longitudinally elongated, bark of older stems not shredding. Leaves pinnately compound, leaflets 5–9, elliptic-ovate to elliptic, 2.5–6 cm long, 2–3 cm wide, the terminal one often broadly ovate, +- lobed on 1 side and up to 5 cm wide, upper surface glabrous, lower surface densely white tomentose, margins serrate, petiolules 0–0.1 cm long, petioles and rachis usually with curved prickles. Flowers in short, terminal, cymose panicles, densely tomentose and with scattered prickles, pedicels 6–12 mm long.

S/N	Scientific Name/ Common Name	Photograph	Key Features
57.	*Salsola tragus*	 https://vicflora.rbg.vic.gov.au/flora/taxon/f5bf6bf2-dbb2-40f4-ad3d-7331d7ad3358	Erect to rounded annual to c. 60 cm high (commonly breaking off near ground level at maturity and dispersing tumbleweed-fashion), glabrous, sparsely bristly or tuberculate on leaf margins and/or stems. Leaves mostly alternate, linear, subulate or triangular, 5–40 mm long, 0.5–6 mm wide, winged and shortly decurrent at base, spreading or recurved, spine-tipped, semi-terete to trigonous in section; floral leaves and bracteoles shorter and sometimes thicker than normal leaves. Flowers sessile, solitary in upper axils; perianth segments at anthesis erect, lanceolate, c. 2 mm long, membranous.
58.	*Senegalia catechu*	 http://tropical.theferns.info/viewtropical.php?id=Senegalia+catechu	Black catechu is a spiny, deciduous tree with slender branches; it can grow 10–20 meters tall. The bole can be 50cm in diameter. The tree starts flowering and producing pods when 5–7 years old. Trees with a girth of 60–120cm are generally preferred for cutch production. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby.

S/N	Scientific Name/ Common Name	Photograph	Key Features
59.	*Solanum viarum*	 https://www.cabi.org/isc/datasheet/50562	*S. viarum* is an erect perennial, 50–150 cm high, with shortly pubescent stems and branches with recurved prickles up to 5 mm long, pubescent at their base. There are also longer, straight spines up to 2 cm long on the petioles and the veins of upper and lower surfaces of the leaves. The leaves are broadly ovate up to 20 cm long and 15 cm wide, bluntly lobed with markedly undulate edges, generally dark green, glossy above, duller below. The flowers are white, 1.5 cm across in clusters of 1–5 on pedicles about 1 cm long, the more distal flowers are often male only.
60.	*Tussilago farfara*	 https://pfaf.org/user/plant.aspx?LatinName=Tussilago+farfara	*Tussilago farfara* is a perennial growing to 0.2 m by 1 m at a fast rate. It is hardy to zone 5. It is in flower from February to April, and the seeds ripen from March to May. The species is hermaphrodite (has both male and female organs) and is pollinated by bees and flies. The plant is self-fertile.

S/N	Scientific Name/ Common Name	Photograph	Key Features
61.	*Verbascum thapsus*	 https://www.cabi.org/isc/datasheet/56652	*V. thapsus* is a biennial herb. During its first year, V. thapsus forms a low-growing rosette from a tap root. It has a dense yellow to white tomentose (stellate or dendritic) pubescence on the bluish grey-green leaves; blades obovate to oblanceolate, 8–50 cm by 2.5–14 cm, with margins entire to shallowly crenate.

Annex C3-I: Reducing Avian Collisions with Power Lines (Avian Power Line Interaction Committee, 2012)

