

Initial Environmental Examination

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NEP: Urban Water Supply and Sanitation (Sector)
Project – Ilam Water Supply and Sanitation
Subproject

Package No. W-05

CURRENCY EQUIVALENTS

(as of 2 July 2018)

Currency unit - Nepalese rupee (NRe)
\$1.00 = NRs 109.821
NRe1.00 = \$ 0.009

ABBREVIATIONS

| | |
|--------|--|
| ADB | – Asian Development Bank |
| BDS | – Bulk Distribution System |
| CSA | – concerned sector agency |
| DMA | – district metered area |
| DPH | – dosing pump house |
| DSMC | – design, supervision and management consultant |
| DRTAC | – design review and technical audit consultant |
| DWSS | – Department of Water Supply and Sewerage |
| EARF | – environmental assessment and review framework |
| EIA | – environmental impact assessment |
| EMP | – environmental management plan |
| EMR | – environmental monitoring report |
| EPA | – Environment Protection Act |
| EPR | – Environment Protection Rules, 2054 (1997) (and amendments) |
| ESS | – environmental safeguard specialist |
| ESA | – environmental safeguard assistant |
| GRC | – grievance redress committee |
| GRM | – grievance redress mechanism |
| ICG | – implementation core group |
| IEE | – initial environmental examination |
| NDWQS | – National Drinking Water Quality Standard |
| O&M | – operation and maintenance |
| PMO | – project management office |
| RCC | – reinforce cement concrete |
| RPMO | – regional project management office |
| ROW | – Right-of-way |
| REA | – rapid environmental assessment |
| RVT | – reservoir tank |
| SEAM-N | – Strengthening of Environmental Administration and Management at the Local Level in Nepal |
| SEMP | – site-specific environmental management plan |
| SPS | – Safeguard Policy Statement |
| UWSSP | – Urban Water Supply and Sanitation (Sector) Project |
| WTP | – water treatment plant |
| WSSDO | – Water Supply and Sanitation Divisional Office |
| WUA | – water users' association |
| WUSC | – water users' and sanitation committee |

WEIGHTS AND MEASURES

| | | |
|----------------|---|----------------------|
| amsl | – | above mean sea level |
| m ³ | – | cubic meter |
| dBA | – | decibel audible |

| | | |
|--------------------|---|--------------------------------|
| °C | – | degree Celsius |
| ha | – | hectare |
| km | – | kilometer |
| kph | – | kilometer per hour |
| kg/cm ² | – | kilogram per square centimeter |
| lps | – | liters per second |
| m | – | meter |
| mg/l | – | milligram per liter |
| mm | – | millimeter |
| % | – | percent |
| m ² | – | square meter |

NOTE

In this report, "\$" refers to United States dollars.

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EXECUTIVE SUMMARY

The Urban Water Supply and Sanitation (Sector) Project (UWSSP) will support the Government of Nepal in expanding access to community managed water supply and sanitation (WSS) in 20 project municipalities by drawing on experiences and lessons from three earlier projects funded by the Asian Development Bank (ADB). The project will finance climate-resilient and inclusive WSS infrastructure in project municipalities and strengthen institutional and community capacity, sustainable service delivery, and project development. The project will be implemented over a five-year period (indicative implementation period is 2018 - 2023) and will be supported through ADB financing using a sector lending approach.

The project will have the following impact: impact quality of life for urban populations, including the poor and marginalized, improved through the provision of sustainable WSS services. The project will have the following outcome: inclusive and sustainable access to WSS services in project municipalities achieved. The project will have two outputs: (i) water supply and sanitation infrastructure in project municipalities improved, and (ii) institutional and community capacities strengthened.

The Ministry of Water Supply (MOWS) is the executing agency and Department of Water Supply and Sewerage (DWSS) the implementing agency. The project management office (PMO) will be responsible for the overall management, implementation and monitoring of the project. There will be regional PMOs (RPMOs) to manage day-to-day project implementation at the subproject/municipality level. After construction including a one-year operations and maintenance (O&M) period by the contractor, subprojects will be operated by the WUSC or municipality.

Ilam (Ilaam) subproject is one of the subprojects proposed under UWSSP. The existing water supply from surface water sources is not able to meet the current demand of the Ilam municipality. At an intermittent supply rate of 1.5 hours in a day, current water availability is only about 24 liters per day. Supply is further reduced due to pipe leakages and unsafe due to non-treatment.

Subproject Scope. The subproject is demand-driven by municipality and water users' association (WUA), and selected based on transparent criteria, including population growth, poverty index, existing WSS infrastructure, formed WUA, community willingness for cost sharing and long-term O&M contract. The subproject is formulated to improve water supply service delivery in wards 6, 7 (fully) and wards 8 and 9 (partially).

Environmental assessment has been conducted for the Ilam (Ilaam) water supply and sanitation subproject and selected based on (i) detailed engineering design, and (ii) most likely environmentally sensitive components. The environmental assessment used ADB's rapid environmental assessment (REA) checklists (Appendix 1) and a "no mitigation measures scenario" checklist developed for UWSSP (Appendix 2). The environmental assessment of the Ilam (Ilaam) water supply and sanitation subproject shows it is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Potential impacts are unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

Therefore, the Ilam (Ilaam) water supply and sanitation subproject is classified as Category B for environment per ADB Safeguard Policy Statement (SPS), 2009. This initial environmental examination (IEE) report has been prepared based on detailed design and following requirements

of ADB SPS and Government of Nepal Environment Protection Rules where the subproject is listed under Schedule-1 requiring an IEE.

Description of the Environment: The project components are located in Ilam Municipality, Ilam District, Mechi zone in the Province 1 of Nepal, bound towards the east by Namsaling, separated by Mail Khola (river), Radjuwali to the west by Puwa Khola, Barbote VDC to the north, and Sangrumba separated by Puwa Khola to the south. Geographically, the project area lies in the hilly region at 26°51'58" N to 26°56'46" N latitude and 87°53'30" to 87°57'46" E longitude.

Potential Environmental Impacts and Mitigation Measures. The subproject is unlikely to cause significant adverse impacts that are irreversible, diverse or unprecedented because: (i) the components will involve straightforward construction and operation, so impacts will be mainly localized; (ii) there are no significant sensitive environmental features in the subproject sites although careful attention needs to be paid to minimizing disruption to the community; and (iii) predicted impacts are site-specific and likely to be associated with the construction process and are produced because the process is invasive, involving excavation and earth movements.

Some impacts and their significance have been reduced by amending the designs and locations. The concepts in the design of the project are: (i) demand for new piped water supply; (ii) maximum population coverage mostly in residential areas and areas of high growth rate; (iii) avoidance of water-use conflicts; (iv) locating pipelines within rights-of-way (ROWs) to reduce acquisition of land; (v) locating pipelines at least 10 meters (m) away from latrines, septic tanks and any main drains to avoid contaminations; (vi) locating the intake at least 30 m upstream from sanitation facilities; and (vii) ensuring that all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultations.

During construction, impacts will likely arise from the need to dispose of moderate quantities of soil; and the disturbance to residents, businesses, and traffic. These temporary impacts are common for construction activities in urban areas, and there exist well-developed methods for their effective mitigation. Traffic management will be necessary during pipe laying on busy roads. Earthworks will be conducted during the dry season to avoid difficult working conditions that prevail during the monsoon. The location of stockyards will be identified at least 300 m away from watercourses. Fuel and lubricant storage areas will be located away from drainage. Precautions will be taken to minimize construction wastes. Measures will be provided to prevent wastewater entering into streams, watercourses, or irrigation channels. Open burning of solid wastes generated from the workers camp will be strictly prohibited. Better solid waste management practices will be adopted such as collection, segregation, reuse and recycling activities within the construction site and workers camp.

An O&M Manual including standard operating procedures for operation and maintenance will be developed, imparting necessary training; safety and personal protection equipment for workers, measures to maintain the water supply system efficiency. During operation, the delivery of unsafe water will be mitigated with prompt action on leaks, and frequent monitoring. WUSC, as operator, requires the development of its capacity in water quality monitoring. Monitoring kits and laboratory rooms will be provided to WUSC, and the enhanced capacity development will be met through a "learning-by-doing." An expert in the first year and periodic capacity strengthening after that will be undertaken the successful operation.

