Appendix F: Final Report

ESSA 35 YEARS

Construction Environmental and Social Management Plan

Upper Trishuli-1 Hydropower Project, Nepal

Prepared for

NWEDC NEPAL WATER & ENERGY DEVELOPMENT COMPANY

IFC International Finance Corporation World Bank Group

Appendix F:
Construction Environmental and Social Management Plan

Supplemental ESIA-

Upper Trishuli-1 Hydropower Project, Nepal

December 2014

Prepared for:
Nepal Water and Energy Development Company
&
International Finance Corporation

Cover Photo:
Trishuli River downstream from the proposed powerhouse site, facing upstream. October, 2013. [Photo: P. de la Cueva]

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1 Introduction

1.1 Purpose of the Construction Environmental and Social Management Plan

This Construction Environmental and Social Management Plan (CESMP) has been developed to ensure that any negative environmental and social impacts of the UT-1 Hydroelectric Project are minimized and that any possible environmental, safety and efficiency benefits are maximized during project construction. The CESMP provides practical guidelines for environmental management to ensure that all measures undertaken by the Project's Proponent, Contractors, Engineers, and Supervisors have minimal impact on the environment and surrounding communities, and are in accordance with all relevant laws, regulations, technical guidelines and codes of practice of the Nepal and the Lenders' Environmental and Social Standards and Guidelines[1].

1.2 Organization of the CESMP

The CESMP contains environmental principles and procedures for communication, reporting, training, and supervision to which all staff, engineers, supervisors, Contractors and sub-Contractors are required to comply with throughout construction of the Project.

The CESMP is organized as follows:

- ***Roles and Responsibilities for Environmental Management during Construction***: defines the roles and responsibilities for environmental management for all actors involved in the Project giving emphasis to the environmental duties of the main actors involved in the construction process.
- ***Environmental Compliance Framework***: describes the Contractor's ESMP Implementation Plans, the compliance with legal and contractual requirements, and the penalties that shall be imposed for non-compliance with the ESMP.
- ***Reporting:*** describes the different environmental reports that have to be prepared during Project construction.
- ***Minimum Environmental and Social Standards:*** describes the minimum environmental and social mitigation measures that the Contractor(s) shall put into place.
- ***Environmental and Social Specifications for Contractors:*** describes in detail the different environmental and social plans that shall be presented by Contractors. These specifications are to be included in all tendering documents and contracts.

[1] *IFC Performance Standards* (2012), the *General EHS Guidelines* (April 30, 2007), and the IFC/EBRD *Guidance on Workers' Accommodation* (August 2009).

2 Roles and Responsibilities for Environmental Management during Construction

2.1 Roles and Responsibilities during Project Implementation

The main roles and responsibilities of different agencies, institutions, and individuals during the construction of the UT-I Hydroelectric Project are summarized in Table 2-1.

Table 2-1: Roles and Responsibilities during Project Implementation

No.	Stakeholders	Responsibilities	Time Schedule
1	Ministry of Science, Technology and Environment	• Final approval of the EIA report as per provisions of Act and Rules • Review project monitoring reports during construction and operation phases and provide comments for corrective actions • Auditing of project general performance during operation phase	• Prior to proposal implementation • As required during construction and operation • After two years of operation phase
2	Ministry of Energy/Dept. of Electricity	• Review and comments on EIA for Final approval • Licensing and permissions for Project Implementation • Review project design and contract documents against approved EIA measures and national environmental standards and provide comments for corrective actions • Review of monitoring reports of project construction and operation and provide comments for corrective actions	• Prior to EIA approval • After EIA approval • Before contract bidding • As required during construction and operation
3	Ministry of Forest and Soil Conservation / Department of Forest and its District Office	• Review and comments on EIA for Final approval • Grant approval and permission for forest clearance of national forest land • Assist proponent in identifying, measuring and evaluating the forest resources of the affected forest stretch • Review of monitoring reports of project construction and operation and provide comments for corrective actions related to forest and ecology • Assist the proponent in identifying compensatory afforestation areas as per the plans of the district and reserve areas • Advise and assist the proponent in forestry awareness programs	• Prior to EIA approval • After EIA approval • Pre-construction phase • Before construction starts • As required during construction and operation • As required during construction and operation
4	Environmental and Social Management	• Ensure that EIA measures and the Environmental and Social Specification for Contractors are incorporated in the final	• Prior to contract award

No.	Stakeholders	Responsibilities	Time Schedule
	Cell (ESMC)	project design and tender documents of project construction and operation • Acquire necessary permits and approval for project construction and operation • Ensure that the project construction and operation activities are in accordance with EIA, the Environmental and Social Specification for Contractors and other GON legislative requirements, as well as international standards • Monitoring and record keeping regarding environmental measures and impacts. • Ensure public participation and involvement in project implementation and operation. • Compilation of environmental monitoring and performance report and submit for review by stakeholders	• Before construction • During construction, and operation phase • During construction, and operation • During construction, and operation. • Every 2 months during construction. Once every three months for the first two years of operation.
5	Construction Contractor	• Implement mitigation measures as specified in the EIA and in the Environmental and Social Specifications for Contractors or as instructed by supervision engineer • On site monitoring and record keeping of environmental mitigation measures implemented and their performance • Implement any corrective actions specified by supervising engineers within specified time • Provide training to operators/workers	• Daily during construction phase • Regularly during construction phase. • Regularly during construction phase • First year of operation
6	Environmental Supervision Team (EST)	• The Contractor's EST is responsible for supervision, baseline, compliance and impact monitoring of construction contractor's activities as per responsibilities in the contract document(s) and advise the proponent and Supervision engineers for needed actions at the site during regular environmental management meetings. • Monitoring of implementation of the socio-economic, cultural, and environmental responsibilities of the proponent not included in the contract document and advise the proponent for needed actions • Provide needed corrective action as per the field requirements to minimize impacts • Prepare environmental monitoring report of the project construction and forward to the proponent for review by stakeholders	• Daily, weekly, monthly, every three months • Regularly during construction phase • Regularly during construction phase • Bi-monthly during construction and after three months of the project construction completion.
7	Construction Supervision Engineer (CSE)	• The CSE is part of the EST. The CSE will supervise construction works according to the provisions of EIA, the Environmental and Social Specifications for Contractors and	• Regularly during construction phase

No.	Stakeholders	Responsibilities	Time Schedule
		direct the construction contractor in consultation with the environmental engineers for the environmental improvement • Preside over monthly Environmental Management and Health and Safety Meetings of the supervision engineers, contractors and Environmental Engineers and maintain records for implementation status and needed corrective actions	• Monthly during construction
8	Workplace Safety and Environmental Officer (SEO)	• The SEO is part of the EST. The SEO will be responsible for overseeing the Contractor's internal compliance with the ESMP requirements and ensuring that the environmental specifications are adhered to.	• Prior to start of construction
9	District Development Committees	• Provide recommendations to the Project proponent with comments and suggestions and assist proponent in the project implementation • Assist in public consultation awareness building organized by the proponent • Assist and provide suggestions to the proponent in matters related to community mobilization • Assist MoEnv in the proposal audit • Review of monitoring reports of project construction and operation and provide comments for corrective actions • Ensure that transparency is maintained by all concerned stakeholders according to the EIA report and commitments.	• Prior to proposal implementation • During construction and operation • During construction and operation • During operation • As required during construction and operation phases • Regularly during construction and operation
10	Affected Village Development Committees, NGOs, CBOs, WUG, CFUG*	• Provide recommendations to the Project proponent with comments and suggestions and assist proponent in Project implementation • Assist in public consultation awareness building organized by the proponent • Assist and provide suggestions to the proponent in matters related to community mobilization • Assist MoEnv in the proposal audit • Review of monitoring reports of project construction and operation and give comments for corrective actions • Form Environmental Enhancement committees in each of the project affected VDCs and a central committee of EEC of the affected VDCs through a public franchise process to select and assist to implement the programs of Environmental Enhancement Programs. • Ensure that transparency in the project activities are maintained by all the concerned	• Prior to proposal implementation • During construction and operation • During construction and operation • During operation • As required during construction and operation • Pre-construction and as required during construction and operation • Regularly during construction and operation

No.	Stakeholders	Responsibilities	Time Schedule
		stakeholders according to the EIA report and commitments.	

* Non-government Organizations, Community Based Organizations (Community Forest User Groups, Irrigation User Groups, Water Supply User Groups etc.)

2.2 Environmental Responsibilities during Construction

2.2.1 Environmental and Social Management Cell

According to Nepalese Environmental Protection Rules, environmental and social management of the UT-I Hydroelectric Project is the responsibility of the Proponent. The Proponent's Project Management Office (PMO) has this overall responsibility. A separate Environmental and Social Management Cell (ESMC) shall be established, reporting to the PMO, to address social, environmental and safety issues. The UT-1 Project recently appointed an Environmental Manager to ensure that the EIA recommended mitigation and monitoring actions are duly implemented, monitored, assessed, evaluated and disseminated to project stakeholders for feedback and improvements. The ESMC is led by the Environmental Manager.

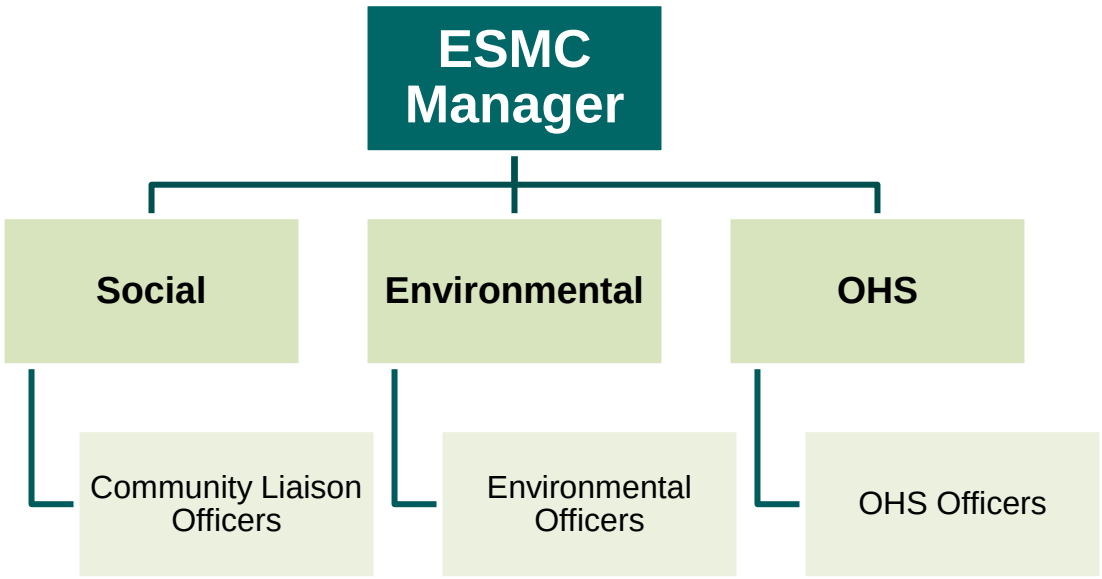

Figure 2-1: ESMC Organizational Chart

The ESMC will have the responsibility to implement environmental provisions not included in the contract documents of the Contractor and liaison with the other governmental and nongovernmental organizations, as well as the responsibility for monitoring of environmental and social provisions during construction and operation.

The ESMC will have full time social, environmental, and Occupational, Health & Safety (OHS) professionals on staff to directly lead the supervision and management efforts for social, environmental, and safety aspects of project preparation and construction. ESMC staff will be based in Kathmandu and at the project site. It is recommended that two Community Liaison Officers be located in the field in close proximity to affected communities and the project site. Environmental Officers will also be required to be located near the project site to be able to monitor ongoing construction activities. OHS Officers will be responsible for monitoring the health and safety activities of the EPC and the owner's engineer.

The ESMC will have the authority to stop construction works if in their opinion there is/may be a serious threat or impact to the environment caused directly by construction operations. Their authority shall be limited to emergency situations where consultation with the Construction Supervision Engineer (CSE) or the Environmental Supervision Team (EST) is not immediately possible. In all such work stoppage situations, the ESMC shall document and inform the PMO of the reasons for the stoppage within 24 hours.

Upon failure by the Contractor or his employees to show adequate consideration to the environmental aspects of the ESMP, the PMO could have the Contractor's representative or any employee(s) removed from the site or work or suspended until the matter is remedied. No extension of time will be granted in the case of such suspensions and all costs will be borne by the Contractor. The ESMC shall be on site daily during the construction phase.
Other responsibilities of the ESMC are as follows:

- Ensure that the necessary environmental authorizations and permits have been obtained.
- Ensure that the Environmental and Social Management Plan (ESMP) is implemented in compliance with relevant legislation.
- Implement and administer land and property acquisition, and compensation to affected parties.
- Supervise for mitigation and other environmental protection measures during project construction, including incorporation of environmental requirements into construction contracts.
- Conduct periodical inspection of construction sites to verify that environmental issues are kept to a minimum.
- Engage and supervise environmental monitoring programs, receive and review monitoring reports from the Environmental Supervision Team (EST) as well as from contractors on their regular reports for environmental performance.
- Consult and/or communicate to the local communities, project affected people, regulatory agencies, and other stakeholders during the project preparation and construction to ensure that they have full knowledge of project progress, potential

issues and mitigation actions, and to listen and respond to their concerns, suggestions and demands for environmental and community protection.

- Maintain open and direct lines of communication with Contractors, Construction Supervision Engineer (CSE) and the Environmental Supervision Team (EST) with regard to environmental matters.
    - Monthly reports to PMO regarding environmental issues at construction sites.
    - Review and approve the Contractor's construction method statements.
    - Take appropriate action if specifications are not followed.
    - Assist Contractors in finding environmentally responsible solutions to problems.

1.3 Contractors and Sub-Contractors

Contractors refer to the teams appointed by the Project's Proponent to undertake the construction activities for the UT-I hydroelectric Project. The Contractor(s), his sub-Contractor(s) and employees shall adhere firstly to minimize impacts that may result from Project construction activities and secondly, the mitigation measures set down in the ESMP to prevent harm and nuisances to local communities, resulting from construction and operation impacts. The duties of the Contractor(s) and his Sub-Contractor(s) include but are not limited to:

- Compliance with relevant legislative requirements governing environment, public health and safety.
- Work within the scope of contractual requirements and other tender conditions.
- Organize representatives of the construction team to participate in the joint site inspections undertaken by the ESMC.
- Carry out any corrective actions as instructed by the ESMC or the EST.
- Provide and update information to the EST regarding works activities which may result in adverse environmental conditions.
- In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impacts.
- Stop construction activities which generate adverse impacts upon receipt of instructions from the ESMC or EST. Propose and carry out corrective actions and implement alternative construction method, if required, in order to minimize environmental impacts. Major non-compliance by the Contractor will be cause for suspension of works and other penalties until the non-compliance has been resolved to the satisfaction of the ESMC.