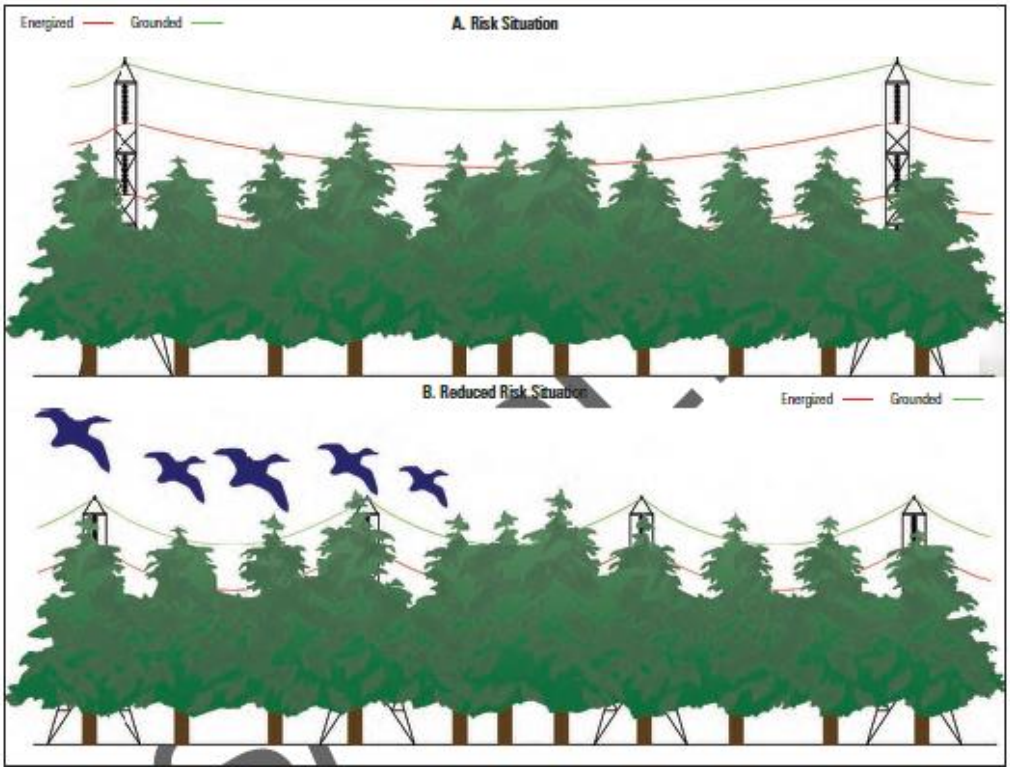
Title	Reducing Avian Collisions with Power Lines
Document Reference	UAHEL BMP Annex C3-I RACPL
Objective	Outline measures to manage avian collisions with power lines throughout the construction and operational phase of the Project.

Project design shall conform with the standards of this document. Key standards include the following:

- Minimize powerline crossings of major river valleys to the extent possible.
- Maintain canopy height of trees above the transmission lines outside the RoW to the extent possible so birds fly over the lines (Figure I.1).

Figure I.1: Reduce Bird-Line Collisions in Wooded Areas by Keeping Lines at Canopy Level

Source: APLIC 2012



- Scrutinize the structure placements to minimize structure lighting needs (continual lighting or strobe lighting) especially along bird flyways, as it can attract birds.
- Install visibility enhancement objects such as marker balls, bird deterrents, bird flight diverters, suspended devices, solar powered reflectors, and/or aerial marker spheres (typically 30 cm in diameter) on static lines to increase line visibility to birds and reduce bird-line collisions, especially

where lines cross known flyways (Figures I.2 and I.3). The size and type of deterrent is to be determined based on the terrain type, forest type, targeted species and potential for corona discharge.

Figure I.2: Bird Diverter

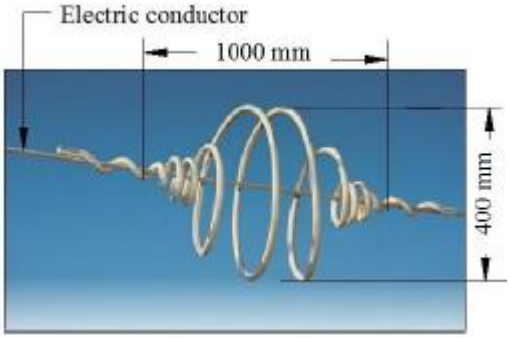


Figure I.3: Aerial Marker Sphere

- Maintain 1.5 m separation between energized conductors or energized and grounded hardware or, where spacing is not feasible, cover energized parts and hardware (see Figures 1.4, 1.5, and 1.6).