Environment Management: This IEE included an environmental management plan (EMP) which describe and address the potential impacts and risks identified by the environmental assessment. The EMPs included proposed mitigation measures, environmental monitoring and reporting

requirements, emergency response procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. The IEEs and EMPs will be included in bidding and contract documents with specific provisions requiring contractors to (i) comply with all other conditions required by ADB, and (ii) to submit a site-specific environmental management plan (SEMP), including proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (iii) specific mitigation measures following the approved EMP; (iv) monitoring program as per SEMP; and (v) budget for SEMP implementation. A copy of the EMP/approved SEMP will be kept on site during the construction period at all times.

The budget for EMP implementation is NRs20,00,000 that include air quality, noise level monitoring, capacity building, workforce, administrative and other costs, e.g., public consultation and information disclosure, grievance redress mechanism (GRM) implementation and any unanticipated impacts. The implementation costs of mitigation measures are covered separately under civil work contract. The contractor will be responsible for implementing the mitigation measures given in EMP. PMO, RPMO, and DSMCs are responsible for monitoring the EMP implementation.

Consultation, Disclosure, and Grievance Redress Mechanism. The stakeholders were involved during the IEE through discussions on site and public consultations. The views expressed by stakeholders were incorporated in the IEE and project design. IEE will be made available to the public through the ADB and UWSSP websites. The consultation process will continue during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within IEE to ensure that public grievances are addressed quickly.

Monitoring and Reporting. PMO, RPMO, and DSMC will be responsible for environmental monitoring. RPMO with support from DSMC will submit monthly monitoring reports to PMO. PMO will consolidate the monthly reports and will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports in its website.

Conclusions and Recommendations. Ilam water supply and sanitation subproject will bring a series of benefits to the local people. Based on the IEE findings, there are no significant impacts, and the classification of the subproject as Category B per ADB SPS is confirmed. To conform to government regulations, permits and clearances will be obtained prior to award of works contract. This IEE will be submitted to ADB for concurrence and disclosure.

I. INTRODUCTION

A. Background

1. The Urban Water Supply and Sanitation (Sector) Project (UWSSP) will support the Government of Nepal in expanding access to community-managed water supply and sanitation (WSS) in 20 project municipalities by drawing on experiences and lessons from three earlier projects funded by the Asian Development Bank (ADB).¹ The project will finance climate-resilient and inclusive WSS infrastructure in project municipalities and strengthen institutional and community capacity, sustainable service delivery, and project development. Subprojects will be demand driven by water users' associations (WUAs) and project municipalities and selected based on transparent criteria² including population growth, poverty index, existing WSS infrastructure, community willingness for cost sharing, and long-term operation and maintenance (O&M) contract.³

2. The project will build upon the on-going efforts of the Government of Nepal in providing water supply and sanitation (WSS) services in urban areas of Nepal. It will help the country to meet Sustainable Development Goal (SDG)-6 to ensure availability and sustainable management of water and sanitation for all by 2030 and it is aligned with sector objectives laid out by the government's Fourteenth Plan, National Urban Development Strategy, and updated 15-year Development Plan for WSS in Small Towns, which is to improve water supply and sanitation service delivery in urban areas across Nepal.

3. The project will have the following impact: quality of life for urban populations, including the poor and marginalized, improved through the provision of sustainable WSS services.⁴ The project will have the following outcome: inclusive and sustainable access to WSS services in project municipalities achieved. The project will have two outputs: (i) water supply and sanitation infrastructure in project municipalities improved, and (ii) institutional and community capacities strengthened.

4. The Ministry of Water Supply (MOWS) is responsible for planning, implementation, regulation, and monitoring of WSS. The Department of Water Supply and Sewerage (DWSS) under the MOWS supports the provision of WSS facilities in municipalities where large utilities do not exist, and these are operated by WUSCs⁵ or municipalities.⁶ Shortage of investment funds, skilled personnel, and inadequate O&M budgets, hinders municipalities from providing adequate, cost-effective services. The Local Governance Operation Act, 2017, established municipalities as autonomous government institution with responsibility for WSS services. While municipalities' capacity is being built, the government and residents have been receptive to the decentralized, participatory, and cost-sharing service provision model by WUAs. Development support for municipal WSS has been channeled through a combination of (i) government grants through

¹ ADB. [Nepal: Small Towns Water Supply and Sanitation Sector Project](#) [Nepal: Second Small Towns Water Supply and Sanitation Sector Project](#); and [Nepal: Third Small Towns Water Supply and Sanitation Sector Project](#).

² Subproject selection criteria are detailed in the Project Administration Manual (PAM). Selection of future investments to be designed under the project will follow same criteria, with preference for investments located in Kathmandu Valley, provincial headquarters, and strategic border municipalities.

³ Procurement can only commence after DWSS and municipality sign management agreement with WUSC for 20 years O&M service. The municipality will own the system and the WUSC will be the operator.

⁴ Government of Nepal. 2009. *Urban Water Supply and Sanitation Policy*. Kathmandu.

⁵ The WUSCs, formed under the Nepal Water Resource Act, 1992, are the elected executive bodies of the water users' association.

⁶ The DWSS assists in preparation of investment plans, project design, and establishing sustainable service delivery.

DWSS, (ii) loans by the Town Development Fund (TDF),⁷ and (iii) contributions from municipalities and beneficiaries.⁸ The TDF also supports WUAs in institutional and financial management including the introduction of tariffs.

5. The project will be implemented over a five-year period (indicative implementation period is 2018 - 2023) and will be supported through ADB financing using a sector lending approach. The MOWS is the executing agency and DWSS the implementing agency. The project management office (PMO) established under ongoing Third Small Towns Water Supply and Sanitation Sector Project (footnote 1) will be responsible for the overall management, implementation and monitoring of the project. There will be regional PMOs (RPMOs) to manage day-to-day project implementation at the subproject/municipality level. After construction including a one-year O&M period by the contractor, subprojects will be operated by the WUSC or municipality.

6. Ilam (Ilaam) subproject is one of the projects proposed under UWSSP. There is no existing water supply scheme in the subproject. People are using tube wells, dug wells, and river for their daily water use.

B. Name and Address of the Individual Institution Preparing the Report

Name of Proponent

Project Management Office
Third Small Towns Water Supply and Sanitation Sector Project
Ministry of Water Supply and Sanitation
Government of Nepal

Address of the Proponent

Panipokhari, Kathmandu
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Consultant, Preparing the Report

7. **TAEC Consult P. Ltd.** *Joint Venture with* Integrated Consultants Nepal (P) Ltd. Has worked on behalf of the proponent for conducting IEE studies and preparing IEE report using all the prevalent guidelines, acts, policies and regulations. The name and address of the consultant is given below;

Name of Consultant

TAEC Consult P. Ltd. – Integrated Consultants Nepal (P) Ltd. (ICON) J/V
DSMC
Urban Water Supply and Sanitation Sector Project

Address of the Consultant

Shankhamul, Kathmandu, Nepal

⁷ The TDF is a government-owned entity established under the Town Development Fund Act, 1997. Loans from the government to WUAs or municipalities are generally on-lent by TDF under a subproject financing agreement.

⁸ WUAs contribute 30% of project costs for water supply subprojects (25% from TDF loan and 5% from users' upfront cash contribution) and 15% for sanitation subprojects (subsidy from municipalities).

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C. Purpose of the Initial Environmental Examination

8. All projects funded by ADB must comply with its Safeguard Policy Statement (SPS) to ensure that projects are environmentally sound, designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. Environmental assessment has been conducted for the Ilam (Ilaam) water supply and sanitation subproject⁹ selected based on detailed engineering design, and (ii) most likely environmentally sensitive components. The environmental assessment used ADB's rapid environmental assessment (REA) checklist for water supply and sanitation (Appendix 1) and a "no mitigation measures scenario" checklist developed for UWSSP (Appendix 2). The environmental assessment of the Ilam (Ilaam) water supply and sanitation subproject shows it is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Potential impacts are unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

9. Therefore, the Ilam (Ilaam) water supply and sanitation subproject is classified as Category B for environment per ADB SPS. This initial environmental examination (IEE) report has been prepared based on detailed design and following requirements of ADB SPS and Government of Nepal Environment Protection Act (EPA) and Environment Protection Rules (EPR) where the subproject is listed under Schedule-1 requiring an IEE.

10. This IEE report primarily:

- (i) provides information on the project and its environmental requirements;
- (ii) provides the baseline physical, ecological, cultural and socioeconomic environments and resources in and surrounding the project's area of influence;
- (iii) identifies and assesses potential environmental impacts arising from the implementation of the project;
- (iv) recommends measures to avoid, mitigate, and compensate the adverse impacts;
- (v) presents information on stakeholder consultations and participation during project preparation;
- (vi) recommends a mechanism to address grievances; and
- (vii) includes an environmental management plan.