1.3.1 Environmental Supervision Team

The Environmental Supervision Team will be comprised of the Construction Supervision Engineer (CSE), the Workplace Safety and Environmental Officer (SEO), and Social Specialists. The EST will have adequate knowledge on environmental protection and construction project management to perform the required duties and to supervise the Contractor's performance. At least one member of the EST shall have extensive experience (at least 10 years of experience is required) in environmental management, supervision and monitoring on construction projects and be familiar with Nepalese environmental legislatives requirements. Depending on project requirements, the EST may be required to work full-time on-site. The terms of reference for the EST, CSE, SEO, and Social Specialists shall be clearly stipulated in the contract signed between CSE and the Project Proponent.
The responsibilities of the EST include:

- Supervise the Contractor's compliance with contract specifications, including the implementation and operation of environmental mitigation measures and ensure their effectiveness, and other aspects of the ESMP Implementation Plan. Major non-compliance by the Contractor will be cause for suspension of works and other penalties until the non-compliance has been resolved to the satisfaction of the ESMC. Contractors are also required to comply with national and municipal regulations governing the environment, public health and safety.
- Instruct the Contractor(s) to take remedial actions within a specified timeframe, and carry out additional monitoring, if required, according to the contractual requirements and procedures in the event of non-compliances or complaints.
- Supervise the Contractor's activities and ensure that the requirements in the ESMP and contract specifications are fully complied with.
- Instruct the Contractor(s) to stop activities which generate adverse impacts, and/or when the Contractor(s) fails to implement the ESMP requirements / remedial actions instructed by the ESMC.
- Participate in the joint site inspection with ESMC.
- If the Contractor discovered cultural relics by chance, the EST will order site protection and report to the relevant authorities and the ESMC.
- Request and monitor Contractors the felling of trees and vegetation strictly in accordance with the pre-determined area, numbers, species, etc.
- Engage a qualified staff, preferably a Landscape Architect to review and monitor the Contractor's submitted Clearing, Revegetation and Restoration Management Plan (included in Contractor's environmental specifications), and to supervise the Contractor's landscaping works.
- Monitor noise levels at sensitive receptors by use of portable noise monitoring kit. Monitoring will take place during intensive construction activities, such as excavation, piling, power generation, material transport and night time construction,

and will be conducted near villages, schools, and other sensitive receptors along the project alignment.

- Visual inspection to check air-borne dust, during demolition, bulk material handling and storage, transportation routes near the villages;
- Visual inspection to check water quality in receiving rivers, fish ponds and lakes affected by the construction activity such as turbidity, odor, color, fish kills, etc. particular at discharge points in water bodies adjacent to construction sites and construction camps.
- Prepare reports for environmental monitoring data and site environmental conditions.
- Adhere to the procedures for carrying out grievance and complaint investigations.

Within the EST, the CSE will supervise construction works according to the provisions of EIA, the Environmental and Social Specifications for Contractors and direct the construction contractor in consultation with the environmental engineers for the environmental improvement. Preside over monthly Environmental Management and Health and Safety Meetings of the supervision engineers, contractors and environmental engineers and maintain records for implementation status and needed corrective actions. The SEO must have at least 5 years of experience in environmental management and must possess the skills necessary to impart environmental and social management and performance measures to all personnel involved in the contract. The qualifications and competence of the proposed SEO shall be approved by the PMO/ESMC prior to commencement of the project.

The SEO will be responsible for overseeing the Contractor's internal compliance with the ESMP requirements and ensuring that the environmental specifications are adhered to.
The duties of the SEO shall include but not be limited to the following:

- Carry out environmental site inspections to assess and audit the Contractors' site work practices, equipment and work methodologies with respect to pollution control and adequacy of environmental mitigation measures implemented.
- Monitor compliance with environmental protection measures, pollution prevention and control measures and contractual requirements.
- Investigate complaints and recommend any required corrective measures.
- Advise the Contractor on environment improvement, awareness and proactive pollution prevention measures.
- Complete start-up, weekly, monthly and site-closure checklists.
- Follow the procedures in the ESMP and recommend suitable mitigation measures to the Contractor in the case of non-compliance. Carry out additional monitoring of noncompliance within the specified timeframe instructed by the ESMC.
- Submit Contractor‘s ESMP Implementation Plan reports to the ESMC, EST, and relevant administrative authorities, if required.

- Keep detailed records of all site activities that may pertain to the environment.
- Supervise construction works where environmental management is a key aspect (e.g. in sensitive areas, with high environmental risk, etc.).
- Keep a photographic record of progress on site from an environmental perspective.
- Keep a register of complaints in the site office and recording and dealing with any community comments or issues.
- Keep a record of on-site incidents and accidents and how these were dealt with.

3 Environmental Compliance Framework

3.1 Contractor(s) Environmental and Social Management Plan (ESMP)

Prior to commencement of construction, the Contractor will be required to submit an ESMP Implementation Plan to ESMC based on the Contractor's actual construction methodologies, work program and schedule, machinery and construction to be used, management of construction activities and management of the workforce during construction. The ESMP Implementation Plan shall demonstrate compliance with Nepalese environmental requirements, the mitigation measures set down in the Specifications for Contractors and Lenders' Environmental and Social Standards and Guidelines. The content of the Contractor's ESMP shall be in line with the project specific EIA requirements and shall be enhanced by the Contractor's works practices, implementation procedures and program. The Plan shall be verified by the SEO and approved by ESMC and PMO.

The Contractor's ESMP Implementation Plan shall provide details such as commitment to environmental protection by the Contractor's Project Management Team; implementation procedures for the project EMP; detailed designs and installation of pollution control measures (e.g. drainage channel, settling tank, temporary noise barrier, etc.); environmental control mechanism; detailed earthworks management plans and site operation plans outlining the measures that are proposed to minimize, mitigate and manage the effects, for the duration of the construction works; and environmental monitoring program during different stages of construction period.

3.2 Compliance with Legal and Contractual Requirements

The Contractor(s) shall comply not only with the environmental and social specifications and contractual requirements on an on-going basis, but also with environmental protection and pollution control laws of Nepal, and the Lenders' Environmental and Social Standards and Guidelines. Any failure on their part to do so will entitle ESMC to impose a penalty or event of default with Lender requirements.

All work method statements submitted by the Contractor(s) to the EST for approval will also be sent to the ESMC for vetting to ensure that sufficient environmental protection and pollution control measures have been included. The ESMC will review the progress and program of the works to check that relevant environmental laws have not been broken, and that any foreseeable potential for non-compliance can be prevented.

The Contractor(s) will regularly copy relevant documents to the ESMC. The documents will at least include the updated Work Progress Reports, the updated Works Program, and correspondence for different license/permits under the environmental protection laws, and all the valid license/permits. The site diary will also be available for the ESMC's inspection upon its request.

In the event of non-compliance, the following recommended process shall be followed:

- If the EST or the SEO concludes that the current status on license/permit application and any environmental protection and pollution control preparation works may not comply with the works program, or may result in potential violation of environmental protection and pollution control requirements by the works in due course, they shall notify the Contractor and the ESMC accordingly.
- The ESMC shall issue a notice of non-compliance to the Contractor, stating the nature and magnitude of the contravention. A copy shall be provided to the SEO.
- The Contractor shall act to correct the non-compliance within 24 hours of receipt of the notice, or within a period that may be specified within the notice.
- The Contractor shall provide the ESMC and the SEO with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions. If restoration is done satisfactorily during the established period, no further actions will be taken.
- In the case where the Contractor fails to remedy the situation within the predetermined time frame, the ESMC shall impose a monetary penalty based on the conditions of the contract. The PMO or ESMC will immediately arrange for another contractor to do the restoration, and deduct the cost from the offending contractor’s next payment.
- For major infringements—an incident where there is long-term or irreversible damage—there will be a financial penalty in addition to the cost for restoration activities. To minimize the damage, the restoration activities will be implemented without delay.
- For minor infringements—an incident which causes temporary but reversible damage—the Contractor (s) will be given a reasonable period of time to remediate the problem and restore the environment.
- In the event of a dispute, difference of opinion, etc. between any parties in regard to or arising out of interpretation of the conditions of the ESMP, disagreement regarding the implementation or method of implementation of conditions of the ESMP, etc. any party shall be entitled to require that the issue be referred to specialists for determination.
- ESMC or the EST shall at all times have the right to stop work and/or certain activities on site in the case of non-compliance or failure to implement remediation measures.

3.2.1 Penalty System

Any inexcusable non-compliance with the conditions of the ESMP shall be considered sufficient ground for the imposition of a penalty. The ESMC shall propose a system of penalties for offences in terms of this ESMP and may, after consultation with the SEO, adjust these penalties, based on the severity, actual or potential impact and environmental risk involved at the time of the offence

4 Reporting

4.1 Contractor's Reports

Records shall be kept on site where possible for each project activity for easy access during site supervision or enquiries. Table 4-1 shows the records that have to be maintained by the Contractors and the SEO in each respective activity site office. The records shall be available to the ESMC, EST or PMO upon request.

4.2 Environmental and Social Unit's Reports

As a minimum the ESMC shall prepare the following written reports:

- Weekly report of non-compliance issues
- Summary monthly report of key issues and findings from auditing activities
- Summary monthly report of key issues arising from CSE supervision activities
- Consolidated summary report from Contractor's monthly report
- Collect and report on data as requested by PMO.
- Final report summarizing Project's environmental performance.

4.3 Environmental Supervision Team's Reports

As a minimum the EST shall prepare the following written reports:

- Weekly report of non-compliance issues
- Summary monthly report covering key issues and findings from reviewing and supervision activities
- Consolidated summary report from contractor's monthly report
- The SES shall also collect and report on data as requested by the ESMC.

At the end of the project the EST shall prepare a final report summarizing the key findings from their work, the number of infringements, resolutions, etc. as well as advice and guidance for how such assignments should be conducted in the future.

During the course of the Project the EST shall provide briefings as requested by the ESMC, or the PMO on the project progress, incidents, and other issues associated with environmental management and supervision. As a minimum these are expected to be at six-monthly intervals.

Table 4-1: Records to be kept on-site during construction

Category	Record
General	• Environmental training records (e.g. attendance records for environmental awareness training, topics covered) • Environmental permits and licenses • Site diary and site inspection records • Construction program and schedule • Equipment maintenance and repair records • Correspondence with concerned parties and other parties in relation to environmental matters • HIV/AIDS information • Meeting minutes
Noise Control	• Updated list of Powered Mechanical Equipment currently on-site • Details of examination periods and the results if any environmental sensitive receivers such as local schools, hospitals, resident villages may be affected. • Records of noise levels near sensitive receptors
Water pollution control	• Records of quantities of collected spent bentonitic slurries and/or drilling mud for reuse, reconditioning and disposal. • Records of maintenance and cleaning schedules for sediment and oil/grease traps • Records of toilet sewage disposal (where connection to existing sewer is not undertaken) • Records of the wastewater final discharge quantity and the pollutants concentration • Plans of construction site drainage
Waste Management	• Copies of relevant valid licenses as provided by employed waste haulers and waste collectors • Records of quantities of reused and recycled waste • Waste disposal records
Atmosphere	• Route and the program of the construction material transportation • Mitigation measures on the atmosphere effect such as sprinkling • The monitoring results of the atmosphere quality
Culture Property	• Drawings of the identified Culture Property sites (if any) • Log of construction near Culture Property sites (if any) • Records of discoveries during construction (if any)
Land contamination	• Preliminary analysis results of materials suspected to be contaminated (if any)
Ecological resources	• Records of sensitive ecological resources locations and associated protection plan
Storage of explosives, chemicals and hazardous substances	• Drawings of storage facilities; • Logs of inventory and consumption • Material data sheets of all substances kept on-site.
Environmental Emergency	• Emergency incident reports
Corrective and preventive action	• Corrective and preventive action request records and forms

4.4 Minimum Environmental and Social Standards

The contractor must comply with the minimum environmental and social standards presented in Table 4-2. The methods and procedures detailed in the ESMP Implementation Plan presented by the contractor must be sufficient to meet these minimum standards.

Table 4-2: Minimum Environmental and Social Standards for the UT-I Hydroelectric Project

Issues	Key Principle / Mitigation Standard	Minimum Mitigation Method
Unemployment of local labor	Villagers shall not be disadvantaged by the influx of outside workers	• Have a Human Resources Policy*[2] • Hire local labour as much as possible • Encourage women to work in the Project*
Workers intruding on village life and disrespecting traditional cultural values.	Workers shall respect local traditions and culture	• Have a Workers' Code of Conduct* • Education and orientation of outside workers to local culture and social norms before the start of work. • Have an environmental training program for workers
Health issues	Contractor to present a Health Management Plan	• The Health Program shall be made available to the communities • Implement a vaccination program • Provide education program on sexually transmitted diseases HIV/AIDS, tuberculosis and other illnesses • Provide periodical health check to construction workers • Implement measures against malaria if applicable
• **Workers' Camps and Work Sites**		
Water supply affecting ecology or village water supply	Camp to provide its own water supply that does not affect village water supply.	• Any water supply sources should be located so that it does not adversely affect the villages supply. • The intake of water from streams for water supplies should leave residual flows in the watercourses. • Storage tanks should be used to buffer water supplies*.
Wastewater discharges affecting water quality	Wastewater to be treated prior to discharge.	• Sewage disposal methods should be designed to the standards outlined by the Nepalese government
Solid waste polluting the environment and causing health hazards	No waste to be burnt or buried on site.	• All solid waste shall be removed from site and disposed of at a municipal landfill or at an approved disposal site*

[2] *These are the minimum mitigation measures are either in addition to those in the EIA (and in accordance with IFC EHS Guidelines and GIIP, or are simply a more detailed version of what is included in the EIA.

Camps using local services and resources, at the expense of villagers.	Camps shall not affect local resources, infrastructure, utilities	• Locations of camps shall be approved by ESMC and local authorities* • Provide adequate housing to outside workers with potable water and proper medical and sanitary facilities • Camps shall be self- sufficient in resources and services. • Camps to be secure and discourage workers from leaving the camp*.
• **Village Impacts**		
Deterioration of current quality of life and traditional livelihoods	Villagers should have the ability to communicate issues to, ESMC, EST, SEO and Contractors. Villagers have the expectation that issues will be addressed and resolved by negotiation. Meetings shall be undertaken to ensure villager's concerns are recorded and addressed. Villagers shall be adequately informed of all potential hazards to health and safety.	• Set up a communication network for discussing issues with ESMC, EST, SEO, Contractors. Complaints should be directed to the ESMC full-time safeguards staff*. • ESMC to manage a grievance mechanism, and have staff on site at all times to manage grievances*. • The Contractor's Health Management Plan shall be made available to the communities*. • Developing village protocol that could serve as a guideline for outside workers*. • A complaints record shall be kept of all issues raised by villagers in response to construction activities as well as the remedial actions taken and the turnaround time for the response and actions noted*.
Health and safety risks from such activities as increased traffic, blasting, operation of heavy machinery, etc. **Traffic causing safety risks to villagers**	Safety risks shall be minimized. Villagers have the expectation that issues will be addressed and resolved by negotiation.	• Refer to "Safety Issues" below
Nuisance issues such as noise, dust and vibration	Nuisances shall be minimized. Villagers have the expectation that issues will be addressed and resolved by negotiation.	• Refer to "Construction Issues" below.
Sediment affecting river water uses.	Sediment discharges to the river shall be minimized.	• Refer to the sections below discussing erosion and sediment control.
• **Construction Issues**		
Construction of access roads can affect cultivated areas, sensitive areas and cause noise, dust and	New access roads should not disrupt village life and affect ecosystems, and agricultural land	• Design and location of access roads shall be approved by a road engineer and ESMC*. • Follow erosion and sedimentation procedures, and noise and dust

Issues	Key Principle / Mitigation Standard	Minimum Mitigation Method
erosion		procedures as explained below. • Avoid constructing access roads in sensitive areas and agricultural land. • Build an appropriate drainage system.
Erosion and sedimentation caused by the construction activities	Erosion and sedimentation have to be maintained to a minimum to avoid changes in water flow patterns, loss of productive land, landslides, and destruction of surface vegetation	• Protect all areas susceptible to erosion by installing necessary temporary and permanent erosion and sediment control structures. • Conserve as much vegetation as possible • Initiate revegetation after completion of construction works
Noise and vibration associated with construction activities, excavation and blasting	Noise must not unreasonably intrude on traditional village life.	• Keep a current list of all noise and vibration producing machinery • Machinery operation to occur only during designated hours (to be confirmed by Contractor in agreement with villagers) *. • Blasting to occur at the same time each day, and / or a warning siren should sound prior to blasting. • Use of complaints register and procedures to address issues as they arise*. • Work to be carried out in daylight, in typical working hours. • Concrete batching plants and other noisy equipment to be located as far as practical from villages.
Dust generation from construction activities	Dust must not cause a hazard or nuisance to village life.	• Dust generating operations to occur only during designated hours (to be confirmed by contractor in agreement with villagers) *. • Use of complaints register and procedures to address issues as they arise*. • Concrete batching plants and other dusty equipment to be located as far as practical from villages.