Figure 1.4: Avian-safe Compact Three-phase Design

Source: APLIC 2006

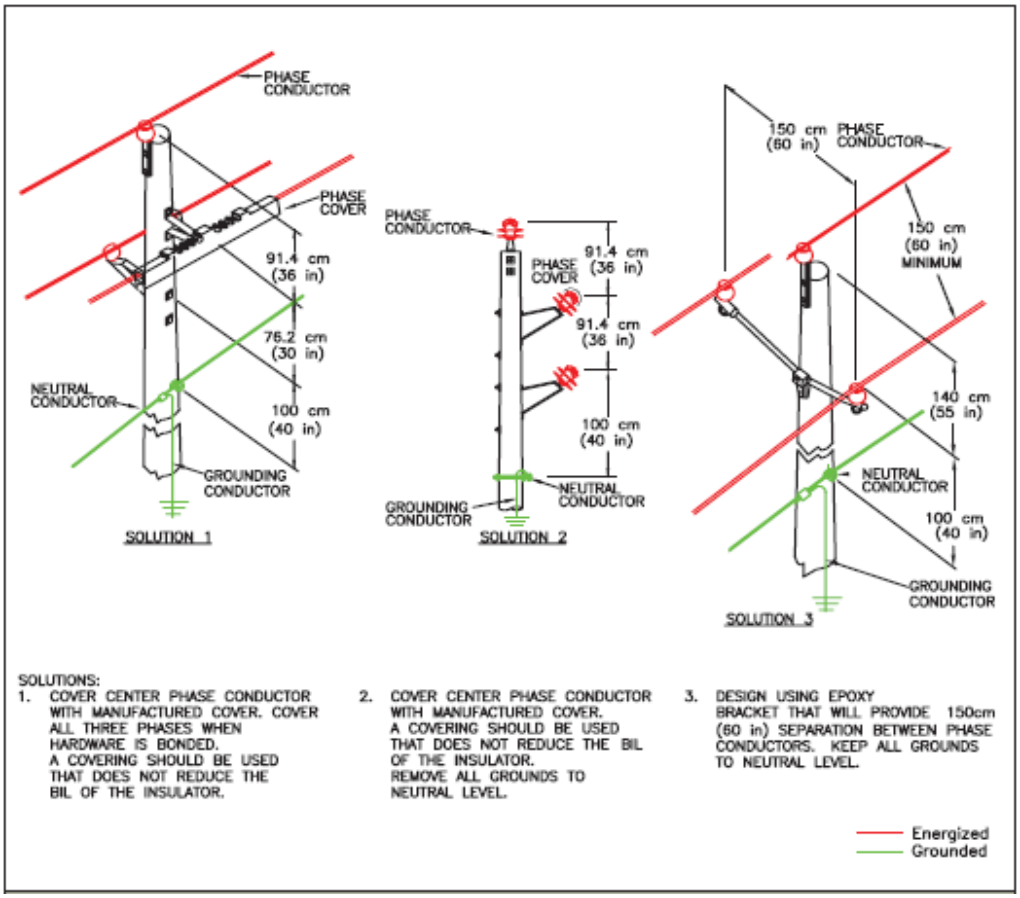
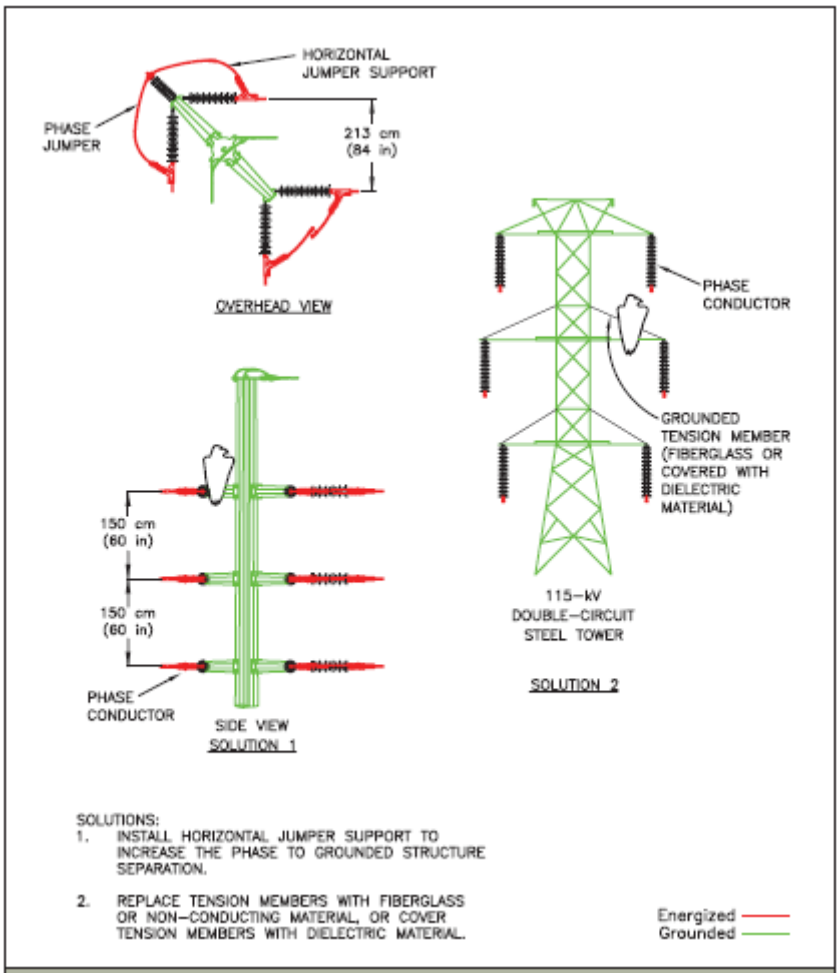