11. The IEE study team conducted a preliminary exercise to solicit information from planners, policy makers, project components, concerned authorities, the user community and affected population. The team reviewed the relevant documents on water supply and sanitation in the country the feasibility report. Similarly, the team also reviewed the reports on hydrology, meteorology, geology, and others related to the environment.

12. The study team visited the site to identify the potential impacts, both positive and negative, of the project. During the visit, the team met local people and conducted meetings, brainstorming

⁹ All the water supply and sanitation subprojects will include output-based aid (OBA) for sanitation (toilets), hence they are called water supply and sanitation.

sessions, field examinations, and data gathering. The team also made walkthrough surveys of the project area to assess the baseline environment and potential environmental impacts of the project during the construction and operation phases.

II. DESCRIPTION OF THE SUBPROJECT

A. Need for the Subproject

13. The existing water supply system is not able to meet Ilam municipality's water demand, as the supply system is intermittent, supplying water for 1.5 hours per day, which is approximately equivalent to about 24 liters per day. However, factoring in leakage & wastage, the actual availability may even be much lower than 24 liters per day, but this is not measured. The existing system supplies water from surface sources without any treatment. As the district headquarters, the population has more transients than permanent residents, including local tourists. Almost all district level government offices and security agencies are in the same service area. This influx of people has shown a growing demand for water, therefore, supply shortage is a major constrains growth.

14. Deficiencies in the existing system will be upgraded and rehabilitated to meet the growing demand on a consistent and sustainable level.

B. Relevance of the Subproject

15. The proposed water supply and sanitation subproject is intended to serve drinking water to complete area of ward numbers 6 & 7 (fully) and wards 8 & 9 (partially) of Ilaam district. The proposed project shall be surface water sources to benefit a base year population of about 2,711 (2019) and a design population of about 3,836 (Design Year 2039).

16. **Subproject Selection.** Ilam (Ilaam) water supply and sanitation subproject is demand driven by WUA or municipalities, and selected based on transparent criteria, including population growth, poverty index, existing WSS infrastructure, formed WUA, community willingness for cost sharing and long-term O&M contract.¹⁰

C. Overview of the Subproject

17. The Ilam subproject lies in Ilaam District, Mechi Zone, in Province 1 of Nepal, which includes the whole Ilam municipality, and is situated in the hilly regions at 26°51'58" N to 26°56'46" N latitude and 87°53'30" to 87°57'46"E longitude. It is bound by Namsaling and separated by Mai Khola (river) to the east, Rajduwali by Puwa Khola to the west, Barbote VDC to the north, and Sangrumba separated by Puwa Khola to the south. During the last election, however, the judiciary boundary of the municipality has been changed incorporating the areas of adjoining VDC.

18. The project area is located about 76 kilometer (km) north of Charali, Jhapa, along the Mechi Highway, 97 km from Fidim (Panchthar district) and 713 km from Kathmandu. The nearest operating airport, Bhadrapur in Jhapa district, is about 90 km from the project area. The newest

¹⁰ Subproject selection criteria are defined in the PAM. Procurement of services can only commence after the DWSS and municipality sign a management agreement with the WUSC for O&M of services for 20 years. The municipality will own the system, while WUSC will be the operator.

operating domestic airport, Falgunand Sukilumba Airport has recently opened and is 900 meters (m) from Mechi Highway and connected via Airport Road.

D. Subproject Components

19. Ilam (Ilaam) water supply and sanitation subproject is a surface-based water supply system project covering wards 6 and 7 (fully) and wards 8 and 9 (partially) of Ilaam district. The major components of the surface water-based supply system consist of: (i) intake, (ii) treatment units, (iii) ground reinforced cement concrete (RCC) reservoir, (iv) valve boxes, and (v) distribution system. Thrust blocks, a guard house, boundary wall, fire hydrants and related structures will be built alongside the water supply system.

1. Intake

20. There are two intakes available in the two sources, Rate and Mewa Khola. Stream intake is the proposed method for both new sources rivers – simple weir intake across Rate Khola using simple off-take type, and a side intake in the case of Mewa Khola. Each river has a safe yield of more than 15 liters per second (lps). 12.5 lps will be abstracted from Rate Khola, with a relative level of around 1,875 above mean sea level (amsl).

21. As the Mewa Khola flows in very steep gradient with large rolling stones at intake area, temporary type of weir by Rip-Rap has been recommended. A single orifice type intake with minimal sill height has been provided to divert river water to intake filter chamber in the main river. As rigid structure like concrete or masonry weir is not found suitable for the river of mid hill with wider river width, a temporary weir formed by heaping of Rip-Rap for 0.5 to 1 m high across 20 m wide river has been provided for the diversion structure of the system. Moreover, such flexible structure is easy for operation and maintenance. A single orifice type of intake has been provided to capture the design flow even during the lean season. To make simple design and simple operation, no gates and scour sluice at intake has been provided. To control heavy discharge in the canal during flood time in the river, a control orifice has been provided immediately after the gravel tap. Relative level of this intake is around 1910 m amsl.

2. Transmission Main

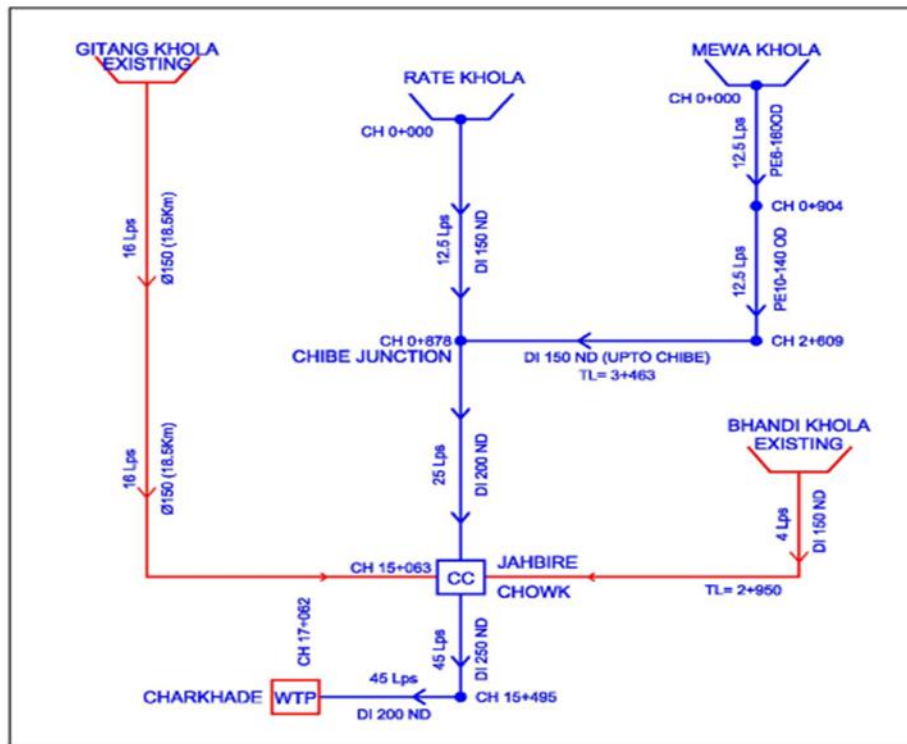
22. There are three different transmissions subsystem in the proposed system. The first two are existing transmission system, and the third one is proposed transmission system.

23. The main transmission line has been considered length between Intakes to water treatment plant (WTP) at Charkhade. The transmission mains have been designed to meet water demand for the design year. The cumulative length of transmission line 41.975 km.

24. The total length of existing transmission lines of Gitang and Bhadi Khola up collection chambers are 18.5 km and 2.95 km, respectively. The proposed transmission Rate is about 17.1 kms. The segmental length of proposed transmission of Mewa Khola is 3.463 km. The transmission line of Mewa Khola joins transmission line from Rate at Chibe junction.

25. The proposed transmission line comprises of 150 mm to 250 mm diameter ductile iron pipes and 140 and 160 outside diameter of 6 kg polyethylene and 10 kg polyethylene pipes, respectively. The detail of the transmission line is presented in the figure below.

Figure 1: Schematic Diagram of the Proposed Water Supply System



3. Thrust Blocks, Saddle Blocks and Thrust Beam

26. Thrust blocks have been proposed for ductile iron pipes (both transmission and distribution mains) from being moved by forces exerted within the pipe arising from the internal pressure of the pipeline or the flow of water hitting bends, tapers and closed or partially closed valves. Typical thrust blocks for horizontal and vertical bends have been designed for a pressure of 16 kilogram per square centimeter (kg/cm^2) for both transmission lines and distribution lines.