Issues	Key Principle / Mitigation Standard	Minimum Mitigation Method
Increased utilization of roads by traffic associated with construction activities	There should be no significant increased risk to local populations from traffic associated with the Project.	• Road upgrades, including signage, speed humps, re-grading. • Wetting of roads to reduce dust during the dry season, and as necessary • Training of locals regarding the hazards of traffic*. • Training of vehicle drivers regarding the driving risks through villages and along remote roads*. • Use of complaints register and procedures to address issues as they arise*.
Pollution risk activities occurring on site	Develop appropriate storage, transport and use practices for storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers. There shall be no solid or liquid waste disposal directly or indirectly to any water course (whether flowing or not).	• Keep a current list of all potentially contaminating materials used onsite*. • Develop and implement appropriate storage, transport and use practices to recognized standards*. • Solid waste disposal shall be taken off site*.
Clearing, revegetation and restoration of construction sites		
Loss of productive land, disturbance of soil profile, loss of habitats for animals **Lack of appropriate compensatory planting at the end of construction or use of non-native species**	Clearing activities shall allow the existing usage of land to continue as long as is practicable. Avoid discharging sediments and vegetation material into water courses, cultivated land, an irrigation canals. Initiate revegetation of exposed areas as soon as practicable.	• Clearing shall take place in a phased matter to retain vegetative cover as much as possible. • Areas not approved for clearing shall be kept undisturbed and demarcated by construction fencing*. • Save as much topsoil as possible. • Appropriate local native species of vegetation shall be selected for the compensatory planting and restoration of the natural landforms. • Establish a method for timber salvage with participation of local communities*. • All affected areas should be landscaped and any necessary remedial works should be undertaken without delay, including revegetation and reforestation.
• **Earthworks, Fill Slopes, Cuts, Borrow Pits, Quarries, Disposal Sites, Stockpiles**		
Generation of suspended solids from bare ground and runoff	Construction activities should not give rise to storm water containing elevated suspended	• No direct discharge of sediment laden water without treatment. • Earthworks and land clearance

Issues	Key Principle / Mitigation Standard	Minimum Mitigation Method
into watercourses	solids. Provide treatment to achieve 75% reduction in suspended solids.	should be minimized and phased. • Storm water should be diverted around exposed areas. • Any discharges to watercourses should occur during high flow and / or discharged as close to the outfall as possible to maximize mixing. • Stockpiles, borrow pits, quarries, disposal sites should be located at least 50m from a watercourse and avoid sensitive areas*. • Timing of works around the drier seasons where possible. • Provision of storm water cut off drains wherever possible.
Introduction of invasive species	Fill material should not contain invasive species.	• The use of imported fill shall be minimized. • Machinery should be cleaned prior to working on site to reduce the opportunity of the spread of weeds.
Disturbance of natural habitats for spoil / alluvial material.	Soils should be reused where possible in the development – to reduce the need for spoil sites and the need to import fill.	• Limit extraction of material to approved and demarcated quarries and borrow pits. • Stockpile and reuse soils before excavating new soils / alluvium. • Stockpiles should be compacted as much as practical and not be exposed for extended periods. • Stockpiles should be reused as soon as practicable. • Storm water should be diverted around stockpiles.
Efficiency of control measures over time	Control measures should continue to work appropriately throughout the construction period.	• Earthworks control measures should be inspected and maintained in efficient operating condition over the construction period.

Issues	Key Principle / Mitigation Standard	Minimum Mitigation Method
• **Work in watercourses**		
Sediment discharges arising from working in and near the river	Work in the wetted area of the riverbed should be minimized, and only in relation to the construction of the power house, weir and intake structure or to insert culverts for stream crossings.	• Stabilize works at the end of each working day and prior to storm events*. • Do the work during low flow periods. • Works shall be minimized. • Diversion of the river around the work area where possible. • Culverts shall be placed in access tracks where they cross streams more than 3 meters wide and 0.5m deep*.
Tunnels		
Contaminants in water discharged from tunnels during construction	No direct discharges of tunnels water to any water course. Provide treatment prior to discharge to achieve 75% reduction in suspended solids.	• Settlement ponds and /or sediment infiltration devices • Monitoring immediately upstream and 50m downstream of the discharge with a clarity tube to estimate any effects on clarity; for nutrients to detect explosives residue and for pH*. • Any discharges to watercourses should occur during high flow and / or discharged as close to the outfall as possible to maximise mixing*. • Spill kits and emergency procedures should be used for spills of chemicals, fuels and oils and staff trained*
Concrete, Cement		
Contaminants in water discharged from concrete manufacturing, including a rise in pH	No direct discharges of concrete batching water to any water course. Provide treatment prior to discharge to achieve 75% reduction in suspended solids.	• Settlement ponds and / or sediment infiltration gallery. • Monitoring immediately upstream and 50m downstream of the discharge with a clarity tube to estimate any effects on clarity; for pH to detect alkali discharges*. • Any storm water discharges to watercourses should occur during high flow and / or discharged as close to the outfall as possible to maximize mixing*. • Water to be reused where possible in the process. • Procedures for handling of un-

Issues	Key Principle / Mitigation Standard	Minimum Mitigation Method
		hydrated cement material and wet cement to avoid spills*.
Community nuisances	Noise and dust must not unreasonably intrude on traditional village life.	• Concrete batching plants and other noisy / dusty equipment to be located at least 100 meters from villages*
Material Handling, Use and Storage		
Pollution risk associated with the storage and use of fuels, chemicals, explosives, hazardous substances	No oil, lubricants, fuels or containers should be drained or dumped to ground or waterways. Accidental spills shall be minimized, and procedures put in place to clean up the environmental damage.	• Keep a current list of all chemical and hazardous substances stored on site*. • Keep the Safety Data Sheet of all hazardous materials used on site*. • Develop appropriate storage, transport and use practices to recognized standards*. • Explosives, chemicals and hazardous substances to be handled by authorized personnel*. • Diesel to be stored in truck tankers or in overhead tanks to a maximum of 5000 liters*. • Diesel to be stored on flat ground, and 50 m from a waterway*. • Dikes to capture 100% of fuel must be placed around fuel storage areas*. • All refueling of vehicles and plant to be done on flat ground*. • All significant vehicle and plant maintenance shall be undertaken offsite where possible. • Spill kits and emergency procedures should be used and staff trained*. • There shall be no deliberate discharge of oil, diesel, petrol or other hazardous materials to the surrounding soils and waterways.

Issues	Key Principle / Mitigation Standard	Minimum Mitigation Method
Maintenance of Construction Equipment and Working Areas		
Reduction of air quality due to emission from poorly maintained equipment and vehicles **Risk of pollution of vegetation and watercourses due to improper disposal of used lubricants and fuels**	Equipment and vehicles shall not reduce air quality No oil, lubricants, fuels used for the maintenance of equipment should be drained or dumped to ground or waterways Construction debris shall be disposed at approved disposal sites	• Maintain all equipment in good working conditions • Establish spill prevention procedures* • Ensure that maintenance activities are carried out in approved areas • Establish and enforce daily site clean-up procedures, including maintenance of adequate disposal facilities for debris. • Onsite burning of debris and wastes shall be prohibited
Safety Issues		
Health and safety risks from such activities as increased traffic, blasting, operation of heavy machinery, etc.	Health and safety risks to villagers and workers shall be minimized.	• Provide personal protective equipment and clothing (goggles, gloves, dust masks, hard hats, steel-toed boots, etc.,) for construction workers and enforce their use • Follow national regulation on blasting • Inform villages one week in advance of the blasting event*. Blasting is prohibited during night-time hours. • Establish a methodology to be followed in case of fire* • Remove workers from tunnels and underground construction in case a hazardous gas is present* • Respond to emergencies in a prompt matter
Traffic causing safety risks to road users	Construction traffic will be managed to minimize the impact on existing road users.	• Signage to be used to identify current risks to road users. • EST and Contractors to discuss major traffic issues with village* representatives • Establish pedestrian routes* • Heavy traffic to avoid the hours when school children walk to and from school*.
Archaeological and cultural site disturbance		
Finding and disturbance of previously unknown sites	No sites shall be disturbed once identified.	• Follow the 'chance find' procedure*.
Flora and Fauna		
Wildlife populations may be adversely	Sufficient trainings on ecological protection and mitigation	• Demarcate natural habitats for sensitive, rare, threatened and/or

Issues	Key Principle / Mitigation Standard	Minimum Mitigation Method
affected by direct losses of individuals (e.g., mortality, injury) or modification of habitat **Destruction of native vegetation and land outside proposed working areas**	measures shall be provided to construction workers and site management staff	endangered species before the commencement of construction activities* • Ensure that no hunting, fishing, trapping, shooting, poisoning or otherwise disturbance of any fauna takes • Delineate with temporary construction fencing the vegetation to be preserved* • Ensure that vegetation to be preserved is kept undamaged*. • Prohibit use of fire wood and the burning of vegetation. • Install sediment control measures to prevent siltation of water courses

5 Environmental and Social Specification for Contractors

The following are the environmental and social specifications that must be included in the tender documents for Contractors as qualification and selection criteria and eventually in the construction contracts so that they will form part of the contractual requirements for Contractors working on the UT-I Hydroelectric Project. The mitigation measures and actions proposed in these specifications can be enforced by PMO and ESMC. However, this information is intended solely as broad guidance to be used in conjunction with local and national regulations.

The Contractor and his employees shall adhere to the mitigation measures set down in:

- The Environmental Impact Assessment (EIA) Report for the Project.
- The mitigation measures included in project design and bill of quantities;
- The specifications, procedures, and best practices included in these specifications. These specifications complement any technical specifications included in the work quantities and the requirements of any Nepalese regulations and standards.

The Contractor shall prepare at least the following Environmental and Social Management Plans:

- Workforce Management Plan
- Health Management Plan and Community Relations Plan
- Workers' Camps and Work Sites Management Plan
- Clearing, Revegetation and Restoration Management Plan
- Construction Impact Management Plan
- Waste Management Plan
- Material Handling Use and Storage Management Plan
- Maintenance Management Plan
- Safety Management Plan
- Physical Cultural Property Chance-Finds Procedures
- Ecological Management Plan

Prior to their implementation, these management plans will have to be approved by the proponent's PMO through the ESMC. The Environmental of Supervision Team (EST) of the Contractor will oversee the implementation and the required monitoring of the approved plans.

5.1 Workforce Management Plan

5.1.1 Workforce

To prevent or reduce negative impacts on communities near the project, the Contractor shall implement a series of measures related to construction workers. These measures are:

- Give priority to hiring local workers, both male and female.
- Encourage women to work in the Project.
- Ban child labor.
- Address potential tensions between workers and the local communities.
- Address increase risk of prostitution and communicable diseases, theft, drug and alcohol abuse, market distortion due to temporary inputs to local economy and other local tensions such as unemployment, ethnicity and cultural values.
- Implement the laws on hiring workers established in Nepal.
- Report vacant positions in all locations in the Project area.
- Ensure that the workers have all required documentation as follows: employment contract, insurance, routine checkups, vaccinations, occupational health training, etc.
- Provide adequate housing for outside workers with proper facilities of water and sanitation.
- Provide training on environmental issues and workers' safety.
- Open Training and Development Centers to help local people improve their skills to be able to work in the Project.
- Provide educational classes on venereal diseases and AIDS and vaccinate workers once they are hired (for more details see: "Health Management Plan" below).
- Provide transportation to local workers to get to and from the areas of the Project.
- Provide adequate food and accommodation for workers.
- Establish a Worker Code of Conduct
- Inform local authorities of any criminal acts or incidents caused by workers in the local communities.
- Restrict access to workers to the lands/territory of vulnerable minority groups.

5.1.2 Code of Conduct

A major concern during the construction of large hydroelectric projects is the potential negative impacts that might arise from the interaction of outside workers with local communities. For this reason, it is important that the Contractor establish a Code of Conduct that emphasizes the importance of appropriate behavior, respect for local communities and customs, and compliance with all Nepalese laws and regulations. Each employee shall be informed of the Code of Conduct, once she/he has signed the contract to work for the Project. The Code of Conduct should be available to local communities at the Public Information Centers (PIC) established for the Project.

The Code of Conduct should address at least the following topics:

- All of the workforce shall comply with the laws and regulations of Nepal.
- All illegal substances, abuse of drugs and alcohol, carrying of firearms, as well as pornographic material and gambling shall be prohibited.
- Fighting (physical or verbal), creating nuisances and disturbances in or near communities, disrespecting local customs and traditions shall be prohibited.
- Smoking shall only be allowed in designated areas.
- Workers must follow appropriate standards of dress and personal hygiene while visiting local communities and in the accommodation quarters.
- Workers visiting the local communities must behave in a manner consistent with the Code of Conduct.

5.1.3 Prohibitions

The following activities (which must be included in the Code of Conduct) are prohibited on or near the Project area:

- Cutting of trees outside the approved designated areas.
- Hunting, fishing, trapping and trade of wildlife especially endangered species and collection of flora.
- Caging wild animals (especially birds).
- Purchase of wild animals for food.
- Illegal hunting and poaching of any kind.
- Fishing in any river of water body within the Project area
- Use of unapproved toxic materials such as lead-based paint, asbestos, etc.
- Damage to any property with architectural or historical value.
- Building of unapproved fires.
- Wood collection for cooking or heating and as a fuel for heating during the processing or preparation of any materials forming part of the works. The Contractor shall provide another fuel other than wood, such as kerosene or LPG.
- Burning waste or vegetation.
- Use of firearms (except authorized personnel).
- Use of alcoholic beverages during working hours.
- Washing machines, vehicles or clothes in rivers, streams or lakes.
- Maintenance of machinery and vehicles outside designated areas.
- Disposal of trash or construction waste outside designated areas.
- Driving vehicles or equipment improperly or under the influence of drugs or alcohol on local roads or in the Project area.
- Working without the proper protective equipment (including helmets and boots).
- Spilling potential contaminants such as petroleum products.