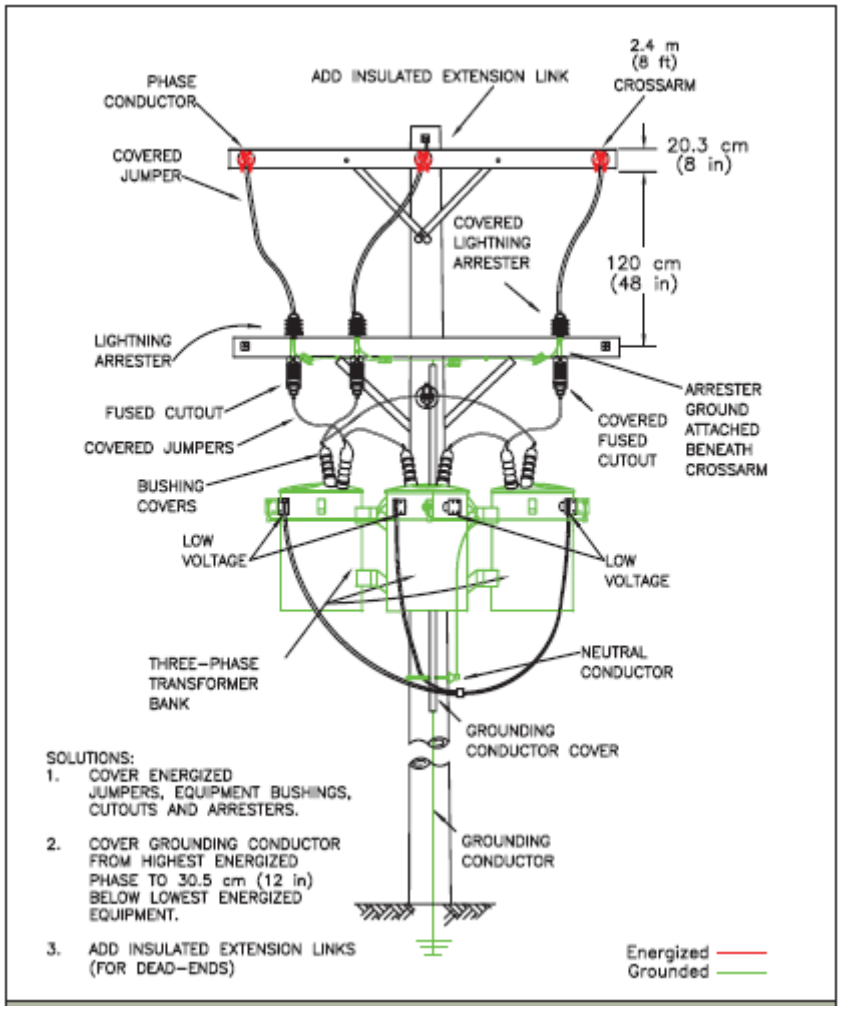
Figure I.5: Avian-safe Transmission Tower Design

Source: APLIC 2006[18]



[18] Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines.* Washington, D.C.: Edison Electric Institute and Avian Power Line Interaction Committee.

Figure I.6: Avian-safe Three Phase Transformer Bank (APLIC 2006)[19]



- Provide measures to deter raptors from perching on transmission line structures (e.g., perch guards) in designated areas or provide platforms for safe perching/nesting.

[19] *Ibid.*

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Institutional Capacity Assessment and Strengthening Plan

Appendix C – Annex C4

January 2024

26 January 2024

CONTENTS

1. PURPOSE OF THIS PLAN

The Upper Arun Hydroelectric Project (UAHEP, or Project) is a large complex hydropower project, which has been classified as a High Risk project. The High Risk classification takes into consideration "the type, location, sensitivity, and scale of the project; the nature and magnitude of the potential environmental and social risks and impacts; and the capacity and commitment of the Borrower (including any other entity responsible for the implementation of the project) to manage the environmental and social risks and impacts in a manner consistent with the WB's Environmental and Social Framework (ESF) Environmental and Social Standards (ESS)." Although not finalized, this plan assumes that the World Bank (WB), or an international lender with similar environmental and social requirements, will provide funding for project construction. In some cases, we reference WB specific requirements in this plan.

The ESIA contract calls for the consultant to carry out an assessment of the current institutional capacity in place in view of implementing the environmental and social interventions, management measures and programs related to the Project, and to propose a set of interventions, including institutions, staffing, and budget requirements, to build up the institutional capacity to implement the designed programs. Accordingly, this assessment relates to the capacity of the Nepal Electricity Authority (NEA), and specifically Upper Arun Hydro-Electric Limited (UAHEL), which, as a subsidiary of NEA, is proposed to be the "Borrower," to address the Project's environmental and social risks and impacts in a manner consistent with the WB's ESF ESS and identifies recommendations for strengthening capacity. This plan also makes recommendations for other institutions that will be involved with implementing the environmental and social interventions, management measures, and programs related to the Project.

2. METHODOLOGY

This assessment was based on discussions with NEA's UAHEP Project Team, a review of materials provided by the UAHEP Project Team, interactions with other Nepal ministries and institutions, and input from the World Bank Project Team. A draft of this plan was shared with the UAHEP Project Team, who provided comments, which were addressed and incorporated. It should be noted that this plan is not based on the World Bank's Draft Interim Guidance on Assessing Borrower Capacity (World Bank 2021).