27. Saddle blocks, thrust beams and anchor blocks are proposed for ductile iron pipes laid up in the sloping area and un-buried portions along the transmission mains. All saddle blocks are proposed to be anchored with concrete at the center of each pipe to prevent movement.

28. Provision of thrust beams for stretches of buried ductile iron pipelines that are laid-up in the sloping area has been made to prevent pipe movement.

4. River and Stream Crossing

29. There are several river crossings in the proposed transmission system. There are major wide crossings in the transmission systems at Rate Khola, Sano Mai Khola, and Soti Khola. Pipe crossing of MS truss over these rivers have been proposed. MS truss pipe crossing span of 25 m have been proposed for Rate, and Sano Mai Khola whereas crossing span of 20 m have been proposed for Soti Khola. These truss crossings are triangular comprising of tuber mild steel

sections and braced by welded tubular sections to form composite light section which is economical than the traditional angle and channel sections.

30. A simple crossing by providing SP-4 type concrete saddle blocks has been recommended for the small crossing for ductile iron pipes. These types are used only when the crossing span is less than 6m. There are about ten numbers of this type of crossings in the transmission line. In case of crossing near existing bridge and culvert provision has been made for pipe clamps.

5. Water Treatment Plant

31. There is one existing water treatment plant at Charkhade which consists of the following: (i) Sedimentation Tank (ST), (ii) Horizontal Roughening Filter (HRF), (iii) Slow Sand Filter (SSF) and Disinfection Unit. During inspection of WTP at Charkhade, some design inconsistencies between design discharges of different units were observed. The design discharge of SSF is about five to six times higher than sedimentation and horizontal roughening unit.

32. The water treatment plant will consist of the following components: (i) Sedimentation Tank (2 nos.) in corresponding transmission routes of Rate & Mewa Khola; (ii) Horizontal Roughening Filter (8 units).

33. Plain sedimentation tank has been provided as a pre-treatment unit for proposed transmission lines where settling process of coarse and heavy suspended particles such as sand, silt, and the like, will settle through the force of gravity. In each settling tank, the retention period is equal or more than 4 hours.

34. Each settling basin is rectangular with a longitudinal flow. Each settling basin with two identical chambers of 2.4 m x 12 m has been adopted for design discharge of 12.5 lps with a design load of 0.8 cubic meter per square meter per hour ($\text{m}^3/\text{m}^2/\text{hour}$). The required area for the proposed tank is about 150 square meter (m^2) in every location along transmission line of Rate and Mewa Khola.

35. Since SSF have good in size, the proposed system will include the existing SSF after repair under its components category.

36. The HRF has been proposed near to Charkhade (existing WTP). It has been designed for a flow capacity of 3147.6 m^3/hour (or 41 lps) considering the diverted additional 4 lps from Bhadi Khola which does not require any treatment since it is a spring source. The number of units proposed is 4 with a filtration rate of 1.8 $\text{m}^3/\text{m}^2/\text{hr}$. A unit consists of four chambers 5 m wide and 1.7 m deep. Each chamber is 5 m x 8.8 m. Each unit comprises of three chambers for the fill filter material apart from the inlet, and outlet compartment of each chamber is 90 cm wide. The additional required area for the proposed HRF tank is about 3500 m^2 in a location close to the existing WTP area.

37. The entire distribution network is to be supplied from multiple (ten) reservoirs system. Water treatment plant will act as main distributors for these reservoirs. The total demand for the system has been divided to these reservoirs to manage reservoir tank (RVT) wise demand. Result of the environmental audit of WTPs is shown Appendix 12.

6. Service Reservoir

38. The proposed system has been designed based on the multi-reservoir system. The design considers the use of existing RVTs to the extent possible. Four existing RVTs amounting to a total capacity of 692.5 m³ are included in the proposed system with minor rehabilitation. However, the storage capacity of these reservoirs is not enough to meet water demand. Hence, new six RVTs with a total storage volume of 700 m³ has been provided in this Ilam Water Supply Project.

Table 1: Proposed Service Reservoirs

| Location | Name | Existing Capacity | Size of RVTs (m ³) | | | Remarks |
|----------|-----------------------|-------------------|--------------------------------|-----------------|--------------|--|
| | | | Required | Use of Existing | New Proposed | |
| 1 | Gumba Danda | 60 | 50 | | 50 | Required relocation |
| 2 | Gadhi Barrack (RVT A) | 48 | 150 | | 150 | Non-Operating |
| | Gadhi Barrack | | 120 | 120 | | Under Construction |
| 3 | Shikhar Nagar | 165 | 150 | | 150 | Demolition of all 4 old RVTs (made of stone masonry) |
| | Shikhar Nagar | Damaged | | | | |
| | Shikhar Nagar | 38 | | | | |
| | Shikhar Nagar | 42 | | | | |
| | Shikhar Nagar (JICA) | 360 | 360 | 360 | | |
| 4 | Milan Kendra (JICA) | 87.5 | 87.5 | 87.5 | | Rehab of existing |
| 5 | Campus Danda | 80 | 50 | | 50 | Required relocation |
| 6 | Tundikhel (JICA) | 125 | 125 | 125 | | Rehab of existing |
| 7 | Golakharka | | | | 150 | |
| 8 | Tilkini | | | | 150 | |

39. The cumulative capacity of all service reservoirs provided in this proposed project is about 1,392.5 m³. The reservoir sizing has also been carried out. All reservoirs have a minimum of 50 m³ capacity.

7. Bulk Distribution Mains

40. Bulk Distribution System (BDS) comprises of ductile iron spigot-socket pipe from 80 mm, 100 mm, 125 mm and 200 mm diameter, Polyethylene (PE) pipes of 110 mm of 6 kilogram per square centimeter (kg/cm²), 63 mm, 90 mm, 110 mm of 10 kg/cm² and medium class galvanized iron pipe of 50 mm, 65 mm and 80 mm. The length of various pipes is shown in Table 2.

Table 2: Details of Pipe Used in Bulk Distribution System

| Pipe and Diameter | Length (m) |
|--------------------------------------|------------|
| PE Pipes of 6 kgf of 75 mm OD | 373 |
| PE Pipes of 6 kgf of 110 mm OD | 762 |
| PE Pipes of 10 kgf of 63 mm OD | 1,456 |
| PE Pipes of 10 kgf of 75 mm OD | 278 |
| PE Pipes of 10 kgf of 90 mm OD | 131 |
| PE Pipes of 10 kgf of 110 mm OD | 751 |
| GI Medium Class of 50 ND | 659 |
| GI Medium Class of 65 ND | 735 |
| GI Medium Class of 80 ND | 180 |
| DI Spigot-Socket Pipe of 3" (80mm) | 233 |
| DI Spigot-Socket Pipe of 4" (100 mm) | 41 |
| DI Spigot-Socket Pipe of 5" (125 mm) | 1,284 |

| Pipe and Diameter | Length (m) |
|--------------------------------------|---------------|
| DI Spigot-Socket Pipe of 8" (200 mm) | 5,932 |
| Total of Bulk Distribution System | 12,816 |

DI = ductile iron, GI = galvanized iron, kgf = kilogram force, m = meter, mm = milliliter, OD = outer diameter.

8. Distribution Main

41. The distribution system consists of pipe networks, which is looped in certain cases and branched in others. The network has been analyzed using EPAnet, a design analytical software tool. The entire system has been designed using PE and galvanized iron (GI) pipes. No ductile iron pipes have been used. To proper saddle arrangement at the household connection in distribution pipe, the minimum diameter of the distribution pipe has been adopted as 50 mm.