- Defecation or urination outside designated sanitary facilities. The Contractor shall provide portable toilets on all work fronts.

Any construction worker, office staff, Contractor's employees, the Client's employees or any other person related to the project found violating the Code of Conduct, the prohibitions established in these specifications, or the rules, regulations, and procedures implemented at the construction camp will be subject to disciplinary actions that can vary from a simple reprimand to termination of employment, depending on the severity of the offense.

5.1.4 Environmental Training for the Workforce

During construction, there will be a potential for workers to damage the forest and waterways adjacent to camps and work areas. The Contractor shall prepare an Environmental Training Plan to ensure that all construction workers and relevant personnel are familiar with the environmental requirements of the Project. The Plan shall include:

- The Contractor shall distribute to all construction workers and relevant personnel: (1) the Contractor's Environmental Plans, (2) The Environmental and Social Specifications contained in this document, and (3) copies of relevant environmental laws, standards and regulation of Nepal.
- The Contractor shall provide environmental training to employees according to their level of environmental responsibility.
- All employees shall be required to comply with environmental protection procedures and training records shall be prepared showing that they attended the training sessions detailed in the Plan.
- The Plan shall educate all construction workers and relevant personnel on the following issues but not limited to them: The Code of Conduct, the prohibitions mentioned above, traffic regulations, illegal logging and collection of non-timber forestry products, non-disturbance of communities, hunting and fishing restrictions, waste management, erosion control, health and safety issues, establishment of penalties for those who violate the rules, and any other environmental and social aspect relevant to this Project.
- The Contractor shall present to ESMC and SEO for approval the proposed methods for conducting the training program, which shall include formal training sessions, posters, data in newsletters, signs in construction and camp areas and 'tool box' meetings.
- The Contractor shall provide periodical training as deemed necessary.
- The Contractor shall keep records of attention and issues covered and provide such records when required by ESMC or SEO.

5.2 Health Management Plan and Community Relations

5.2.1 Health Management Plan

The Contractor shall prepare and enforce a Health Management Plan to address matters regarding the health and wellbeing of construction workers, project staff and nearby communities. The Contractor shall include in his proposal the outline of the Health Plan. The SEO will issue a certificate of compliance to the Contractor prior to the initiation of Construction. The Contractor shall:

- Require screening of all workers on recruitment and annually.
- Implement a vaccination program including, but not limited, to vaccination against hepatitis A and B, tetanus, polio, rabies, etc.
- Provide periodical health check to construction workers to ensure their health and wellbeing.
- Provide appropriate information and education to the workforce on basic personal hygiene, prevention of diseases, including respiratory diseases, vector-borne diseases such as malaria and dengue, water and food borne diseases such as diarrhea, tuberculosis, etc.
- Implement a program for workers and local communities for the prevention, detection, screening, and diagnosis of sexually transmitted diseases (STD), especially with regard to HIV/AIDS. The program shall also include information on alcohol abuse and human trafficking.
- The HIV/AIDS program should include awareness campaigns at the construction sites and in the communities, developing peer educators and community monitoring combined with the prevention of human trafficking, awareness on safe migration, and community monitoring.
- Distribute educational materials to all workers including brochures, and leaflets which provide information of Tuberculosis (TB), HIV/AIDs symptoms and counseling and treatment services.
- Establishment of health post or a hospital, promote medical clinics and dispensaries in Haku areas in particular where population densities are likely to increase (EIA page 220)
- Provide basic first aid services to the workers as well as emergency facilities for emergencies for work related accidents including medical equipment suitable for the personnel, type of operation, an ambulance or motorized vehicle and the degree of treatment likely to be required prior to transportation to a hospital or health care center. The Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of

epidemics (also see: “Workers’ Camps and Work Sites Management Plan: Medical Facilities presented” below).

- Send to the EST, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the EST may reasonably require.
- Include a Pest Management Program for the construction areas, including construction work camp areas, in the Health Management Plan. The use of pesticides shall follow procedures acceptable to the government of Nepal.

If applicable, to reduce the risk of workers contracting malaria, the following measures shall be followed:

- Education of workers about problems and preventive measures.
- Use of protective clothing.
- Repellents applied to clothing.
- Minimize containers full of water.
- Ensure correct maintenance of water and water treatment plants to prevent the breeding of mosquitoes.
- Keep storm water drains and borrow pits free of vegetation.
- Use insecticides as a last control method and only after studies indicate the primary location of mosquitoes.

5.3 Community Relations and Grievance Mechanism

Discussion and public consultation shall be a continued effort throughout the construction period of the project, through the following measures:

- The Contractor shall maintain open communications between the local government and concerned communities.
- The Contractor shall have a mailing list to include agencies, organization, and residents that are interest in the Project.
- The Contractor shall disseminate project information to affected parties (for example local authority, enterprises and affected households, etc.) through community meetings before construction commencement.
- Visible public notice boards shall be erected at all construction sites providing information about the project including but not limited to: (i) brief project description, (ii) construction and work schedules, (iii) main construction activities, (iv) names, telephones and contact information about the project manager, chief construction

supervisor as well as environmental staff, health and safety staff, so that any affected people can have the channel to voice their concerns;

- Each Contractor will be required to hold public meetings at villages near their work sites at least twice a year. At these meetings, the site management will explain the construction activities and learn from the villagers about any concerns they may have and provide responses to their concerns;
- ESMC shall also have a full time safeguard staff whose partial responsibility would be to receive public complaints about project construction and operation. The ESMC staff's name and contact number shall be made available to the local communities through pamphlets and public meetings. He/she shall respond to telephone inquiries and written correspondence in a timely and accurate manner.
- The Contractor and SEO shall visit frequently key sensitive receptors such as schools and hospitals to understand any concerns they may have and how they feel about the impact of construction activities to the natural environments and their operations.
- All Contractors shall be required to conduct safety training programs to the local communities and local schools once a year.
- In preparation for special and high impact construction activities such as demolition, blasting, night time construction, etc., the Contractor or the SEO shall be required to visit the potentially affected communities to explain the activities and their impacts (e.g., safety risk, high noise, etc.), listen to the communities and take appropriate and responsible measures to address their concerns.
- Identify in advance potential disruptions to cultural/religious sites and activities and coordinate with communities to avoid/minimize these potential impacts.
- At least five days in advance of any service interruption (including water, electricity, telephone, and bus routes) the community must be advised through postings at the project site, at bus stops, and in affected homes/businesses. The postings shall also inform the community of any possible detour routes and provisional bus routes A coordination system between the Contractor and local authorities shall be set up to solve problems and incidents incurred.

5.4 Workers' Camps and Work Sites Management Plan

5.4.1 Site Selection

According to the EIA Report, three separate labor camps will be needed during the construction of the Upper Trishuli-I Hydroelectric Power Project due to unavailability of sufficient housing in the nearby villages: (i) For the headworks site, the area near Sano Haku and Thulo Haku; (ii) For the powerhouse site and surge tank, the area near Mailung Dhovan; and (iii) For Company's permanent camps, the area near the powerhouse at Mailung Dhovan.

The Contractor shall plan, design and build workers' camps and work sites to meet the following requirements:

- The Contractor shall submit for approval the designs and location of the camps and work sites including details of all buildings, facilities, materials used, the construction methodology and work schedule at least two months before the start of the construction works. The permits and approvals must be obtained in accordance with relevant laws and regulations, applicable standards and environmental requirements in order to meet legal obligations for the construction of the camps and work facilities.
- Camps and work sites should be zoned according to use. For example, dormitories, dining area, kitchen, recreation areas, warehouses, workshops, material storage areas, sanitary facilities, medical facilities, administrative offices, etc.
- Camps and work sites and access roads shall be located so as to avoid clearing as many major trees and vegetation as possible from the areas and to avoid important aquatic habitats. These areas shall be located to allow effective natural drainage.
- Offices, workers' camps, depots, concrete batching plants, asphalt plants, mixing stations, crushing plants, warehouses and storage areas for chemicals, diesel, explosives, fuel and bitumen shall be located at least 50 meters from watercourses, and operated so that no pollutants enter watercourses, either overland or through groundwater seepage, especially during the rainy season. This can be achieved by recycling lubricants and building a ditch or canal around the area with an oil separator or settling pond/oil trap at the outlet of the ditch.
- Offices, workers' camps, depots, concrete batching plants, asphalt plants, mixing stations, crushing plants warehouses and storage areas for chemicals, diesel, explosives fuel and bitumen shall be located at least 100 meters from residential areas and shall never be located near schools, hospitals, hospices or areas with scenic value. In any case, their location shall be approved by EST.
- Offices, workers camps, concrete batching plants, asphalt plants, mixing stations, warehouses and storage areas for chemicals, diesel, explosives, fuel and bitumen shall not be located in scenery zones or environmentally sensitive areas such as nature reserves, forests, water source protection areas, agricultural land, etc.
- Effective sediment and erosion control measures shall be implemented during construction of the camps and work sites in accordance with the environmental requirements of the Project especially near watercourses.
- Drainage systems, wastewater treatment and solid waste disposal shall be carried out according to national laws and regulations and the measures presented in the Waste Management Plan introduced later.

5.4.2 Facilities

- The Contractor shall provide suitable, safe and comfortable facilities for the labor force. The facilities shall include dormitories, rest areas, lavatory facilities, canteens, adequate for the numbers of workers in the camps. The Contractor shall present the design of the facilities, to ESMC for approval.
- The Contractor shall provide adequate and suitable facilities for washing clothes and utensils for the use of contract labor employed therein.
- The Contractor shall provide recreational facilities to the workforce. Such facilities will help mitigate against potential conflict and impact on the local population as the incentive to go outside the camp will be reduced.
- Adequate power, heating, air conditioning and telecom system shall also be provided.
- The Contractor shall provide nutritious meals that will take into account ethnical and cultural differences of the workforce.

5.4.3 Potable Water

- It will be the Contractor's responsibility to carry out all the works necessary for the provision of a water supply system. A gravity flow water supply system can be constructed using water sources from the upper ridges. In any case, the water supply system shall be approved by ESMC.
- The Contractor shall verify the availability of water in the area to determine the scope of the works to be done. The Contractor shall supply water to the camps without affecting in any way the water supply of neighboring towns and villages.
- Water at sources should be tested and treated as necessary.
- The Contractor shall provide potable water for food preparation, drinking and bathing in all labor camps, administrative offices, medical facilities, canteens, etc. Potable water shall comply with the national standards for human consumption.
- Public taps should be installed at appropriate locations
- The system shall be cleaned and maintained on a regular basis.

5.4.4 Sanitary Facilities

- Separate and adequate toilet and bathing facilities shall be provided for the use of male and female workers. 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.
- Toilet and bathing facilities shall be provided with adequate supplies of running water, soap, and toilet paper. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions on a regular basis.

- Latrines should also be constructed in areas, which are likely to be visited frequently by the construction workers.
- The Contractor shall provide portable toilets in all construction sites in the following scale: one latrine for maximum 15 women and one latrine for maximum 15 men.
- A dry system of sewage disposal, such as ventilated improved pit latrine, will be appropriate for the Project area. It is easy to construct and does not require a flushing system. The latrines should be located at a distance of at least 10m away from residential areas and at least 50m away from water sources.
- If septic tank systems are used for any residential labor camps, the seepage pits should be located at a safe distance from water sources to avoid contaminating them. Wastewater should not be disposed into water bodies without treatment.
- The wastewater treatment plants shall be designed, installed, operated and maintained in accordance with the regulations and specifications of Nepal.

5.4.5 Medical Facilities

- The Contractor shall establish a medical center located at the main construction camp for the diagnosis and treatment of communicable diseases, simple medical complaints, and the handling of medical emergencies and accidents, prior to transportation to the hospital. The medical center shall have:
- A 7-10 bed health facility fully equipped to provide emergency medical care to stabilize emergency patients before they can be referred to district or provincial hospital
- Essential medical equipment for the center to provide emergency care
- Short term care of patients requiring hospitalization
- Isolation room (one bed) for any infectious disease patient (in epidemic situations, district and provincial facilities will have to be used)
- An ambulance or an appropriate motor vehicle to transport patients to the nearest health care center or hospital.
- The center shall include one medical officer, one trained nurse of senior level, two medical auxiliaries, one laboratory technician (who may be also responsible for monitoring water quality in construction camp areas).
- The smaller construction camps shall have first aid posts staffed by either a trained nurse or a locally trained personnel, as required.
- All waste from the medical center and the first aid posts shall be packed in containers designated for that purpose and discarded according to the rules and regulations established for the disposal of medical waste.

5.4.6 Maintenance of Camp Facilities

The Contractor shall implement the following measures to ensure that the construction camp and its facilities will be organized and maintained to acceptable and appropriate standards:

- Meals and drinks shall be provided in the areas designated for this purpose (canteens) and during the established schedule. Cooking or preparation of food shall be prohibited in accommodation quarters.
- Designated rest times and recreational hours shall be established.
- 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.
- The dormitories, medical and health facilities as well as canteens, kitchens, administrative offices and other facilities should be kept clean and free of debris, solid wastes and contaminants (also see: Waste Management Plan).
- The latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times.
- Reserve water shall be kept in drums or barrels in or near the latrines and urinals.
- The Contractor shall establish a complaint system to receive and respond to complaints from the construction camp residents regarding the maintenance of facilities and services provided (food, medical care, recreation, etc.).

5.4.7 Security

Some security measures shall be put into place to ensure the safe and secure running of the camp and its residents. Some of these security measures include:

- Adequate, day-time night-time lighting.
- The construction site should be properly fenced and guarded in order to restrict access to public. The perimeter security fence shall be at least 1.8 m in height constructed from appropriate materials. The type of fence and the materials used must be approved by ESMC.
- Access to the camp shall be limited to the residing workforce, construction camp employees, and those visiting personnel on business purposes.
- Visitors and relatives of the camp residents must obtain written permission to camp entrance. This permit must be approved by the construction camp manager.
- Guided tours should be arranged whenever required to inform people about construction activities of the project to avoid local people from gathering and crowding near the construction sites.
- Camps shall have emergency equipment such as first-aid kits, flashlights, firefighting equipment, portable fire extinguishers, audible warning devices such as a siren,

water rescue equipment, emergency vehicle and phone on site at all times, with workers well informed about the proper use of such equipment.

5.4.8 Camp Followers

According to the Environmental Impact Assessment (EIA) Report[3] about 350 migrant workers including their family members are expected to come in the region. Others like trades and merchants will come looking for business opportunities. This migrant population will locate themselves in available land exerting serious impacts not only on the local communities which might be affected by the loss of land, but on the environment due to an increase in fuel-wood collection, rearing of livestock, grazing pressure, killing and poaching of animals for consumption and commerce, pressure on medicinal plant species, change in landscape features, minor degradation of habitat through tree felling, and contamination of nearby waterways with inadequate disposition of wastes.

The increased population in the Project area will put pressure on available services such as health care services, water and sanitation, and housing. Migrant workers might also act as carriers of various diseases like AIDS, VDS, gastro-enteritis, etc.