In terms of limitations, this plan reflects the capacity of the UAHEP Project Team and other Nepal ministries and institutions at the time of its preparation (2020–2021), while recognizing that there are several international organizations that are providing technical support to the Government of Nepal in terms of technical and project management capacity building.

3. UAHEP ENVIRONMENTAL AND SOCIAL RISKS

As indicated above, the UAHEP is categorized as a High Risk project from an environmental and social perspective. The UAHEP is large (1,040 MW installed capacity), complex project (multiple components including roads, hydropower, and transmission line), involving multiple contractors (at least separate road and hydropower contractors), located in a remote area with very difficult terrain and a monsoon climate. Further, nine of the ten World Bank's ESSs (only excluding ESS 9 – Financial Intermediaries) are relevant , including ones that address several of the most challenging environmental and social issues, such as dam safety, land acquisition, physical and economic resettlement, critical habitats, indigenous people, and free, prior and informed consent (FPIC. In addition, the Project must be executed in an area where nearly all project-affected people are indigenous and considered vulnerable, where there is little infrastructure or capacity to address issues around labor influx, and where child and forced labor issues are not uncommon. Under these circumstances, managing the UAHEP's environmental and social risks and impacts, consistent with the WB ESF ESSs, will be challenging.

4. BORROWER REQUIREMENTS INSTITUTIONAL CAPACITY ASSESSMENT

The Borrower's (i.e., the UAHEL's) project responsibilities will likely include the following:

- The Borrower will manage the environmental and social risks and impacts of the Project throughout the project life cycle in a systematic manner, proportionate to the nature and scale of the Project and the potential risks and impacts.
- The Borrower will:
  - Conduct an environmental and social assessment of the proposed Project, including stakeholder engagement.
  - Undertake stakeholder engagement and disclose appropriate information.
  - Develop an Environmental and Social Commitment Plan (ESCP) (assuming that the WB provides financing), and implement all measures and actions set out in the legal agreement including the ESCP.
  - Conduct monitoring and reporting on the environmental and social performance of the Project.
- The Borrower's decision to proceed with a project, and the Bank's decision to support it, are predicated in part on the expectation that the ESMP will be executed effectively.
- The Borrower will require that all contractors engaged in the Project operate in a manner consistent with the requirements of the WB ESF ESSs, including the specific requirements set out in the ESCP. The Borrower will manage all contractors in an effective manner, including (as set out in ESS 1, Annex 3):

  (a) Assessing the environmental and social risks and impacts associated with such contracts;

  (b) Ascertaining that contractors engaged in connection with the project are legitimate and reliable enterprises, and have knowledge and skills to perform their project tasks in accordance with their contractual commitments;

  (c) Incorporating all relevant aspects of the ESCP into tender documents;

  (d) Contractually requiring contractors to apply the relevant aspects of the ESCP and the relevant management tools, and including appropriate and effective non-compliance remedies;

  (e) Monitoring contractor compliance with their contractual commitments; and

  (f) In the case of subcontracting, requiring contractors to have equivalent arrangements with their sub-contractors.

Ultimately, UAHEL is required to meet these requirements and implement the Project in accordance with the Lenders' environmental and social requirements.

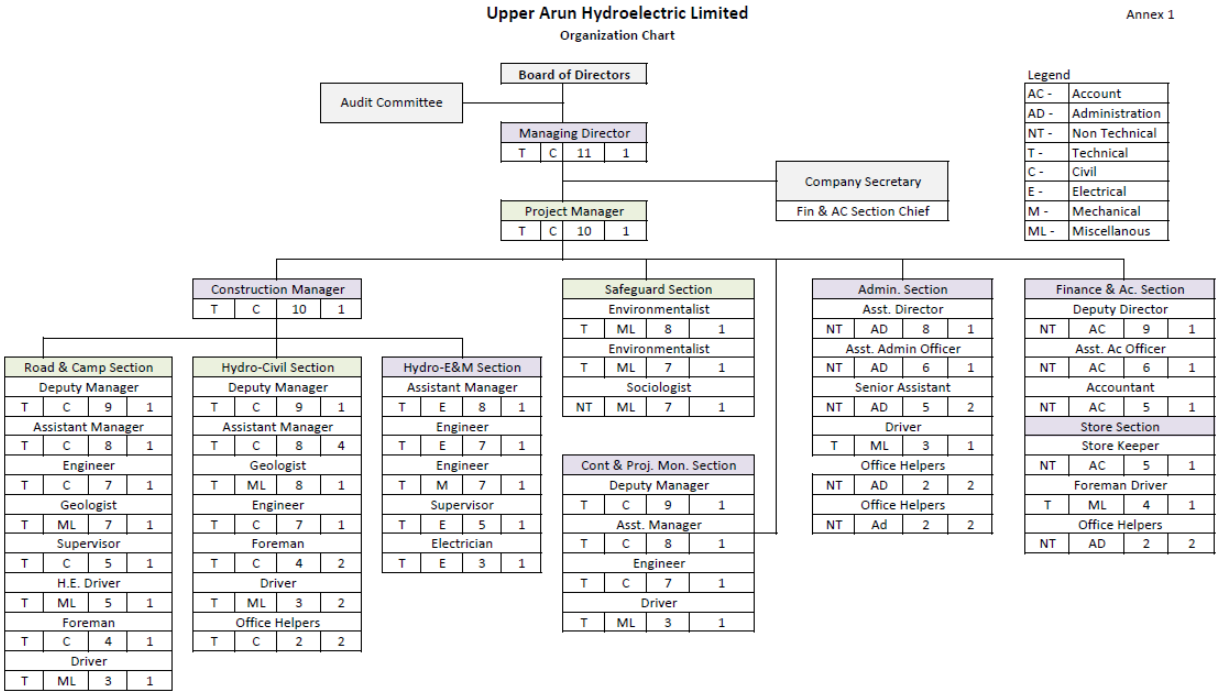
5. UAHEL INSTITUTIONAL CAPACITY ASSESSMENT