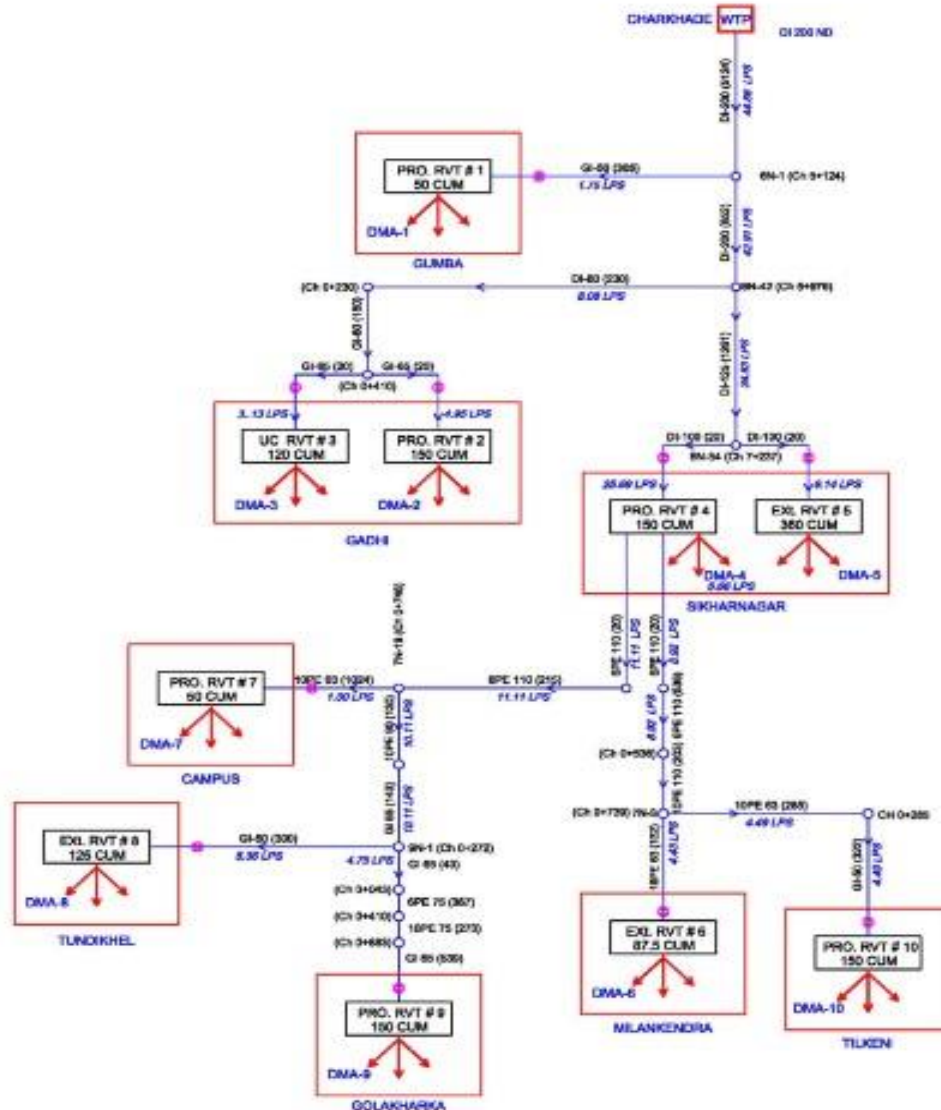
Table 3: The Total Length of Pipes Used in Distribution

| A | Polyethylene Pipes of 6 kg/cm ² | Length (m) | B | Polyethylene Pipes of 10 kg/cm ² | Length (m) |
|-------------------------|--|------------|---|---|------------|
| | 75 mm OD | 6,072 | | 50 mm OD | 25,367 |
| | 90 mm OD | 2,307 | | 63 mm OD | 22,937 |
| | 110 mm OD | 2,248 | | 75 mm OD | 3,599 |
| | 125 mm OD | 923 | | 90 mm OD | 1,553 |
| | 140 mm OD | 460 | | 110 mm OD | 913 |
| | 160 mm OD | 716 | | 125 mm OD | 589 |
| | Sub Total | 12,725 | | 140 mm OD | 359 |
| | | | | Sub Total | 55,316 |
| C | GI Pipes | Length (m) | | | |
| | 50 ND | 22,001 | | | |
| C | GI Pipes | Length (m) | | | |
| | 65 ND | 1,523 | | | |
| | 100 ND | 10 | | | |
| | Sub Total | 23,534 | | | |
| Total Distribution Line | | | | | 91,575m |

42. Two types of pipes have been used in the distribution network: (i) galvanized iron pipes, and PE pipes with pressure 6 kg/cm² and 10 kg/cm². However, galvanized iron pipes have been limited use. The total pipe length of various diameters is given in the table above.

43. The total pipe length of the proposed distribution system works out to 91.575 km.

Figure 2: Schematic Diagram of Bulk Distribution System and Transmission Main



9. Electrical Facilities

44. Some components, such as dosing pump installed at each RVT, laboratory, guard house and public toilets will be provided with electrical facilities.

10. Pump Requirement

45. The project area is surrounded by rivers from where water can be pumped. Considering energy cost, O&M difficulties in operating pumping system, user's preference and the possibility of gravity system, the proposed system has been designed as a gravity system.

46. A dosing pump will be provided in the proposed system. Each RVT subsystem has its dosing system before distributing water to the system. The dosing system comprises of electronic

dosing pump with FRP tank and stirring device. As the pump is automatic dosing pump of the electronic type, close housing has been recommended.

47. To add bleaching solution in distribution, each RVT in the system has its dosing system. The Dosing Pump House (DPH) with two compartments has been proposed. One compartment houses a dosing pump and the other compartment is for chemical storage. Altogether, nine Dosing Pump Houses have been proposed.

11. House Connection

48. Two types of house connections have been envisaged in the project. There is about 573 number of house connections from GI pipes from distribution chambers in core bazaar and high-pressure area, about 2,007 number of house connections from PE pipes out of which about 286 HHs connection require drain-crossing provision. This will make the total household connection of 2,868 in the project area. All connections will be private.

49. The house connection shall comprise of about 12 m pipe PE or GI Pipe (as per requirement) and a water meter. The house connection pipe shall be PE-80 or 100, 20 mm OD diameter pipe rating PN-16 for tapping from ductile iron or PE pipes. In case of tapping from GI pipes, the house connection pipe shall be medium class GI of 15 ND. Tapping of household connection in PE pipe has been proposed from a PE saddle with a ferrule and in case of ductile iron pipe, ductile iron saddle shall be used with a ferrule without touching the ductile iron pipe by the ferrule. Tapping from GI pipes has been proposed from PE saddles with ferrules.

50. A dry dial volumetric rotary piston type water revenue meter for all house connections are proposed. These household water meters have 15 mm ND and have been recommended.

12. Appurtenances

51. These will consist of: (i) Line or Sectional Valves, (ii) Air (Release) Valves, (iii) Washout Valves, (iv) Flow Meters, (v) Fire Hydrant, and (vi) Valve Chambers. They are discussed below.

a. Line or Sectional Valves

52. Line or Sectional valves are gate valves used to isolate sections of a pipeline in an emergency or for maintenance and repair. It should be noted that gate valves are suitable for isolation of a pipeline in either “fully open” or “fully closed” positions, but not for frequent open/close operation and flow regulation. All valves shall be with nominal pressure rating PN16 unless in special circumstances where higher-pressure rating is required.

b. Air Release Valves

53. Air valves will be installed at all high points of the pipeline, in sections, which form a peak concerning the hydraulic gradient and on the downhill side of line valves. Air valves shall be of the combined type with a larger and smaller venting orifice which permits passage of large volumes of air for vacuum breaking and venting on starting up and shutting down operation and a small venting cross section for the release of small volumes of air under full internal operating pressure. All air valves shall be Double Orifice Air Valves and shall be with nominal pressure rating PN 16 unless in special circumstances where higher pressure rating is required.

c. Washout Valves

54. Washout valves (WOVs), formed by gate valves, has been proposed to allow sediment to be flushed out and to enable the pipeline to be drained for maintenance and repair work. At least one washout valve has been proposed at the lowest point between two sectional valves on the pipeline and the dead end of a pipeline. Double valves should be provided to washouts for trunk mains and primary distribution mains to suit operational needs. The upstream valve should be opened while the downstream valve should be closed so that the washout pipe on the upstream side of the downstream valve is fully charged with water. Care should be taken to position the discharge points of washout pipes to avoid water in stream course seeping through the washout pipes into the water mains.

d. Flow Meters

55. A flowmeter has been installed at the at the inlet and outlet mains of a service reservoir, within treatment works to measure the quantity of water flow for a supply zone. For a district metered area (DMA), a flow meter has been installed at the inlet of the DMA to monitor continuously the quantity of water flowing into or out of the DMA. The recommended flowmeter for a DMA is Waltman type.

e. Fire Hydrant

56. Fire hydrants are provided at major road junctions. These fire hydrants shall also be used for flushing of the system as required. Fire hydrants, namely, stand post type, conforming to IS 908 is recommended.

f. Chambers

57. Two types of Chambers have been proposed in the project. A Chamber constructed by brick masonry wall has been provided in non-vehicular areas and rural area. In other vehicular carriageway and city area chambers constructed with RCC has been provided.

58. The concrete chambers shall serve as housing, protection and convenient access to these pipe appurtenances. Inside the concrete chambers, necessary concrete supports shall be provided for pipes and valves at appropriate locations.