Although the influx of new population may create a market for local products and services, which may trigger local development, it is essential that the Project's Proponent plan and provide areas outside formal construction camps for these camp followers in order to avoid damage to the surrounding and agricultural areas, contamination to nearby waterways and to minimize the impact of these camp followers in the local communities and resources.

The Project's Proponent shall prepare a Camp Followers Management Plan which shall include:

- Selection of adequate areas for the settlement of camp followers;
- Camp followers shall be provided with health services and have access to local health facilities and clinics, or to the health facilities established for the Project.
- Camp followers shall be provided with minimum services such as potable water (standpipes), latrines, collection and disposition of solid wastes, electricity, etc.
- People should not be allowed to collect fuel wood and other forest materials from the forest of the region. The wood coming under the submergence after procuring from the forest department may be allowed to be used by the Project's Proponent for distribution to the laborers.
- The Contractor's responsibilities with the camp followers shall be defined and established by the Project's Proponent.

[3] Upper Trishuli-I Hydropower Project 216 MW. Environmental Impact Assessment (EIA) Report, November 2011. Section 5.4.1 "Anthropogenic Pressure", page 200.

5.5 Clearing, Revegetation and Restoration Management Plan

5.5.1 Clearing of Construction Areas

The Contractor shall present the Clearing, Revegetation and Restoration Management Plan to ESMC for approval. The Vegetation Clearing Plan shall consider the existing usage of the project land to allow its existing usage to continue as long as is practicable, without interference with the Contractor's activities.

This Plan, limited in scope to the construction phase, needs to be aligned with the broader Reforestation Plan (see Environmental and Social Action Plan in the Supplemental ESIA, July 2014), to be developed by the PMO through their ESMC and whose goal is to compensate for the overall are of forest and natural vegetation lost during Project implementation. Given the importance of community forests for the livelihoods of local communities, it is expected that Forest User Groups (FUG) and other relevant stakeholders, such as the District Forest Office, will be consulted and engaged in the formulation of the Reforestation Plan. The Clearing, Revegetation and Restoration Management Plan deals with the reforestation actions that need to happen during the construction phase, whereas the Reforestation Plan extends into the operations phase of the Project.

In general, the Clearing, Revegetation and Restoration Management Plan shall include:

- Areas proposed for clearing shall be approved by ESMC and EST. Only those areas shall be cleared in accordance with the Plan.
- The areas that have not been approved for clearing and removal of vegetation shall be kept in their current state. The Contractor shall identify vegetation to be preserved during the planning process and be delineated with temporary fencing. Preserving vegetation helps to stabilize the soil, prevent erosion, protect water quality and has visual and aesthetic benefits.
- Initially, the Contractor shall perform the removal of existing vegetation to allow access for construction machinery and establish a safe workplace for employees.
- Trees and plants located in the project area and access roads shall be marked to indicate whether they should be kept, transplanted or removed. Large or significant trees and plants with ecological value (for example, those that serve as nesting or rest areas for birds) or that have commercial value, should be preserved wherever possible. Transplantation of existing trees affected by the project works shall be carried out prior to the commencement of construction.
- The Contractor shall take into account soil stability, protection of wildlife and natural vegetation and the prevention of sedimentation of watercourses when determining the method and time to carry out the clearing.
- The removal of vegetation should be avoided, as far as possible, in steep terrains, erosion prone areas and ecologically sensitive sites.

- When clearing within 30 m of permanent streams of 15 m of intermittent streams, the Contractor shall use hand cutting or winching to remove timber.
- Use of “brush rakes” on bulldozers to minimize disturbance of ground cover. Save as much vegetation as possible.
- The vegetation must be removed in stages to retain topsoil as long as possible to prevent large areas from being eroded by wind and rain.
- At the reservoir, fallen vegetation will be left in place over the cleared areas for as long as possible before flooding, so as to minimize sediment run-off.
- Excavations shall avoid damage to the root systems. Mitigation measures are also required to prevent damage to trunks and branches of trees.
- The plants and vegetation that can be used later in the process of revegetation and restoration and threatened or endangered flora identified in the areas to be cleared shall be conserved in temporary nurseries. The location of the nurseries shall be approved by EST.
- All remaining non-indigenous vegetation shall not be burned but disposed of at an approved landfill site.
- Successful land reclamation and re-cultivation of temporary used land are highly depended on reservation of top soil. Therefore, the Contractor shall remove topsoil from all areas where topsoil will be impacted by the construction activities, including temporary activities such as storage and stockpiling, etc. Stripped topsoil shall be stockpiled in locations approved by EST for later use in revegetation and reclamation and shall be adequately protected from wind and water erosion and toxic materials.
- The Contractor shall provide a plan for timber salvage indicating the type of timber to be salvage, methods of storage, transportation and use of timber.
- In community forests, trees shall be cut properly in accordance with the agreement with the affected owners and the timber deposited where the owner indicates within the premises.
- All trees and plants (for example, medicinal plants) deemed to have economic value to individuals or communities shall be adequately compensated, according compensatory procedures established for the Project.
- Local people shall be encouraged to make use of removed vegetation such as composting in gardens.
- The application of chemicals for vegetation clearing shall be minimized. To the extent possible, non-residual chemicals shall be selected and with negligible adverse effects on human health. Herbicides use in the project shall be shown to be effective against the target vegetation species, have minimum effect on the natural environment, and be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well for personnel applying them. The use of chemicals and herbicides, if any, shall be approved by EST and comply with the Nepalese rules and regulation

- The Contractor shall replace at her/his own cost the vegetation that was damaged or destroyed outside the areas approved for clearing.

5.5.2 Landscape, Revegetation and Visual impacts

- The construction program of the project shall be executed in phases, particularly in those locations where severe or high landscape and visual impacts are expected. Construction can be programmed in sequence so that the scale of earth moving activities and area of exposed surface can be minimized.
- Revegetation shall start at the earliest opportunity. Appropriate local species of vegetation shall be used.
- Topsoil stripped from the work areas shall be used for landscaping works.
- Appropriate grass or other erosion control material (such as jute) should be planted in high embankment slopes to recover vegetable cover and protect from erosion.
- The requirement of compensatory planting shall be included in the design and project contract. A Master Landscaping Plan and requirements of ecological monitoring or survey during different stages of the project shall be prepared during the design stage which shall be implemented during construction and maintained during operation. These planning and monitoring requirements need to be integrated into the overall Reforestation Plan (Supplemental ESIA 2014).
- 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, channels with flows exceeding 1 meter/second, stockpiles and slopes adjacent to water bodies and other sensitive resources.
- Spoil heaps and excavated slopes shall be re-profiled to stable batters, and grassed to prevent erosion.
- At the highly sensitive scenery zones, the construction may be scheduled where possible at the low tourist seasons. The construction trucks shall operate at night when possible and kept cleaned and covered when shipping bulk materials.
- The construction sites shall be surrounded with fence if located at the scenery zones to avoid direct visual sights of the construction sites. Temporary fences shall be of a recessive visual appearance in both color and form.
- Random disposal of solid waste in scenery areas shall be strictly prohibited.
- The stockpiles shall be located in hidden areas, and outside of the sight from tourists.
- Spoil disposal sites, quarries and borrow sites shall avoid environmentally sensitive areas such as nature reserves, scenic spots, forests, water source protection areas, agricultural land, etc.

- Use existing roads as access road if possible to minimize the need for new access roads which lead to damage the existing land form and/or greens.

5.5.3 Site Restoration

Remedial actions which cannot be effectively carried out during construction shall be carried out on completion of the works (and before issuance of the acceptance of completion of works). Various activities to be carried out for site restoration are:

- Following the completion of the project, access roads may be turned back to the local government and if desired, used as rural roads or wood land roads. If local governments elect not to use these access roads, the land can be used for farming or plantation purposes.
- At the completion of the construction work, all construction camp facilities shall be dismantled and removed from the site and the whole site restored to a similar condition to that prior to the commencement of the works, or to a condition agreed to with the land owner.
- Construction campsite shall be grassed and trees cut replaced with saplings of similar tree species.
- All affected areas shall be landscaped and any necessary remedial works shall be undertaken without delay, including grassing and reforestation.
- In order to make the land fertile, compaction, grading, construction of drainage channels and spreading topsoil over terrains shall be carried out upon completion of the Project.
- Water courses shall be cleared of debris and drains and culverts checked for clear flow paths.
- All sites shall be cleaned of debris and all excess materials properly disposed. No foreign material generated/ deposited during construction shall remain on site.
- Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas.
- Soak pits and septic tanks shall be covered and effectively sealed off.
- Restoration, of cleared areas such as borrow pits no longer in use, disposal areas, construction roads, construction camp areas, stockpiles areas, working platforms and any areas temporarily occupied during construction of the project works shall be restored using landscaping, adequate drainage and revegetation. Restored dumping sites can then be used for farming.
- Land use for agricultural activity prior to use for construction activities shall be, as much as possible, restored to a state to allow the same agricultural activity to continue. These measures for agricultural land restoration should be incorporated into the Land Acquisition and Livelihood Restoration Plan (Supplemental ESIA 2014).

- Watercourses, which have been temporarily diverted by the construction activities, shall be restored to their former flow paths.
- Any damaged to occupied drainage, irrigation and other agricultural infrastructure shall be restored.

5.6 Construction Impact Management Plan

In order to reduce the impact of the construction activities on local communities and the environment, the Contractor shall implement the following Sub-Plans:

5.6.1 Access Roads

Access roads will be constructed at the sites. About 59 ha land will be disturbed due to construction of new road and expansion of certain roads. In order to reduce the environmental impact caused by the construction of new access roads, the Contractor shall put into place the following measures:

- All new access roads shall be approved by ESMC and EST. A road engineer has to corroborate that the proposed access road is properly designed.
- The Contractor has to present a 1:5000 scale map of the road.
- The design of the new access roads shall follow the landform and avoid alignments that require large volumes of excavation.
- The new access road shall include a drainage ditch and all unstable slopes shall include retaining walls or other appropriate structures to control erosion and landslides.
- Where the soil texture on the slopes to be filled is too loose to resist erosive forces of storm water, a weir of 0.5 m width x 0.2 m height is suggested to be constructed along the edge of the roadbed to retain storm water from running down through the soils on side slopes. In addition, a temporary drainage ditch is to be constructed along the roadbed at an interval of 50 m to divert the excessive storm water. A sedimentation pool will be provided where necessary downstream of the drainage ditch in order to remove solids in the run-off before it reaches any watercourse.
- The Contractor shall carry out stabilization and appropriate bio-engineering activities such as grass and tree plantation along the entire route.
- New access roads shall avoid areas of high scenic value, and protected and sensitive areas.
- Access roads should avoid agricultural areas where reasonable and practical.
- The Contractor shall avoid road construction on unstable slopes.
- The Contractor shall improve existing low-standard roads, which will be used for the movement of construction equipment and vehicles. Community roads also used for

this purpose shall be properly maintained, restored, rehabilitated or upgraded, including strengthening of the road surface and drainage system.

- Night construction activities near sensitive receptors such as residential areas, hospitals, rest homes, etc. shall be prohibited.
- The Contractor shall set all necessary warning signs, and speed bumps near sensitive receptors to reduce speed and increase traffic safety
- For unpaved access roads, the Contractor shall spray water 2-3 times a day during the dry season to reduce the production of dust
- If temporary bridges are needed, their design shall be reviewed by a licensed engineer and approved by ESMC and EST. These bridges can be fabricated from locally available materials, or the Contractor can use pre-fabricated bridges if available. All temporary bridges shall be removed after construction is concluded;
- Roads should be designed with the necessary wide and slope to allow the transit of equipment and machinery is made in both directions without causing any delay.
- In access roads adjacent to communities, the Contractor shall inform local communities of traffic patterns and usage and provide education materials to schools to inform children about traffic safety.
- Once the construction of the Project is finished, all access roads will be (1) given to local governments/communities; (2) decommissioned and the area recovered for use in agriculture or grassing, or re-stored to its pre-construction condition; or (3) use for maintenance of the components of the Project.

5.6.2 Erosion and Sedimentation

Site activities shall be careful managed in order to avoid soil erosion and sedimentation of downstream waterways that can impact aquatic ecosystems. In order to minimize negative impacts in the project area, the following activities shall be carried out by the Contractor:

- Erosion and sedimentation shall be controlled during the construction of the Project. Areas of the site not approved for construction activities shall be maintained in their existing conditions.
- Disturb as little ground area as possible, stabilize that area as quickly as possible, control drainage through the area, and trap sediment onsite. Erect erosion control barriers around perimeter of cuts, disposal pits, and roadways.
- Protect all areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking any other measures necessary to prevent storm water from concentrating in streams and scouring slopes, banks, etc.
- Implement terraces and other erosion control measures, where necessary to prevent soil erosion.
- As a general rule, do not machine clear (bulldozer) on slopes exceeding 35%.

- Preserve as much vegetation as possible. Preserving vegetation is beneficial in the following areas: floodplains, buffers, wetlands, stream banks, steep slopes, and other sensitive resource areas where it might be difficult to establish, install, or maintain erosion control devices.
- Conserve topsoil with its leaf litter and organic matter, and reapply this material to local disturbed areas to promote the growth of local native vegetation.
- Apply local, native grass seed and mulch to barren erosive soil areas or closed construction surfaces.
- Apply erosion control measures before the rainy season begins preferably immediately following construction. Install erosion control measures as each construction site is completed.
- Install slope breakers such as silt fences, staked hay or straw bales, or sand bags to reduce runoff velocity and divert water off the construction site. Slope breakers must 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.
- Reduce water speed and volume by increasing the number of drainage culverts and selecting proper places for culvert placement to avoid erosion effects.
- Build retaining and gabion walls to prevent scouring of river banks at strategic locations, especially upstream of the river above the weir.
- Build strong protection works such as retaining walls or gabion walls and the structures necessary to prevent scouring from rivers especially during monsoon season.
- The bank of the river especially around the tailrace outlet should be protected using inlet control structures and proper protection works.
- Install sediment control structures where needed to slow or redirect runoff and trap sediment until vegetation is established. Sediment control structures include windrows of logging slash, rock berms, sediment catchment basins, straw bales, brush fences, silt fences and silt curtains, fiber rolls, etc.
- Control water flow through construction sites or disturbed areas with ditches, berms, check structures, live grass barriers, and rock.
- Ground surface at the site offices shall be concreted paved in order to minimize soil erosion.
- Maintain and reapply erosion control measures until vegetation is successfully established.
- Spray water 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. should 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 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 to the satisfaction of EST.
- Monitor potential impacts/activation of landslides (please refer to Appendix B of the Supplemental EIA for an inventory of landslides in the Project area).

5.6.3 Earthworks, Cuts, and Fill Slopes

Earthworks, cuts, fill slopes 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.
- In order 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 should 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 to the construction.
- During the cutting, backfilling, and leveling activities, the cut material with the best mechanical properties will be used for backfilling. In the sections where the suitable excess material from excavation might be insufficient, the required volumes will be extracted from quarries previously authorized by EST.
- Any excavated cut or unsuitable material shall be disposed of in designated disposal areas as agreed to by EST.

5.6.4 Spoil disposal Sites

- Spoil disposal sites should not be located where they can cause future slides, interfere with agricultural land or any other properties, impact endangered / rare

flora, sensitive areas or cause soil from the dump to be washed into any watercourse or. Drains may need to be dug within and around the spoil disposal site.