This section evaluates UAHEL's capacity to implement the UAHEP in accordance with the WB's ESF ESS. This assessment takes into consideration UAHEL's skills, experience, staffing, and budget.

5.1 Resources

The NEA has designated a separate team to staff UAHEL that is focused on the design, obtaining the necessary permissions, and, ultimately, the construction and operation of the Project. Having a

dedicated project team within NEA for this Project is appropriate. This team is proposed to consist of 52 staff, as indicated in the organizational chart below.



At the time of the assessment, however, the UAHEP is only comprised of 11 technical staff, as follows:

- Project director
- Deputy manager (2)
- Assistant manager – scheduling (2)
- Assistant manager – environmental (2)
- Assistant manager – transportation
- Assistant director – accounting
- Assistant director - administration
- On-site supervisor

The UAHEL Team does not currently have a dedicated Environmental, Social, Health and Safety (ESHS) functional unit, but has plans for a Safeguard Section (see organizational chart above). The UAHEL Team receives support from the NEA Environmental and Social Studies Directorate (ESSD) group on a needs basis; for example, the ESSD is preparing the Nepal Environmental Impact Assessment (EIA) for the project access Road, but the ESSD is spread over multiple projects and is unable to provide the level or continuity of support required for this Project.

In addition, the UAHEL Team appears to have constrained funding, which has limited its ability to establish a Project Information Center and provide an on-site stakeholder engagement specialist.

5.2 Education and Skills

The UAHEL Team is predominantly composed of engineers, including some environmental engineers, but no environmental or social specialists. This lack of education and/or training in environmental and

social sciences limits the team's ability to address the WB's requirements relating to key biodiversity and social impacts.

5.3 Experience

The UAHEL Team has experience in managing infrastructure projects in Nepal and extensive experience relating to contracting and financial management. The team is familiar with the EIA and land acquisition process, as conducted in Nepal. However, the team has limited experience with the following:

- Developing a large infrastructure project in conformance with international standards
- Implementing an Environmental and Social Management System (ESMS) to ensure the Project remains in conformance with international standards and other project commitments
- Conducting construction monitoring consistent with international standards
- Building local project support through effective stakeholder engagement
- Maintaining a grievance management system and resolving grievances

5.4 Conclusion

The UAHEL Project Team does not currently have the ESHS resources with appropriate education, training, and experience to effectively manage the UAHEP's environmental and social impacts and risks, without additional institutional strengthening.

6. UAHEL INSTITUTIONAL STRENGTHENING

Based on the capacity assessment above, the following actions are recommended to help strengthen UAHEL's capacity to implement the UAHEP in accordance with the WB's ESF ESS:

6.1 Resource Strengthening

These recommendations relate to UAHEL's organizational structure, project staffing, and travel funding.

6.5.1 Organizational Structure

The UAHEL Team should have an ESHS (or Safeguards) section with at least an ESHS deputy manager who reports directly to the UAHEL's project manager, if not the managing director.

6.5.2 Staffing

Although the ESSD has staff with appropriate education, it is a support function for multiple projects and does not provide the continuity and focus required. The following additional resources are recommended to be added to the UAHEL Project Team during project construction, commissioning, and early (first year) operations:

- **ESHS Manager** – The UAHEL Project Team needs a dedicated ESHS manager, who preferably reports directly to the Project Manager/Director. This person should have at an advanced degree in the environmental or social sciences or civil/environmental engineering with at least 15 years of experience in managing environmental and social risks for large infrastructure projects, including at least some experience with hydropower projects and some experience with ESMS. This person should have good working knowledge and applied experience with international standards (e.g., WB, EIB, IFC, ADB). This person should have experience in construction phase monitoring. This person would be approximately 80% office/20% field based.