59. Access to the concrete chamber will be given via lockable cast iron covers with frames. Manhole covers of the heavy-duty type have been recommended in these RCC chambers. Covers for utility holes in paths may be proposed of medium duty type.

g. Office, Guard Quarter, Dosing House and Boundary Wall

60. A two-bay two-story building for office is proposed at Shikharnagar. The old building on the north-west corner shall be demolished to construct the office building. The proposed office building comprises of big meeting hall, water quality laboratory, administrative rooms, store for household meter and other small gadgets.

61. Three single-storey Guard Houses have been proposed at two WTP locations and Golkharka RVT area. The Guard House building comprises of residential facilities for a guard in addition to rooms for tools for repair and maintenance.

62. Similarly, two small guard houses (GH-1) have been proposed at two reservoir locations, Gadi & Tikini. It comprises of two rooms that included Guard Room and Tool Room.

63. To add bleaching solution in distribution, each RVT will have its dosing system. The Dosing Pump House (DPH) with two compartments has been proposed. One compartment will house the dosing pump and the other for chemical storage. Altogether, nine Dosing Pump Houses have been proposed.

64. To safeguard storage tanks and RVT from vandalism as well as contamination, chain link boundary walls (CLBW) and barbed wire fencing (BWF) have been proposed. A galvanized chain link fencing over 450 mm high parapet wall has been proposed from aesthetic and economic considerations. The system consists of many RVTs and other structures to be protected and operated, different sizes of building structures and different types of boundary walls have been discussed with WUSC and proposed in the project. Table 4 summarizes these in detail.

Table 4: Proposed Buildings and Boundary Type

| Location | Component | Building | Septic Tank | Boundary Type |
|---------------------|--------------------------|-----------|-------------|------------------------|
| Settling Basin Area | Settling Basin | GH-2 | S+S | Fencing by Barbed Wire |
| Additional WTP Area | HRF | GH-2 | S+S | Fencing by Barbed Wire |
| Gumba Danda | N-RVT#1 | DPH | | Fencing by Barbed Wire |
| Gadi Danda | E-RVT#2+ N-RVT#3 | GH-1+DPH | S+S | GI Chain Link with B/W |
| Shikharnagar | N-RVT#4+E-RVT (JICA)#5 | OFF-1+DPH | EXT. | EXT. |
| Milan Kendra | E-RVT (JICA)#6 | DPH | | Fencing by Barbed Wire |
| Campus Area | N-RVT#7 | DPH | | GI Chain Link with B/W |
| Tundikhel | E-RVT (JICA)#8 | DPH | | Fencing by Barbed Wire |
| Golkharka | N-RVT#9 | GH-2+DPH | | GI Chain Link with B/W |
| Tilkini | N-RVT#10 | GH-1+DPH | | GI Chain Link with B/W |
| Various Locations | Intakes, IC, CC and BPTs | | | Fencing by Barbed Wire |

DPH = Dosing Pump House; HRF = Horizontal Roughening Filter; RVT = reservoir tanks.

h. DMA Establishment

65. One common principle of managing a large water network is to sub-divide it into some areas, typically of between 500 and 3000 connections, each established area with a defined and permanent geographical and/or hydraulic boundary. Each area is called a District Management Area or, more commonly known as District Meter Area (DMA). Ideally, each DMA has a single source of supply to maximize the accuracy of data, with a strategically placed and suitably sized meter installed at the inlet that is capable of accurately measuring flow into the area. In this way, it is possible to regularly quantify the leakage level in each DMA so that the leakage location activity is always directed to the worst parts of the network.

66. An important factor in lowering and subsequently maintaining a low level of leakage in a water network is pressure control. The division of the network into DMAs facilitates the creation of a permanent pressure control system, thus enabling pressure reduction in DMAs which reduces the level of background leakage, flow rate of individual bursts and the rate of the annual burst frequency. The total system is divided into 10 DMAs, according to the serving reservoir, to manage NRW in the proposed system.

13. Salient Feature of the Project Area

67. The detail salient features of the project are shown in Table 5.

Table 5: Salient Feature of the Project

| S. No. | Items | Description |
|--------|---|---|
| 1 | Name of Project | Ilam Town Water Supply and Sanitation Project |
| 2 | Type | Gravity System |
| 3 | Study Level | Detail Engineering Design Report |
| 4 | Location Area | |
| | Region | Eastern Development Region |
| | Zone | Mechi |
| | District | Ilam |
| | VDC/Municipality | Ilam Municipality |
| | Ward | The total project area covers wards 6 and 7 (fully) and wards 8 and 9 (partially). |
| 5 | Available Facilities | |
| | Road | Mechi Highway |
| | Supply Water System | WUSCs |
| | Electricity, Communication, Health Services, Banking Facilities | Available |
| 6 | Source Characteristics | |
| | Source Name | Apart from Existing Bhade and Gitang source, Rate and Mewa Khola are two new sources |
| | Source Type | Perennial River (Surface Water) |
| | Source Location | Within the municipality |
| 7 | Type of Structures | |
| | Proposed Intakes | 4 Nos with rehabilitation of 2 Nos intake |
| | Water Treatment Plant | Total Capacity for 41 lps, assuming water from Bhadi Khola does not require any primary treatment |
| | Ground Reservoir (No and Capacity in CUM) | 3N-50 m ³ +1UC-120 + 1E-125 +3 N-150 m ³ + 1E-360 m ³ (Total 1392.5 CUM) |
| | Valve Chamber (Bricks/RCC) | 20/10/15 |
| | Office (O1) /Medium Guard House (GH1) / Small Guard House (GH2) /Dosing House (DPH) | 1-OFF / 2-GH1 / 3-GH2 / 8- DPH |
| | Household Connection | 2,868 |
| | Fire Hydrant | 10 |
| | Total Length of pipe in transmission and Bulk Distribution | 50,975 m (with 13,729 m of BDS) |
| | Total Length of pipe in Distribution | 100,740 m |
| | Survey Year's HHs (2017) | 2,798 |
| | Survey Year's Population (2017) | 20,704 |
| | Base Year Population (2019) | 39,860 |
| | Design Year Population (2039) | 28,172 |
| | Average HHS size | 7.22 |
| | Weighted Growth Rate % (WGR) | 1.75 |
| 9 | Total Cost of WS Scheme (Inclusive of all) NRs. | 854,309,523.60 |

| S. No. | Items | Description |
|--------|---|--------------------------------|
| 10 | Cost Sharing Arrangement | |
| | Government of Nepal Component (70 %) | 598,016,666.52 |
| | TDF Loan (25 %) | 213,577,380.90 |
| | WUSC's Contribution for upfront (Cash 5 %) | 42,715,476.18 |
| 11 | Tariff | |
| | Up to 6 m ³ /monthly (NRs) | 210 |
| | 7 to 10 m ³ /monthly (NRs) | 60 |
| | 11 to 20 m ³ /monthly (NRs) | 90 |
| 12 | Sanitation Cost (Inclusive of all) NRs. And Sharing | 10,037,176.58 |
| | Government of Nepal Contribution (85 %) | 8,531,600.09 |
| | Local Authority / Users' (15 %) | 1,505,576.49 |
| 13 | Per Capita Cost of W/S Component | |
| | Per Capita Cost (for base year pop.) | 31,116 |
| | Per Capita Cost (for design year pop.) | 18,024 |
| 14 | Total Cost for Sanitation Component | 10,581,204.16 |
| | Per Capita Cost (for base year pop.) | 468 |
| | Per Capita Cost (for design year pop.) | 331 |
| 15 | Total Cost of the Project (WATSAN) | 864,346,700.18 |
| 16 | Economic and Financial Indicators | |
| | Economic Rate of Return (EIRR) | 43.08% |
| | Financial Rate of Return (FIRR) | 6.49% |
| 17 | Environment | |
| | ADB Category | B, Only IEE necessary |
| | IEE finding | No significant adverse impact. |

III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Safeguard Policy Statement

68. ADB SPS requires borrowers to meet a set of requirements (Safeguards Requirements 1) when delivering environmental safeguards for projects supported by ADB. The objectives are to ensure the environmental soundness and sustainability of projects, and to support the integration of environmental considerations into the project decision-making process. Hence, UWSSP is required to comply with these requirements. Summary of the step by step process is discussed below in this section. Detailed discussions are provided in the ADB SPS.¹¹

69. **Screening and categorization.**¹² Subprojects are to be screened for their expected

¹¹ ADB. 2009. *Safeguard Policy Statement*. Manila.