- Spoil disposal sites shall not be located near residential areas or in unstable lands, prohibited on flood plains and shall not affect drainage and irrigation ditches.
- Spoil disposal sites shall be constructed in locations that are not susceptible to water erosion and be designed and constructed to be stable during and subsequent to construction.
- Include provisions for incorporating the most appropriate stabilization techniques for each disposal site and determine the selected spoil disposal sites do not cause unwanted surface drainage.
- A drainage ditch shall be built around the disposal site to control surface runoff.
- If the disposal site would be located near a river or water course, a retaining wall and/or interception ditch or settling ponds shall be built prior to the initiation of the construction activities to prevent the deposits from being washed away by the monsoon waters. The surface runoff shall be retained and settled first before allowed discharge into the receiving water.
- The Contractor shall use excavated materials for filling purposes in the powerhouse site and remaining quantity for filling access road and regulating poundage to minimize the spoil dumps requirement.
- Some of the spoil may be utilized for the following construction purposes: (1)Suitable rocks from the excavations can be used as aggregate; (2) Some amount of spoil materials can be used for road construction; (3) Spoil may also be used for backfilling of quarries and borrow pits, and for land reclamation.
- The construction of disposal sites and transportation of spoils at night is strictly prohibited near residential areas. The sites shall be watered for dust suppression during their operation.
- The disposal sites will 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 (also see: “Site Restoration”). The stability of the sites will be inspected and measures such as retaining walls shall be constructed as needed.
- Disposal sites close to patches of natural vegetation will be limited in size to avoid cutting vegetation and disturbing any existing wildlife.
- Access roads, if needed, conducting to the disposal areas shall be handled in the same manner as the construction of new access roads (See: “Access Roads”).

5.6.5 Stockpiles, Quarries, and Borrow Pits

The Contractor shall prepare and overall Stockpiles, Quarries and Borrow Pits Management Plan for the total works. Operation of a new borrowing area, on land, in a river, or in an existing area, shall be subject to prior approval by ESMC and the operation shall cease if so instructed by the EST.

Stockpiles, Quarries and Borrow pits shall be prohibited where they might interfere with the natural or designed drainage patterns. River locations shall be prohibited if they might undermine or damage the river banks, or carry too much fine material downstream.
Rock or gravel taken from a river shall be far enough removed to limit the depth of material removed to one-tenth of the width of the river at any one location, and not to disrupt the river flow, or damage or undermine the river banks. The Plan shall include:

- A map showing the extent of the area to be developed.
- A method statement defining the proposed working methods.
- The proposed access and haulage routes between the borrow pits and the destination for the extracted materials.
- A justification for the quantities of materials to be extracted, an estimation of the waste material to be generated and disposal details for such waste materials.
- Details of the drainage system (ditches, culverts, etc.)
- Details of the measures taken to minimize the borrow pit areas and their visual impact on the surrounding area.
- Details of the measures to be taken for the long-term rehabilitation of the borrow pit areas in order to avoid situations that could constitute a threat to health and safety and cause environmental pollution.

In general terms, the Contractor shall:

- Identify and demarcate locations for stockpiles and borrow pits, ensuring that they are 50 m away from critical areas such as steep slopes, erosion-prone soils, and areas that drain directly into sensitive water bodies. Locations of stockpiles, quarries and borrow pits shall be in non-productive land to the maximum extent possible and be approved by EST.
- Location of stockpiles, quarries, and borrow pits shall avoid sensitive areas such as nature reserves, scenic spots, forest parks, water source protection areas, woodlands, or grasslands, etc.
- Stockpiles, quarries, and borrow pits shall be located in non-productive land to the maximum extent possible, and avoid agricultural land
- Limit extraction of material to approved and demarcated borrow pits.
- Stockpile topsoil when first opening the borrow pit. After all usable borrow has been removed, the previously stockpiled topsoil should be spread back over the borrow area and graded to a smooth, uniform surface, sloped to drain. On steep slopes, benches or terraces may have to be specified to help control erosion.
- Excess overburden should be stabilized and revegetated. Where appropriate, organic debris and overburden should be spread over the disturbed site to promote revegetation. Natural revegetation is preferred to the extent practicable.

- Existing drainage channels in areas affected by the operation should be kept free of overburden and be cleaned regularly.
- The Contractor shall ensure that all borrow pits used are left in a trim and tidy condition with stable side slopes, re-establishment of vegetation, restoration of natural water courses, avoidance of flooding of the excavated areas wherever possible so no stagnant water bodies are created which could breed mosquitoes.
- When the borrow pits or the local depressions created by the construction activities cannot be refilled or reasonably drained, the Contractor shall consult with the local community to determine their preference for reuse such as fish farming or other community purposes.
- Areas affected by stockpiling shall be reinstated to the satisfaction of EST.

5.6.6 Tunnels and Underground Excavations

These specifications are applicable to all underground excavations such as the desander, settling basin at the intake structure, tunnels, the surge tank, the powerhouse etc.

- Before any underground excavation starts, the areas for disposal of excavated earth shall be selected in order to minimize the occupation of land. Excavated soil shall be used in the construction activities or dispose at the approved spoil disposal sites.
- The Contractor shall provide adequate ventilation systems and other measures to control the concentration of air pollutants within tunnels and underground excavations. Concentration of gases shall be monitor, record, and report in confine spaces (also see: “Safety Management Plan: Measures on Hazardous Gases” presented later)
- Wastewater resulting from the construction activities shall be collected in settling ponds or tanks for solids removal. Solids shall be removed from site and the supernatant reuse or discharge. Wastewater shall not be discharge into water bodies without any treatment.
- Slopes shall be protected with revegetation or retaining walls.
- The excavated materials shall be use, wherever possible, in backfilling and leveling activities.
- Workers shall be provided with the proper protective equipment such as masks against toxic gases, earmuffs, safety boots, helmets, etc. (also see: “Safety Management Plan: Construction Site Safety” presented later)
- The Contractor shall develop an emergency plan to handle unexpected accidents such as the collapse of tunnels and poisoning caused by gases in the underground excavations. The Contractor shall train staff to handle accidents. They shall also be trained in fire control, emergency call and in the rescue and transportation of injured workers to health centers or the medical facilities established for the Project.

- Training on safety and personal security shall also be provided to the tunnel workers and administration staff. This training shall be incorporated into the training plan provided by Contractors to their workers.
- The use of explosives in underground excavations shall follow the rules and regulation for the use of explosives established in Nepal (also see: “Safety Management Plan: Measures on Blasting” presented later).
- Temporary traffic regulations shall be implemented y and signs shall be posted inside the tunnels. The movement of equipment, machinery and workers within the tunnels will be directed by trained personnel.
- The Contractor shall install a temporary maintenance station that will be in charge of daily maintenance and repairs to ensure the proper functioning of the equipment and machinery, close-circuit TV, and the lighting and ventilation systems inside the tunnels and underground excavations.

5.6.7 Work in Watercourses

When crossing or working in watercourses the following measures shall be taken into consideration:

- As far as is reasonably possible, work in watercourses shall take place outside of the expected rainy season and allow sufficient time for construction processes to be effected before the rains start.
- Slopes leading to watercourses shall be hand-clearing.
- All watercourses shall be protected from direct or indirect spills of pollutants, e.g. sediment, refuse, sewage, cement, oils, fuels, chemicals, wastewater, bituminous products, etc.
- Temporary embankments shall be built to protect riverbanks and ponds from erosion.
- Fallen trees, debris or soil inadvertently deposited within the high water mark of any watercourse shall be removed to reduce damage to any aquatic habitat.
- Drip trays shall be used for all pumps, generators, etc. in order to prevent water contamination as a result of fuel spills or leaks.
- In the event of a spill, the Contractor shall take prompt action to clear polluted areas and prevent spreading of the pollutants. The Contractor shall be liable to arrange for professional service providers to clear affected areas, if required.
- Any work requiring the fording of watercourses by machinery and vehicles shall be undertaken at slow speed and with clean vehicles (no leaks, etc.) and along a single track.
- The Contractor shall select appropriate equipment and vehicle crossing methods. Such methods shall be approved by EST.
- The Contractor shall use existing stream and river crossings as much as possible if the crossings can stand the weight of machinery and equipment.

- The Contractor shall build temporary stream crossings such as fords, culverts, PVC and HDPE pipe bundles, and portable or on-site constructed bridges when existing crossings cannot be used. Temporary crossings are required to provide safe, erosion-free access across a stream for construction equipment. Properly designed, installed, and maintained temporary stream crossings can greatly reduce costs and help meet concerns of regulating agencies.
- When vehicle crossing is no longer required, the Contractor shall remove stream crossing structures, restore and stabilize stream beads, banks and other disturbed areas.

5.6.8 Work in the proximity of Community Springs/Water Sources

A number of springs have been identified along the tunnel alignment (please refer to Appendix B of the Supplemental EIA for a detail inventory of these water sources). These springs are used by local communities for drinking water, irrigation and as water supply for livestock and wildlife. The following measures should be taken into consideration to minimize potential impacts on these water sources:

- Identify the location of these springs (coordinates provided in Appendix B) and flag it;
- Minimize as much as possible earth works and any other disturbance in the area around the springs and avoid sedimentation;
- Monitor and document water yield before, during and after construction to detect impacts;
- Notify in advance and coordinate with the respective communities if any impact or temporal restriction on the access to the springs is expected;
- Enable a grievance mechanism that allows communities to express their concerns/claims in relation to the local water supplies.

5.6.9 Emissions and Dust

The Contractor shall propose methods and actions to control dust resulting from construction related activities, including excavation, drilling, blasting, use of heavy equipment, quarry sites, crushing and concrete batching plants, earthworks including road construction, embankment and channel construction, haulage of materials and construction work camps. In particular the Contractor shall:

- Minimize production of dust and particulate materials at all times, to avoid impacts on surrounding communities, and especially to vulnerable people (children, elders).
- Phase removal of vegetation to prevent large areas from becoming exposed to wind.
- Place dust screens around construction areas, paying particular attention to areas close to local communities.

- Spray water as needed on dirt roads, cut areas and soil stockpiles or fill material. The water spray operation shall be carried out in dry and windy days, at least twice a day (morning and afternoon). The frequency of water spray near local communities shall be increased as may be needed.
- Pave access roads with gravel in the sections which near the communities and other sensitive receptors to reduce generation of air-borne dust.
- Provide adequate ventilation system and other measures to control concentration of air pollutants within tunnels.
- Construction plant/vehicles that generate serious air pollution and those which are poorly maintained shall not be allowed.
- Concrete batching plants, asphalt plants, mixing stations, crushing plants shall be operated with approved fitted dust control devices.
- The truck transporting powder materials, such as cement, sand and lime, shall be covered entirely with clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle. Overflow of material shall be avoided. All the stockpiled materials and sloped surface shall be covered with impervious sheeting.
- Maintain linking roads in good conditions to reduce dust and noise.
- Not use any vehicles, either on or off road with grossly excessive noise or exhaust emissions, producing bad odors, or overloaded.
- The exhaust gases from construction machinery and vehicles are accepted. However, the engines shall be inspected and adjusted as required to minimize pollution levels. Exhaust fumes shall comply with relevant Nepalese standards on fumes.
- The burning of waste and/or garbage shall be done in designated areas approved by EST and at a distance of at least 5 km from nearby communities. Burning of any material which produces toxic gases shall not be allowed.

5.6.10 Noise and Vibration

To minimize noise the Contractor shall:

- Maintain all construction-related traffic at or below 30 km/hr on streets within 200 m of the site.
- Maintain all on-site vehicle speeds at or below 30 km/hr.
- To the extent possible, maintain noise levels associated with all machinery and equipment at or below 90 db.
- In noise sensitive areas (including residential neighborhoods, hospitals, rest homes, schools, etc.) more strict measures may need to be implemented to prevent undesirable noise levels.
- Apply proper measures to minimize disruptions from vibration or noise coming from construction activities.

- Design a transportation schedule for the construction materials to minimize the adverse impact on residents, as well as the traffic on the existing roads. The transportation vehicles shall be required to slow down and banned from horning when passing sensitive areas. Transportation during peak hours should be minimized.
- Maintain the construction equipment in its best operating conditions and lowest noise levels possible.
- Use temporary noise barriers to minimize the noise caused by the construction equipment.
- Provide ear pieces to workers who must work with highly noisy machines such as piling, explosion, mixing, etc., for noise control and workers protection.
- The construction team shall be equipped with portable detecting devices to monitor the noise level at the sensitive receptors.
- Materials leaving the construction site shall be transported during non-peak hours in order to minimize traffic noise due to the increase in traffic volume.
- Use of properly designed silencers, mufflers, acoustically dampened panels and acoustic sheds or shields, etc. Mufflers and other noise control devices shall be repaired or replaced if defective. Use of electric-powered equipment when applicable instead of diesel-powered or pneumatic-powered equipment.
- Equipment known to emit a strong noise in one direction, shall when possible, 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.

5.6.11 Nighttime Construction Noise Mitigation

Although in general, nighttime construction shall be banned near sensitive receptors, some construction may still occur for technical and other reasons. Because night time construction, if occurred near local communities, would result in particularly significant impacts to residents and other sensitive receptors, besides the above mitigation measures, the following special measures shall be taken during the construction phase:

- People living within potentially impacted areas shall be notified ahead of time of the length and noise intensity of the proposed nighttime construction. Residents shall be informed on why the night construction is necessary and they shall be provided with the mitigation measures that are going to be implemented to obtain their understanding. These residents shall be allowed to express their concerns, difficulties, and suggestions for noise control prior to the commencement of night time construction. These concerns shall be addressed and suggestions adopted where appropriate.

- Concreted batching plants, power generated and other stationary equipment shall be carefully placed as far away from local communities to reduce noise impacts from these machines. Wherever possible, municipal power supply shall be utilized in construction including night time construction as diesel generators are extremely noisy and avoiding their use is the best mitigation possible.
- Equipment with lower noise levels shall be used for concrete pouring operations, which may require 24 hours non-stop operation.
- Temporary noise barriers at the appropriate places shall be erected to reduce the noise impacts at night time.
- If necessary, the Contractor shall arrange temporary accommodations away from the impacted area for the extremely vulnerable people who need good night time rest, such as persons with illness and the elderly;
- Notification boards shall be erected at all construction sites providing information about the Project, as well as contact information about the site managers, environmental staff, telephone numbers and other contact information so that any affected people can have the channel to voice their concerns and suggestions.
- Supervision personnel shall be assigned to the construction sites during the period of night time construction to ensure that the above measures are taken and to respond to any un-anticipated impacts by implementing any necessary mitigation measures.

5.7 Waste Management Plan

During the construction stage, the Contractor shall prepare a Waste Management Plan before commencement of project works. The Plan shall include the following Sub-Plans:

5.7.1 Site Drainage System

This Sub-Plan shall contain:

- A review of the preliminary site drainage design prepared during the detailed design.
- An update of the preliminary design based on the actual construction program and the site specific conditions (e.g. the geographical conditions, location of slopes and the nature of construction work).
- A detailed implementation program, approved by ESMC and EST of the proposed drainage system.
- Detailed design including drawings, location maps, specifications of drainage collection channels, pumping systems, temporary water pipes, and wastewater treatment facilities.
- Proposed discharge locations and treatment standards.