- **Environmental and Social Specialists** – There should be at least one environment and social manager, senior environmental specialist, senior social specialist/ social/resettlement specialist, environmental specialist, sociologist, gender/GBV specialist, engineer, supervisor one senior biodiversity specialist, one, one stakeholder engagement specialist/community liaison officer, and one health and safety specialist who report to the ESHS manager. These staff should have at least a bachelor's degree in environmental science, engineering, or social sciences, as applicable, with at least 10 years of experience in managing environmental and social risks for large infrastructure projects. They should have a good working knowledge and applied experience with international standards (e.g., WB, EIB, IFC, ADB) and experience with construction inspections and monitoring. These staff would be approximately 60% office/40% field based In addition, a short-term consultant for the terrestrial biodiversity and aquatic biodiversity specialist will be hired by UAHEL, as required.
- **E&S Panel of Experts** – The UAHEP Project Team will have an E&S panel of experts to advise on environmental and social issues for the consultant and UAHEL. These advisors should have at least 15 years of experience applying international standards and have extensive experience with developing and implementing ESMSs and providing construction oversight.

6.5.3 Travel Funding

The Project Team should have a dedicated travel budget to adequately support staff travel to the site.

6.5.4 Office and Field Resources

The UAHEL Team requires an adequate office and meeting space/furniture for company staff and visitors in both Kathmandu and the project site, as well as communication technology (e.g., phones, computers, printers/copiers, projectors) to support proper implementation of the Project. The team also needs to have appropriate equipment for conducting field inspections/monitoring (e.g., tablets, cameras, drones, radios, vehicles).

6.2 Education and Skills Strengthening

The UAHEL Team requires specific training in the following areas:

- General project management
- Contract management
- ESMS preparation and implementation to help ensure that the Project remains in conformance with international standards and other project commitments
- Use of technology to support project management and construction monitoring (e.g., use of drones for monitoring construction activities; scheduling software)
- General environmental and social risk management
- Applicable Lender environmental and social standards
- Protocols for conducting construction monitoring/auditing
- Stakeholder mapping and engagement strategies
- Indigenous peoples understanding, sensitivity training, and FPIC process/Indigenous Peoples Plan Development Plan (IPDP) implementation
- Maintaining a grievance management system and resolving grievances
- Land acquisition and physical resettlement/livelihood restoration
- Biodiversity management
- Occupational health and safety

- Emergency preparedness and response arrangements
- Change management/adaptive management

It is recommended the UAHEL management team (e.g., led by the managing director) and selected other ESHS staff participate in these trainings. The training should be led by international experts and should address the purpose and importance of these measures, but emphasize practical tools, checklists, trackers, and similar methods that the staff can use or readily adapt for use on the UAHEP.

6.3 Experience Strengthening

The UAHEL needs additional experience in managing environmental and social risks for infrastructure construction projects. It is recommended that designated key ESHS staff participate in an environmental and social monitoring trip to another large infrastructure project currently under construction so they can get a better understanding of the challenges they will likely face during UAHEP construction.

6.4 Funding

Funding to support these recommended organizational structure, staffing, skills, and experience strengthening activities has been included in the Project's Environmental and Social Management and Mitigation Measures budget.

7. ASSESSMENT OF OTHER INSTITUTIONS

There are other institutions that may be involved in implementing the environmental and social interventions, management measures, and programs related to the Project. These could include the Ministry of Energy, Water Resources and Irrigation, the NEA Environmental and Social Studies Department, and district, municipal, and ward administrators. Each of these are assessed below.

7.1 Ministry of Energy and Ministry Forests and Environment

The role of the Ministry of Energy (MoE), including the Department of Electricity Development (DoED), and the Ministry of Forest and Environment (MoFE) with the implementation of the UAHEP is primarily related to managing potential cumulative impacts. The Upper Arun Cumulative Impact Assessment (CIA) includes recommendations relating to the following (see Appendix E):

- River basin planning
- Protection of MBNP
- Impact of transmission lines on birds
- Migratory fish and provision of fish passage facilities
- Provision of EFlow
- Protection of river based livelihoods
- Protection of social cohesion
- Protection of cultural heritage
- Sediment management

Most these recommendations relate to other proposed projects within the Arun River Basin, and generally throughout Nepal. The MoE is already working on developing a management plans for river basins in Nepal. These river basin plans should identify priority areas for protection, as well as priority areas for hydropower development, and provide guidelines so that proposed hydropower projects in Nepal meet good international industry practice.

The DoED and the MoFE are the key agencies responsible for the review of proposed hydropower projects.

7.1.1 Capacity Assessment

The MoE, DoED, and MoFE all need additional staff, especially to support river basin planning (MoE) and construction/operation phase compliance monitoring and enforcement (DoED and MoFE).