¹² Per ADB SPS, (i) **Category A**: A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required; (ii) **Category B**: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible and, in most cases, mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required; (iii) **Category C**: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be

environmental impacts, and are assigned to a specific category (footnote 9). Categorization is to be based on the most environmental sensitive component. However, for subproject(s) with component(s) that can trigger Category A or with potentially significant adverse impacts that are diverse, irreversible, or unprecedented, PMO shall examine alternatives to the subproject's location, design, technology, and components that would avoid, and, if avoidance is not possible, minimize adverse environmental impacts and risks, and to meet Category B categorization. The rationale for selecting the subproject location, design, technology, and components will be properly documented, including, cost-benefit analysis, taking environmental costs and benefits of the various alternatives considered into account. The "no action" alternative will be also considered. In general, criteria that can trigger subproject's 'Category A' are in Section V below.

70. Environmental Assessment. Environmental assessment shall include description of environmental and social baseline to provide an understanding of current conditions forming the benchmark against which subproject impacts are assessed. Environmental impacts and risks will be analyzed for all relevant stages of the project cycle, including design and planning stage, construction, operations, decommissioning, and post-closure activities such as rehabilitation or restoration. The structure and composition of the typical IEE report is provided in Appendix 11. The IEEs of sample subprojects prepared during the ADB loan processing stage¹³ may be used as model documents for UWSSP subprojects.

71. Environmental Planning and Management. The PMO and RPMOs shall prepare environmental management plan (EMP) to be included in the IEE report. The EMP shall describe and address the potential impacts and risks identified by the environmental assessment. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the subproject's impact and risks. The EMP shall include the proposed mitigation measures, environmental monitoring and reporting requirements, emergency response procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.

72. Public Disclosure. MOWS, through PMO, shall submit to ADB for disclosure on ADB website so affected people, other stakeholders, and the public can provide meaningful inputs into the subproject design and implementation: ¹⁴

- (i) final IEE upon receipt;
- (ii) a new or updated EIA/IEE and corrective action plan prepared during subproject implementation, if any; and
- (iii) environmental monitoring reports submitted during subproject implementation upon receipt.

73. Consultation and Participation. The PMO and RPMOs shall carry out meaningful consultation¹⁵ with affected people and other concerned stakeholders, including civil society, and

reviewed; and (iv) **Category FI:** A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary

¹³ Subprojects with IEEs prepared during project processing include (i) Charikot WSS, (ii) Ilam WSS, (iii) Tumdadi Chakkifanta WSS, (iv) Charikot DEWATS, and (v) Katarhiya Storm Drain.

¹⁴ Per ADB SPS, 2009, prior to disclosure on ADB website, ADB reviews the "borrower's/client's social and environmental assessment and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles and Safeguard Requirements 1-4."

¹⁵ Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of

facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

74. **Grievance Redress Mechanism.** The MOWS, through PMO, shall establish a mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the subproject's environmental performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject. As of the ADB loan processing for UWSSP, a Grievance Redress Mechanism has been established and discussed in detail in Section VI below.

75. **Monitoring and Reporting.** The PMO shall monitor, measure and document the progress of implementation of the EMP. If necessary, PMO will identify the necessary corrective actions, and reflect them in a corrective action plan. PMO will prepare and submit to ADB semi-annual environmental monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. For subprojects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis until ADB issues a project completion report.

76. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during subproject implementation, PMO shall update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

77. **Pollution Prevention and Control Technologies.** During the design, construction, and operation of the subproject the PMO and RPMOs shall apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards.¹⁶ These standards contain performance levels and measures that are normally acceptable and applicable to subprojects. When the Government of Nepal regulations differ from these levels and measures, the executing agency shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific subproject circumstances, the executing agency will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

78. **Occupational Health and Safety.** PMO¹⁷ shall ensure that workers¹⁸ are provided with a safe and healthy working environment, taking into account risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. PMO shall ensure to take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work by (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and

disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

¹⁶ This IEE sets out performance standards on key environmental parameters such as noise, odor and discharge that accord with the more stringent of international good practice (as set out in World Bank/IFC Environmental, Health and Safety guidelines) and Government of Nepal requirements.

¹⁷ In case where responsibility is delegated to subproject contractors during construction phase, PMO shall ensure that the responsibilities on occupational health and safety as described herein are included in the contract documents.

¹⁸ Including nonemployee workers engaged by the borrower/client through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

79. PMO shall ensure to apply preventive and protective measures consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's *Environmental, Health and Safety Guidelines*.¹⁹

80. **Community Health and Safety.** PMO (Footnote 16) shall ensure to identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

81. **Physical Cultural Resources.** PMO is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. Such resources likely to be affected by the subproject will be identified, and qualified and experienced experts will assess the subproject's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process. When the proposed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

82. **Environmental Audit.** When the subproject involves existing activities or facilities, PMO is responsible to ensure that relevant external experts will perform environmental audits to determine the existence of any areas where the subproject may cause or is causing environmental risks or impacts. If the subproject does not foresee any new major expansion, the audit constitutes the environmental assessment for the subproject.

83. **Bidding and Contract Documents.** IEEs and EMPs are to be included in bidding and contract documents and verified by the RPMOs. The PMO and RPMOs shall also ensure that bidding and contract documents include specific provisions requiring contractors to (i) comply with all other conditions required by ADB,²⁰ and (ii) to submit to RPMO, for review and approval, a site-specific environmental management plan (SEMP), including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEMP; and (iv) budget for SEMP implementation. No works can commence prior to approval of SEMP. A copy of the EMP or approved SEMP will be kept on site during the construction period at all times. Non-compliance with, or any deviation from, the conditions set out in the EMP or SEMP constitutes a failure in compliance and shall require corrective actions.

84. **Conditions for Award of Contract and Commencement of Work.** The PMO shall not award any Works contract for a subproject until (i) relevant provisions from the EMP are incorporated into the Works contract; and (ii) the IEE is updated to reflect subproject's detailed

¹⁹ World Bank Group, 2007. *Environmental, Health, and Safety General Guidelines*. Washington, DC.

²⁰ Contractors to comply with (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.

design and PMO has obtained ADB's clearance of such IEE. For "design, build, and operate" type contracts, PMO shall ensure no works for a subproject which involves environmental impacts shall commence until (i) relevant provisions from the EMP are incorporated into the Works contract; and (ii) the IEE is updated to reflect subproject's detailed design and PMO has obtained ADB's clearance of such IEE.

B. Government Environmental Impact Assessment Law

85. **Environmental Protection Act, 1997.** This Act requires a proponent to undertake IEE or environmental impact assessment (EIA) of the proposed project and have the IEE or EIA Report approved by the concerned sector agency (CSA)²¹ or Ministry of Science, Technology and Environment (MOSTE),²² respectively, prior to implementation.

86. **Environmental Protection Rules (EPR), 1997, and its amendments in 1999 and 2007.** The Rules defines implementing rule and regulations of the IEE or EIA process, elaborating the provisions in the EPA. The preparation, review and approval of IEE and EIA Reports are dealt with in Rules 3 to 7 and 10 to 14. Schedules 1 and 2 list down the projects of activities that require IEE and EIA respectively, as amended in 2007. Table 6 presents the required environmental assessment for activities/works under the subproject.

Table 6: Required Environment Assessment for the Activities of the Subproject Per EPR

| S. No. | Schedule 1: Activities Requiring Initial Environmental Examination Only | Schedule 2: Activities Requiring Environmental Impact Assessment | Applicable Environmental Assessment |
|-----------------------|--|--|---|
| Drinking Water Supply | | | |
| 1 | Surface water source with not more than 4 ft ³ safe yield and supply of not more than 50% of the water during the dry season. | Surface water sources with not more than 1 ft ³ safe yield, and the use of its entire part during the dry season. | Initial Environmental Examination (IEE) |
| 2 | Processing of water at the rate of more than 25 lps. | | IEE |
| 3 | Recharging of up to 50% of the total aquifer for the development of underground water sources. | Recharging of more than 50% of the total aquifer for the development of underground water sources. | IEE |
| 4 | Displacement of not more than 100 persons for operating a water supply scheme. | Displacement of more than 100 persons for the operating a water supply scheme. | IEE |
| 5 | Settlement of not more than 500 persons on the upper reaches of water sources. | Settlement of more than 50 persons on the upper reaches of water sources. | IEE |
| 6 | Supply of drinking water to a population ranging between 2,000 to 20,000. | Supply of drinking water to a population of more than 20,000. | IEE |

²¹ The concerned sector agencies (CSAs) are responsible for the: (i) review of applications for EIA scoping and approval of IEE schedules of work and terms of reference (TORs); (ii) review of submitted IEE or EIA Reports; (iii) approval of IEE Reports; (iv) forward of reviewed EIA Reports together with its review opinions and suggestions to Ministry of Science, Technology and Environment (MOSTE); and (v) monitoring and evaluation of project implementation impacts.