- As part of the design of the site drainage system, surface runoff within the construction site shall be diverted in order to avoid flushing away soil material and the water is treated by device such as sediment trap before discharge.
- Storm water and wastewater systems shall be separated. The rainwater will be collected through a ditch and discharge into any adjacent body of water. The maximum flow velocity for a rainwater ditch shall be determined in accordance with flood prevention measures.

5.7.2 Wastewater

- The Contractor shall be responsible for compliance with the relevant Nepalese legislation relevant to wastewater discharges into watercourses.
- Sewers have to be designed and installed by the Contractor in accordance with the national design code of Nepal.
- The Contractor shall submit a method statement to the EST detailing how wastewater would be collected from all wastewater generating areas, as well as storage and disposal methods. If the Contractor intends to carry out any on-site wastewater treatment, this should also be included.
- Water from kitchens, showers, laboratories, sinks, etc. shall be discharged into a conservancy tank for removal from the site, or pass through an oil screener before discharge.
- Wastewater from mixing stations, concrete batching plants, crushing plants, warehouses, material washing and tunnel construction shall be collected into settling tanks and dispose according to national rules and regulations.
- Runoff from fuel depots / workshops / machinery washing areas, concrete batching plants, mixing station, etc., shall be collected into a settling tank and disposed of at a site approved by the EST.
- Domestic sewage from site office and toilets shall either be collected by a licensed waste collector or treated by on-site treatment facilities. Discharge of treated wastewater must comply with the discharge limit according to Nepalese wastewater discharge standards.
- Wastewater shall not be discharge into water bodies without treatment.
- Chemical toilets can be provided on site for construction workers. Domestic sewage collected from the site office and chemical toilets shall be cleaned up on regular basis. Only licensed waste collectors shall be employed for this disposal.

5.7.3 Solid waste

Disposal of Construction Debris

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 EST. (see “Construction Impact Management Plan: Spoil disposal Sites”)
- Debris generated due to the dismantling of existing structures shall be suitably reused, to the extent feasible, in the proposed construction program (e.g. as fill materials for embankments).
- Trash and debris shall not be buried within fill or backfill areas.
- All arrangements for transportation during construction including provision, maintenance, dismantling and clearing debris, where necessary, will be considered incidental to the work and should be planned and implemented by the contractor as approved and directed by the ESMC and the EST.
- Assess risk of any potential impact regarding leaching of spoil material on surface water.
- Once the job is completed, all construction -generated debris should be removed from the site (also see: “Site Restoration”).

Domestic and Solid Waste

- The Contractor shall submit a method statement detailing a solid waste control system (storage, provision of bins, site clean-up schedule, bin clean-out schedule, etc.) to the ESMC and the EST for approval.
- The Contractor shall ensure that all facilities are maintained in a neat and tidy condition and the site shall be kept free of litter.
- 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.
- Solid waste may be temporarily stored on site in a designated area approved by the EST. The storage area shall have a cover to avoid direct contact with surface runoff be fenced off to prevent wind-blown litter. Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof.
- The Contractor shall identify and demarcate disposal areas clearly indicating the specific materials that can be deposited in each.
- 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 such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, paper, empty cement bags and containers, glass, wood, junk etc., shall be collected and separated on-site from other waste sources. Collected recyclable material shall be re-used or sold to a waste collector for recycling.
- The Contractors will be required to separate construction waste from domestic waste. Where possible, the construction waste will be recycled for land filling. If

possible, the domestic waste shall be transported off site-at least once a week- for disposal in covered containers or trucks, by an environmental sanitary authority or by a licensed waste collector.

- In remote locations where collection of waste is not practical, the Contractors shall be required to bury the solid waste in the designated landfill areas approved by the EST. Organic waste and kitchen wastes shall be disposed into soak pits.
- Burning solid waste in open air conditions is strictly prohibited.
- Random disposal of solid waste in scenic areas shall be strictly prohibited.

5.7.4 Hazardous and Chemical Waste

- All hazardous and chemical waste (including bitumen, disposable lubricating oil, mineral oil, organic solvent, acid and alkali, oil paint etc.) shall be shall be properly stored, handled and disposed of in accordance with the environmental standard, regulation and management policies of Nepal, and the producers of the chemicals.
- Only authorized personnel shall handle hazardous and chemical waste.
- The Contractor shall inform all employees of the emergency measures to be taken in case of spills or accidents due to improper use of these substances (also see: “Environmental Emergency Procedures” presented later)
- Hazardous waste shall be stored separately from other waste and warning signs shall be posted around the site.
- The Contractor shall provide disposal certificates to the EST.
- The removal of asbestos-containing materials or other toxic substances shall be performed and disposed of by trained workers.
- Used oil and grease shall be removed from site and sold to an approved used oil recycling company.
- Under no circumstances shall the spoiling of tar or bituminous products, or any other chemical or hazardous waste be allowed on the site, over embankments, in borrow pits or any burying, water bodies, agricultural land, or sensitive areas.
- Unused or rejected tar or bituminous products shall be returned to the supplier’s production plant.
- Used oil, lubricants, cleaning materials, etc. 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.
- Transportation of hazardous waste off the site should be done in cooperation with an approved and authorized partner. All this material shall be regularly collected, stored and transported to disposal or reuse in accordance to the regulations of Nepal.

5.8 Material Handling Use and Storage Management Plan

Environmental considerations shall be taken into account in the handling, used and location of any material storage areas.

5.8.1 Transportation

- The Contractor shall ensure that all suppliers and their delivery drivers are aware of procedures and restrictions (e.g. restricted areas).
- Material shall be appropriately secured to ensure safe passage between destinations during transportation.
- Loads shall have appropriate cover to prevent them spilling from the vehicle during transit.
- The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to property secure transported materials.

5.8.2 Explosives

- The explosives storage building shall be a dry, well ventilated facility. The building shall be constructed of materials resistant to firearms, fire and atmospheric phenomena. It should have a metal door with a safety lock, lightning protection, warning signs and strict surveillance.
- The explosive storage building shall be located away from other buildings and high traffic roads (also see: “Workers’ Camps and Work Sites Management Plan: Site Selection”)
- Only qualified and authorized personnel shall handle explosives.
- Explosives and detonators shall be of top 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. The explosives damaged by handling or transportation shall not be used and shall be disposed of in accordance with established procedures. The boxes of explosives and blasting caps must be visibly labeled with signs indicating their contents and instructions on how to care and handle them.
- For the transportation, storage, process, package on site, connect, blasting and the disposal of the blasting, the procedure shall be in accordance with the Nepalese regulations on blasting.

5.8.3 Hazardous and Chemical Substances

The Contractor shall provide a method statement detailing the hazardous substances / material that are to be used during construction, as well as the storage, handling, and

disposal procedures for each substance / material and emergency procedures in the event of misuse or spillage that might negatively affect the environment. In general terms, the following activities shall be carried out:

- Make the Hazardous Waste Management Plan available to all persons involved in operations and transport activities.
- All hazardous material / substances (e.g. petrochemicals, oils, etc.) shall be stored on site only under controlled conditions.
- All hazardous material / substances shall be stored in a secured, appointed area that is fenced and has restricted entry. All storage shall take place using suitable containers.
- Hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or containment structure.
- Areas for the storage of fuel or lubricants and for a maintenance workshop shall be fenced and have a compacted/impervious floor to prevent the escape of accidental spillage of fuel and or lubricants from the site. Surface water drainage from fenced areas shall be discharged through purpose designed and constructed oil traps. Empty fuel or oil drums may not be stored on site.
- Fuel shall be stored in a steel tank supplied and maintained by the fuel suppliers. The tank shall be located in a secure, demarcated area. It can also be stored in overhead tanks of 5,000 liters maximum.
- Herbicides shall be appropriately packaged, labeled, handled, stored, disposed of, and applied according to national standards.
- For more information on the location of storage facilities for hazardous materials, chemicals, fuels, lubricating oils, pesticides, and herbicides see: “Workers’ Camps and Work Sites Management Plan: Site Selection”.

5.8.4 Cement, Concrete Batching, and Surfacing Materials

- Concrete mixing shall not be allowed directly on the ground. The mixing shall take place on impermeable surfaces such as geotextiles or metal platforms.
- In case of spillage of the mix, the area must be cleaned immediately. The waste shall be collected and deposited in approved sites and assigned to it. It is prohibited to place these mixtures in water courses, cultivated land, parks, protected areas, etc.
- All runoff from batching areas shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of at a site approved by the EST.
- Unused cement bags shall be stored out of the rain where runoff won’t affect it.
- Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent windblown cement dust and water contamination. Used cement bags shall not be used for any other purpose and shall be disposed of on a regular basis via the solid waste management system (see: “Waste Management Plan”).

- All excess concrete shall be removed from site on completion of concrete works and disposed of. Washing of the excess into the ground is not allowed. All excess aggregate shall also be removed.
- Over spray of bitumen products outside of the road surface and onto roadside vegetation shall be prevented using appropriate methods.
- When heating of bitumen products, the Contractor shall take appropriate fire control measures; Stone chip / gravel excess shall not be left on road / paved area verges. This shall be swept /raked into piles and removed to an approved disposal site.
- Water quality from runoff from any fresh bitumen surfaces shall be monitored by EST and remedial actions taken where necessary.

5.9 Maintenance Management Plan

5.9.1 Maintenance during Construction

The Contractor shall carry out the following activities:

- Establish and enforce daily site clean-up procedures, including maintenance of adequate disposal facilities for debris.
- Collect construction, demolition, clearing, grubbing debris, and other trash weekly for disposal off–site. No on-site burning shall be permitted.
- Maintain silt fence and other temporary erosion and sediment controls in working order throughout the project.
- Excess sediment behind silt fences and Bio Rolls shall be removed and properly disposed of when sediments reach one-third the height of the structure.
- Construction entrances/exits shall be maintained daily.
- Remove all remaining temporary and accumulated silt fences 30 days after site has undergone final stabilization.
- In the event any debris or silt from the sites is deposited on adjacent land, the Contractor shall immediately remove such, debris or silt and restore the affected area to its original state to the satisfaction of the EST.

5.9.2 Maintenance of Construction Equipment

The Contractor shall:

- Identify and demarcate equipment maintenance areas (50m from rivers, streams, lakes or wetlands). Fuel storage shall be located in proper areas approved by EST.
- Ensure that all instruments, machines, and construction equipment meet quality standards before they are put into use.
- The equipment and machinery used for earthmoving activities will be in very good operating conditions, and will be periodically revised for controlling emissions and

avoiding possible mechanicals faults during operation that could lead to oil, lubricant, or fuel leaks.

- Ensure that all equipment maintenance activities, including oil changes, are conducted within demarcated maintenance areas.
- Never dispose spent oils on the ground, in water courses, drainage canals or in sewer systems.
- All spills and collected petroleum products shall be disposed of in accordance with standard environmental procedures/guidelines. Fuel storage and refilling areas shall be located at least 50m from all cross drainage structures and important water bodies or as directed by the EST.
- Vehicles and other transport equipment may only be maintained and washed at sites having impermeable protective layers and collection system for oils, lubricants, detergents, solvents. The use of solvents and detergents should be avoided to a minimum.

5.10Safety Management Plan

5.10.1 Construction Site Safety

The Contractor's responsibilities include the protection of every person and nearby property from construction accidents. The Contractor shall be responsible for complying with all national and local safety requirements and any other measures necessary to avoid accidents, including the following:

- Conduct safety training for construction workers prior to start working.
- Provide construction workers with sufficient personal protective equipment and clothing such as goggles, gloves, respirators, dust masks, hard hats, earmuffs, steel-toed boots, etc., and enforce their use.
- During heavy rains, accidents, or emergencies of any kind, suspend all work.
- Brace electrical and mechanical equipment to withstand seismic events during the construction.
- Conduct sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable.
- Establish safe sight distance in both construction areas and construction camp sites.
- Limit the speed of vehicles moving within the construction site;
- Place signs around the construction areas to facilitate traffic movement, provide directions to various components of the works, and provide safety advice and warning.
- Provide Material Safety Data Sheets for each chemical present on the worksite.
- Require that all workers read, or are read, all Material Safety Data Sheets. Clearly explain the risks to them and their partners, especially when pregnant or planning to

start a family. Encourage workers to share the information with their physicians, when relevant.

- Ensure that the removal of asbestos-containing materials or other toxic substances be performed and disposed of by trained workers.
- Provide Seminars on safety issues for local inhabitants, particularly school students.
- Install warning signs and fence high-risk areas such deep excavations, or blasting areas to control public access.
- Provide lighting at night in roads near constructions sites, if these routes are used regularly by locals.

5.10.2 Measures on Blasting

- Before blasting is carried out, a detailed survey shall be conducted at nearby communities to evaluate the degree of impacts due to the blasting activity (e.g. possible damage to structures or infrastructure due to vibration, effects on animals, local residents, etc.). No blasting shall be allowed during nighttime unless prior approval is obtained from the government authority and the EST.
- The Contractor shall take necessary precautions to prevent damage to special features and the general environment.
- Only trained personnel on blasting operations shall carry out the procedure.
- The Contractor shall notify any occupants of surrounding land at least one week prior to blasting activity and shall address any concerns that they may have. People shall be at least 200 m away from the blasting point.
- The blasting event shall be announced with sirens, or other devices to allow the warning to be heard at least 1 km. Before the detonation takes place, the Contractor or his workers shall check that there are no people inside the controlled area.
- Prior to a blasting event, water shall be sprayed on the surface of the blast area to increase its moisture content, wire mesh gunny sacks and 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 under adverse weather conditions.
- 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.
- The Contractor shall repair at her/his own expense any environmental damage caused by blasting / drilling to the satisfaction of the ESMC.

5.10.3 Fire control

- The Contractor shall submit a fire control and fire emergency method statement to ESMC and EST for approval. The method statement shall detail the procedures to be followed in the event of fire.
- The contractor shall take all reasonable steps to avoid increasing the risk of fire through activities on site.
- The contractor shall ensure that basic fire-fighting equipment is available at all camp areas and facilities.
- The contractor shall appoint a fire officer who shall be responsible for ensuring immediate and appropriate action in the event of a fire.
- The contractor shall ensure that all site personnel are aware of the procedure to be followed in the event of a fire. If needed, drills will be conducted to prepare workers in case of an emergency.
- Any work that requires the use of fire may only take place at a designated area approved by the EST and must be supervised at all times. Fire-fighting equipment shall be available.

5.10.4 Measures on Hazardous Gases

- The Contractor shall establish a plan to guarantee the safety of all personnel working in tunnels and underground excavations.
- If there is hazardous gas (such as coal gas) in the tunnels or underground excavations, all construction activities must stop immediately and construction workers shall withdraw from the site immediately. The Contactor must take corrective action and the construction must not re-start until there is no longer a danger.
- The Contractor shall monitor, record, and report the situation of the hazardous gas at the construction site to make sure that the hazardous gas emission has not exceeded the established standards.
- The Contractor shall install an on-line real-time gas monitoring system including analysis equipment, a security light and an alarm system to provide visual and auditory alerts when elevated concentration of gases is detected.

5.10.5 Traffic Management

The Contractor shall:

- Estimate maximum concentration of traffic (number of vehicles/hour).
- Make sure construction vehicles comply with speed limits.
- Use selected routes to the project site, as agreed with the ESMC, and appropriately sized vehicles suitable to the class of roads in the area, and restrict loads to prevent damage to local roads and bridges used for transportation purposes.