A recent review of hydropower projects in Nepal (Dangol and Uprety 2019) found that many hydropower construction contractors were unaware of the required mitigation measures and that many hydroelectric projects (HEPs) were not complying with EIA approval conditions. Recent studies have found little compliance with required EFlows and that required fish ladders are not designed for the native fish, thereby undermining their likely effectiveness. Further, little government compliance monitoring or enforcement is occurring, and no efforts are being made towards adaptive management. Much more robust compliance monitoring, enforcement program, and adaptive management are needed to achieve sustainable hydropower in Nepal.

7.1.2 Institutional Strengthening

Although there are various institutional strengthening programs being conducted in Nepal with the MoEWRI, DoED, and MoFE, there is an on-going need for education and training of ministry staff to better understand good international industry practice for hydropower development and to develop skills for conducting construction phase compliance monitoring and enforcement.

7.2 District, Municipal, and Ward Administrators and Officials

The district, municipal, and ward administrators and officials will be responsible for helping to manage the increased demands from the Project on the local hospital, solid waste landfill, and police, as well as the impacts associated with influx, gender-based violence, and emergencies.

7.2.1 Capacity Assessment

The district, municipal, and ward administrators and officials have little experience in helping to manage the impacts of large capital projects, with the Arun-3 HEP being the only other large capital project in the area.

7.2.2 Institutional Strengthening

The district, municipal, and ward administrators and officials need training and institutional strengthening. The Project proposes to provide the following support to these local officials:

- General
  - Establish an UAHEP Intergovernmental Coordination Committee with UAHEL, as well as district, rural municipality, and ward level representatives, to address local governance-related issues.
- Solid waste
  - Provide technical and financial support to Sankhuwasabha District for the preparation and implementation of a solid waste management plan and design improvements at the district landfill.
  - Provide technical and financial support to Sankhuwasabha District and Bhotkhola Rural Municipality on raising public awareness on the disposal of the different types of waste generated at the household level and to prevent littering.

- Healthcare
  - Provide funding support to the District Hospital in Khandbari to run additional health units in the project Direct Impact Area (DIA), such as establishing additional birthing centers at Rukma and Namase, and to expand its capacity to handle trauma and emergency cases.
  - Organize annual health camp in coordination with District Health Office to check reproductive health.
  - Support NGOs to collaborate with DoHS/District Hospital and help them implement awareness campaigns and provide preventive and promotive health care services.
  - Provide funding support to DoHS for planning and implementing a health surveillance program in the Project DIA.
  - Support the rural municipality to run awareness campaign for food safety for local food providers.
  - Support the rural municipality for awareness campaigns promoting healthy life-style and diet.
  - Implement an awareness program for workers and local communities for the prevention, detection, screening, and diagnosis of sexually transmitted diseases, especially with regard to HIV/AIDS. The program shall also include information on alcohol abuse, gender-based violence, sexual exploitation and abuse, and human trafficking.
- Police and safety
  - Provide funding to the District Administration to establish police posts at locations where large workers' camps are located (Sibrun and Rukma) and deploy female police personnel at these posts. The police will form a local committee in consultation with the rural municipality to monitor interactions between project workers and local residents, and specifically monitor for trafficking in persons, gender based violence, and sexual exploitation and abuse.
  - Provide funding to a local service provider/NGO to provide counselling and other support related to gender-based violence.
- Cultural heritage
  - Support the rural municipality to preserve traditional crop/seed varieties and encourage continuation of their production and consumption of traditional food items.
  - Relocate affected cultural heritage sites only after the local community or their custodians are consulted, an acceptable alternative location is agreed upon, a forgiveness ritual is performed, and the site is physically moved in a culturally acceptable and agreed upon manner.
  - Establish an Ethnographic Museum and Culture Centre (EMCC) at a location determined in consultation with local communities.
- Influx management
  - Provide training and capacity building for local officials at the District and affected rural municipality and ward levels regarding monitoring and managing influx.
  - Coordinate with Bhotkhola and Makalu Rural Municipalities and Sankhuwasabha District officials regarding the monitoring of project-related influx:
    - Hold a meeting every six months with District and municipal representatives to review influx and growth of any illegal and unsafe settlements.
    - Provide support to District and municipal officials in managing any influx and ensuring orderly development.

- Emergency response
  - Prepare an Emergency Preparedness and Response Management Plan in consultation with appropriate central, district, municipal, and ward officials in Nepal. Once the plan has been approved by UAHEL, the Contractor will hold information meetings with each of the local villages to ensure local residents are familiar with the plan and emergency procedures.

7.2.3 NEA Environmental and Social Studies Department

The Environmental and Social Studies Directorate of NEA provides support to NEA projects by overseeing baseline studies, and preparing EIAs and Initial Environmental Examinations (IEE) of various projects or project components. As indicated above, the ESSD is spread over multiple projects and is unable to provide the level or continuity of support required for this Project. It is not anticipated that the ESSD will be able to undertake project implementation, so they are not evaluated further in this assessment.