- Maintain adequate traffic control measures throughout the duration of the construction activities and such measures shall be subject to prior approval of the EST.
- Carefully and clearly mark pedestrian-safe access routes.
- Promote and disseminate traffic safety information to local residents.
- If school children are in the vicinity, include traffic safety personnel to direct traffic during school hours.
- Ensure traffic safety at intersections, especially near sensitive areas (schools, markets, hospitals, and historical, cultural and religious places).
- Maintain a supply for traffic signs (including paint, easel, sign material, etc.), road marking, and guard rails to maintain pedestrian safety during construction.
- Use signs and flagmen for traffic control.
- Be held responsible for any damage caused to local roads and bridges due to the transportation of excessive loads, and be required to repair such damage to the approval of the ESMC.

5.11 Environmental Emergency Procedures

Environmental emergency procedures relate primarily to the event of accidental leaks, spills, emissions and other unforeseen impacts or issues. By definition, the nature of such emergencies cannot be known. Therefore, the Contractor shall respond on a case-by-case basis to such emergencies and will initiate event-specific measures in terms of notifications and reactions.

In the event that accidental leakage or spillage of diesel/chemicals/chemical wastes takes place, standard response procedures will be followed immediately by the Contractor such as:

- The person who has been identified the leakage/spillage will immediately check if anyone is injured and then inform the SEO and EST.
- The Contractor shall ensure any injured persons are treated and assess what has spilled/leaked.
- Whenever the accidents / incidents generate serious environmental pollution or potential risks resulting in serious environmental pollution problems (eg. spillage / leakage of toxic or chemicals, large scale spillage / leakage, or spillage / leakage into the nearby water bodies which are used for irrigation / portable water), the SEO shall immediately inform the EST .
- In such cases, the Contractor will take immediate action to stop the spillage / leakage and divert the spilled / leaked liquid to a nearby non-sensitive area.
- The Contractor will arrange maintenance staff with appropriate protective clothing to clean up the chemicals/chemical waste. This may be achieved through soaking 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 chemicals must not be flushed to local surface drainage systems. Instead, proper clean-up and disposal procedures shall be carried out as described above.
- Depending on the nature and extent of the chemical spill, evacuation of the activity site may be necessary.
- The Contractor shall prepare a report explaining the reasons for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective actions. The incident report shall be submitted to the EST for review and keep in the records.
- Workers shall receive training so that they are fully aware of the various possible emergency situations in construction activities and the relevant emergency response procedures, as well as the danger and potential damages caused by the emergency to the environment and the people.

5.12 Physical Cultural Property Chance-Finds Procedures

According to the Environmental Impact Assessment (EIA) Report[4], historical and archeological sites as well as temples are absent in the affected village development committees (VDCs). Only a museum and two Ghumpas are reported in the Project's area of influence. However, the Contractor shall to put into place the following measures in case sites or artifacts with archeological or historical value are discovered during the Project construction activities:

- Workers shall report the findings to the Contractors, SEO and EST immediately.
- Construction activities shall stop immediately.
- The Contractor shall notify the ESMC and local or national relevant authorities (within 24 hours or less).
- The SEO or EST shall delineate the discovered site or area which shall be maintained unchanged.
- In cases of removable antiquities or sensitive remains, the site shall be secured to prevent any damage or loss of removable objects and a night guard shall be arranged until the responsible local authorities take charge.
- Relevant local or national authorities shall arrive to the site within 48 hours and shall be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. The job of these authorities is: (i) describe the artifact or historical remain; (ii) define the scale of the site/object; (iii) perform a preliminary

[4] Upper Trishuli-I Hydropower Project 216 MW. Environmental Impact Assessment (EIA) Report, November 2011. Section 4.17 "Cultural Environment", page 178.

evaluation; (v) set up a plan to protect and handle the discovery; and, (vi) determine the significance of the discovery. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values.

- Decisions on how to handle the finding shall be taken by the responsible authorities. This could include conservation, preservation, restoration and salvage.
- If the cultural sites and/or relics are of high value and site preservation is recommended by the professionals and required by the relevant local or national authority, the Project's Proponent will need to make necessary design changes to accommodate the request and preserve the site.
- Decisions concerning the management of the finding shall be communicated in writing by relevant authorities to the Project's Proponent.
- Construction works could resume only after permission is granted from the responsible local authorities concerning safeguard of the cultural resource.

5.13 Ecological Management Plan

An Ecological Management Plan is required to minimize and mitigate impacts on local fauna and vegetation during construction, as well as potential impacts on the access and use of agricultural and grassland areas. This Plan, to be developed by the Contractor and approved by the PMO's ESMC, needs to be aligned with the overall Biodiversity and Wildlife Management Plan as proposed in the Supplemental ESIA (2014). This overall plan will be implemented by the Proponent throughout the life of the Project in order to manage impacts on biodiversity and terrestrial habitats issues within the Project's area of influence (outside of the Langtang National Park).

Sufficient training on ecological protection, wildlife and biodiversity, and mitigation measures shall be provided to construction workers and site management staff. Penalties shall be imposed to people who violate the clauses of wildlife and flora protection.

An evaluation program shall be established to assess and evaluate the proposed mitigation measures and to propose new mitigation measures if inadequacy is identified.

5.13.1 Protection of Natural Vegetation

- Clean construction equipment brought in from outside the project to minimize the risk of introducing new or exotic weeds.
- The extent of site clearance formation and removal of vegetation during the beginning of the project shall be controlled through careful design and site selection to minimize the amount of plants/ animals affected by the project. Protected areas,

key sensitive locations and areas for rare/endangered species shall be avoided (also see: “Clearing, Revegetation and Restoration Management Plan”)

- Erect fences along the boundary of construction sites before the commencement of works to prevent tipping, vehicle movements, and encroachment of personnel into adjacent areas, particularly streams, forest, and other ecologically sensitive location.
- Regularly check the work site boundaries to ensure that they are not exceeded and that no damage occurs to surrounding areas.
- Clearing of natural vegetation shall be kept to a minimum
- The removal, damage and disturbance of natural vegetation outside the approved areas shall be prohibited.
- Be responsible for informing all employees about the need to prevent any harmful effects on natural vegetation on or around the construction site as a result of their activities.
- Regularly check the work site boundaries to ensure that they are not exceeded and that no damage occurs to surrounding areas
- The use of herbicides shall be approved by EST.
- Prohibit and prevent open fires during construction and provide temporary firefighting equipment in the work areas, particularly close to forest areas.
- Forest fire should be strictly checked during dry seasons

5.13.2 Protection of Fauna

- Schedule, whenever practical, the construction activities in such a way that they do not interfere or coincide with critical moments in the seasonal habits of species, such as periods of mating, nesting, spawning, breeding, etc.
- Demarcate natural habitats for sensitive, rare, threatened and/or endangered species before the commencement of construction activities.
- The Contractor shall ensure that no hunting, trapping, shooting, poisoning or otherwise disturbance of any fauna takes place. The feeding of any wild animals as well as fishing shall be prohibited (see also: “Workforce Management Plan: Prohibitions”).
- Where required, animal crossings shall be constructed to assist the migration of animals.
- No-horn signs and movement of wild animal’s signs should be installed on locations where wild animal movement is frequently high.
- The use of pesticides shall be approved by the EST.
- No domestic pets or livestock shall be permitted on site.

5.13.3 Agricultural Lands and Grasslands

- The Contractor shall establish a work program so that the construction activities do not interfere with irrigation of cultivated lands or land use for grazing.
- It the construction activities must be carried out during the irrigation season, the Contractor shall provide for the construction of temporary irrigation canals, water derivation gates, and the various structures that are required by the affected property owners.
- The Contractor shall provide reasonable access to landowners across construction areas during all phases of project construction to minimize disruption to normal movements of farm equipment and animals.
- The Contractor shall confine all construction activities to construction sites, designated access roads and ancillary sites.
- Work in agricultural areas shall be performed preferably during the winter months and when soils are not saturated to reduce the potential for soil compaction and erosion.
- The Contractor shall maintain uninterrupted access of cattle to grasslands.
- Existing fences to restrict movement of livestock shall be kept in good condition and gates must remain closed and locked.
- Damaged wires and fences shall be repaired to the satisfaction of affected property owners after the completion of the works.
- If applicable and as necessary, temporary fences, gates, and cattle guards should be installed to control and minimize disturbance to livestock during project construction.
- If compaction has occurred, affected soils can be chisel plowed as needed to break up compacted layers.

Annex 1: Project Site Maps

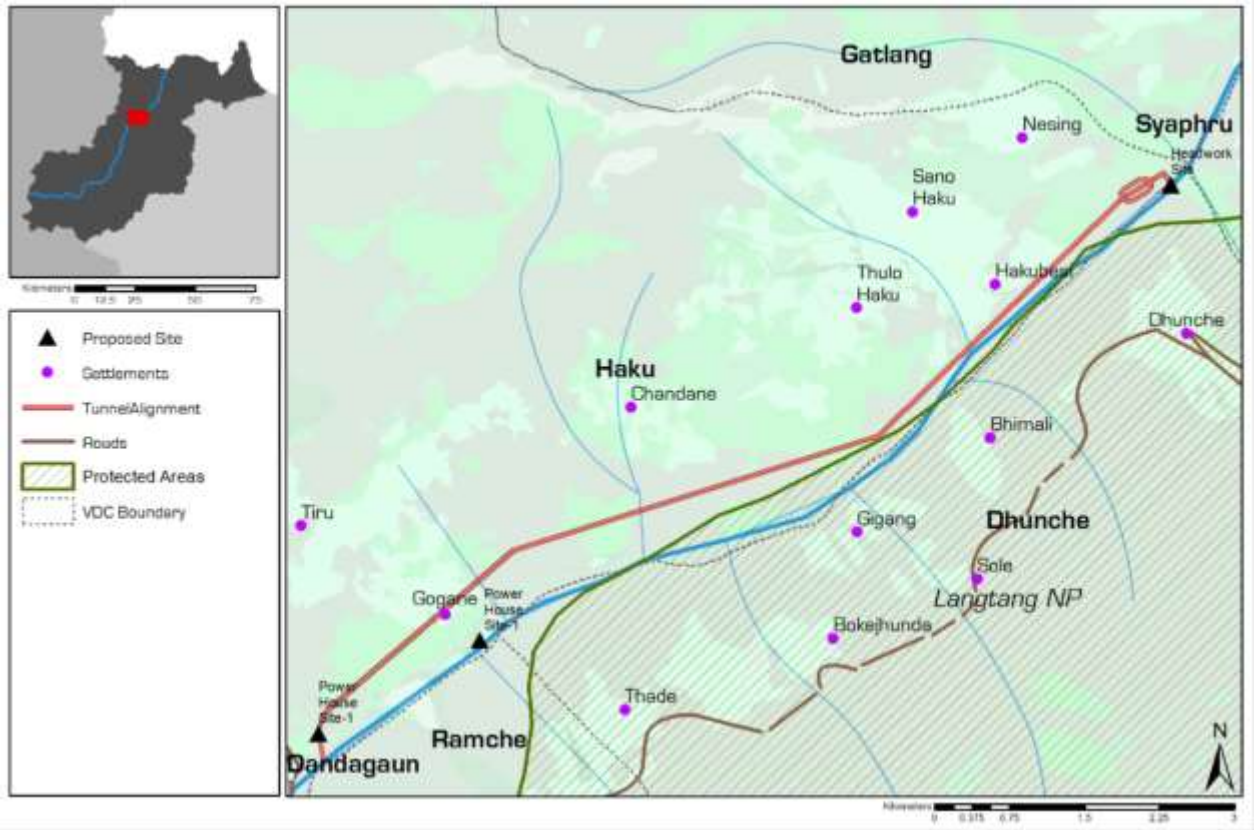

Figure 2: Main infrastructure elements and administrative boundaries at the Project Site

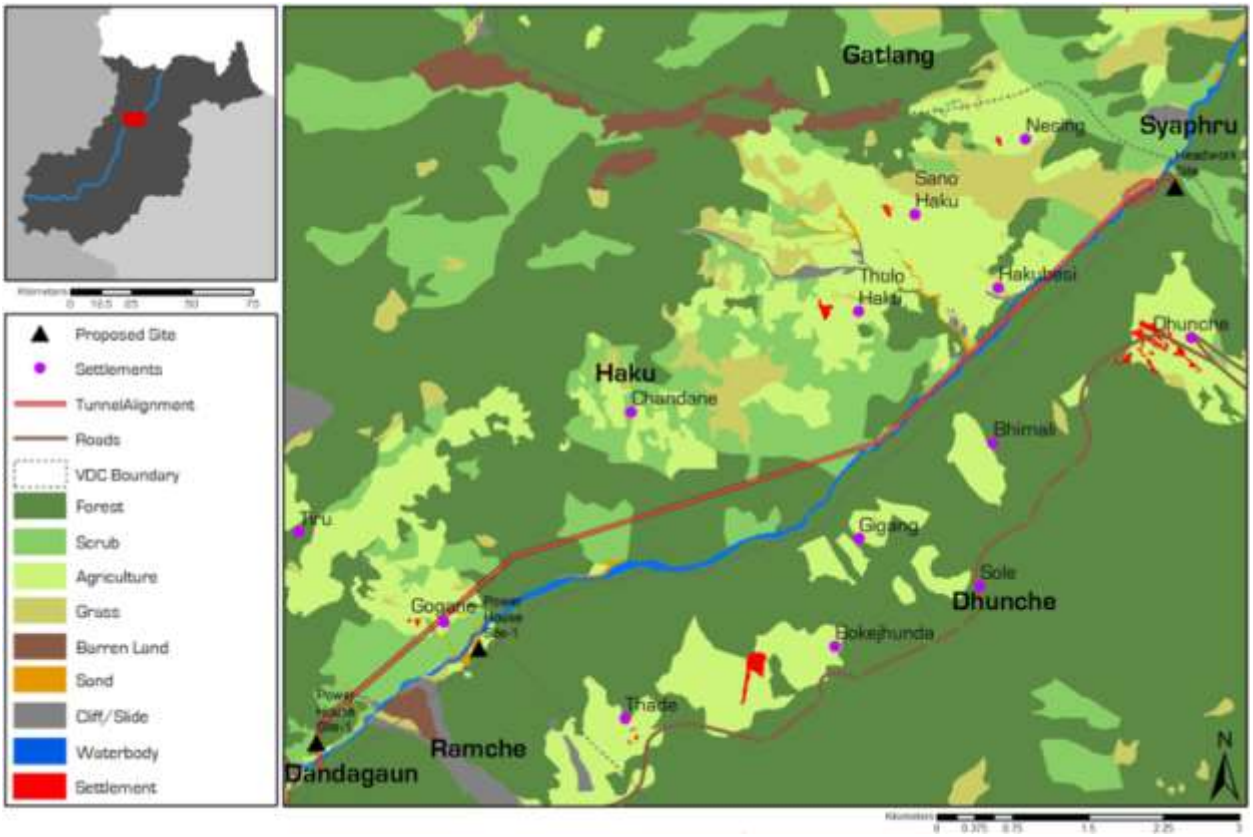

Figure 3: Land uses at the Project Site

Appendix F: Final Report