²² MOSTE is responsible for the: (i) approval of EIA schedules of work and TORs; (ii) approval of EIA Reports; and (iii) conduct of environmental audit of completed project after two years of operation.

| S. No. | Schedule 1: Activities Requiring Initial Environmental Examination Only | Schedule 2: Activities Requiring Environmental Impact Assessment | Applicable Environmental Assessment |
|--------|--|--|-------------------------------------|
| 7 | Supply of drinking water to a population ranging between 10,000 and 100,000 upon connecting new sources. | Supply of drinking water to a population of more than 100,000 upon connecting new sources. | IEE |

87. **Compliance of the subproject with EPR 1997 (as amended in 1999 and 2007).** The subproject falls under Schedule 1 activities and therefore requires an IEE. In compliance with this requirement, the PMO needs to prepare an IEE report following the procedures in the EPR and submit the report for approval to MOWS, which is the CSA (footnote 21) for the subproject. PMO needs to obtain an approved IEE from MOWS prior to award of any contracts under the subproject. PMO may opt to use one IEE report for compliance with ADB and government's environmental clearance requirements, provided that the IEE report complies with both ADB SPS and EPR 1997 requirements.

88. **Status of securing MOWS-approved IEE.** The PMO is currently in the process of securing MOWS-approved IEE in compliance with the EPR. PMO will ensure that the MOWS-approved IEE will be secured prior to the award of any contract under the subproject. A copy of the approval document from MOWS will be attached in the updated version of this IEE that will be submitted to ADB for final review and disclosure. 86.

C. Other Relevant National Laws, Policies and Guidelines

89. For this subproject, IEE is required per Government of Nepal EPA and EPR. Approval of the IEE from Ministry of Science, Technology and Environment (MOSTE) will be obtained prior to award of contract.

90. Table 7 below summarizes all other relevant national laws, policies and guidelines that will be complied with under UWSSP. As UWSSP will avoid projects with potential triggers for Category A classification per ADB SPS, all laws, policies and guidelines governing these types of projects are already excluded in the table.

Table 7: Other Relevant National Laws, Policies, and Guidelines of Nepal

| Policy/Law/ Guideline | Year * | Relevant Provisions | Remarks |
|----------------------------------|----------------|---|---|
| Aquatic Animal Protection Act | 1960 (1997) | It prohibits the closure or demolition of fish ladders and other structures that are placed in streams, rivers, lakes and other surface water bodies, to aid movement and migration and/or protect aquatic animals (Article 3A). Concerned water supply projects shall build fish ladder or make an aquatic nursery in the vicinity of affected water bodies for the artificial breeding of aquatic animals (Article 5B). | Relevant to subprojects that will tap surface water as source. |
| Water Resources Act | 1992 | A comprehensive law on the development, use and conservation of water resources in Nepal, it aims to minimize damage to water bodies by requiring the conduct of EIA & preparation of EIA Report before granting license to use water resources for any purpose. Proponents shall make sure that the beneficial use of water resources does not cause damage to other water uses/users (Article 4). Article | Relevant to all subprojects. IEE required for grant of use of water resources. Compliance with National Drinking Water Quality Standards |

| Policy/Law/ Guideline | Year * | Relevant Provisions | Remarks |
|---|--------|--|---|
| | | 7 ranks “drinking & domestic use” as first in the priority order of use of water resources, which will be one of the bases of decision in case of water use dispute Article 17 requires proponents to apply for any necessary land acquisition accordingly; Article 18, the compliance to quality standards in making use of water resources. Article 19 prohibits the pollution of water resources. Under the Act are two regulations for drinking water purposes: (i) Water Resources Regulation, 1993, setting out the implementation procedures for the Act; and (ii) the Drinking Water Regulation, 1998, which specifies compliance with the drinking water quality standards and control of water pollution (or sanitation) as it affects drinking water. | (NDWQS) |
| Labor Act | 1992 | Chapter 5 stipulates health and safety provisions at work places, keeping work premises clean and safe, e.g., (i) with provisions for solid waste, sewage and hazardous substance management; (ii) instituting measures to prevent dust, fumes and other impure materials that would adversely affect health; (iii) with supply of potable water and water for emergency situations; (iv) with arrangements for the use of protective devices and wears; (v) with fire safety arrangements; and (vi) measures for protection from hazardous machines/equipment and from physical injury or harm from lifting of heavy weights. | EMP provides measures to mitigate workers’ health and safety hazards |
| National Environmental Policy and Action Plan (NEPAP) | 1993 | Of its five objectives, the most relevant to UWSSP are to: (i) mitigate adverse environmental impacts of projects; and (ii) safeguard national & cultural heritage and preserve bio-diversity, within and outside protected areas. | EMP implementation is the overall measure to mitigate adverse impacts. Heritage sites & protected areas shall be avoided. |
| National Water Supply and Sanitation Policy | 1998 | The Policy requires the monitoring of water quality supplied by completed WSS projects. | Monitoring of supplied water in compliance with the NDWQS and its Directives will meet the Policy’s requirement. |
| Drinking Water Rules | 1998 | The Rules: (i) gives the procedure for the settlement of dispute on use of water sources; (ii) requires water supplier to maintain the water quality as prescribed in the Water Resources Act; (iii) prohibits water supplier to construct structures and conduct activities that would pollute the water source & cause significant adverse effect on the environment. | Subprojects to ensure adequate consideration of other water uses of same source during design to avoid disputes; to implement the EMP (both mitigation and monitoring) during construction and operation. |
| Local Self-Governance Act | 1999 | The Act gives Local Government the functions, duties and powers to, among others: (i) conserve and protect their local environment and natural resources; (ii) plan, implement and/or operate and maintain local water supply projects; (iii) implement | Provides basis for Local Government to monitor the environmental performance of the subprojects. |

| Policy/Law/ Guideline | Year * | Relevant Provisions | Remarks |
|---|--------|---|---|
| | | or arrange for implementation local sanitation/sewerage and drainage projects; (iv) protect cultural heritage and religious sites; and/or (v) monitor project activities within their jurisdictions. | |
| National Urban Policy | 2007 | Policy gives importance to environment conservation while carrying out urban development works and natural resource use; thus, supporting the required environmental conservation and protection in donor-assisted development projects. | Relevant to all subprojects. |
| National Urban Water Supply and Sanitation Sector Policy | 2008 | The Policy requires the IEE or EIA of proposed WSS projects in accordance with the EPA and EPR. Such assessments are to: (i) incorporate consultations with key stakeholders, including end-point users; and (ii) specify measures to mitigate environmental impacts prior to and during construction and during operation, as well as corrective measures. | Requires IEE or EIA of all subprojects. |
| Implementation Directives for the National Drinking Water Quality Standards | 2005 | It sets out the water sampling, testing, analysis, monitoring and surveillance procedures to certify that the quality of supplied drinking water conforms to the National drinking Water Quality Standards. | Guide to drinking water quality monitoring. |
| Solid Waste Management Act | 2011 | Article 4 provides that the management of hazardous, medical, chemical or industrial waste rests upon the generators of such wastes. Management shall be as prescribed in the Act. Article 5 provides that individuals and entities have the duty to reduce the amount of solid waste generated while carrying out work or business. | All subprojects to manage generated solid wastes accordingly. |

* (Year) – Year last amended.

91. Following requirements of ADB SPS, PMO and RPMOs shall apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in EHS Guidelines. When the Government of Nepal regulations differ from these levels and measures, the executing agency shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific subproject circumstances, the executing agency will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

92. International Guidelines are presented, where applicable, to show comparison and will be useful if evaluation of quality monitoring results include checking of how subproject's environmental performance fare with international standards.)

Table 8: Ambient Air Quality Standards

| Parameter | Averaging Period* | Nepal's Ambient Air Quality Standard, 2003** ($\mu\text{g}/\text{m}^3$) | WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$) | | Standard values to be followed by the subproject ^{a, ^^^} ($\mu\text{g}/\text{m}^3$) |
|------------------|-------------------|---|---|-----------------------------------|---|
| | | | Global Update [^] 2005 | Second Edition ^{^^} 2000 | |
| TSP | Annual | - | - | - | |
| | 24-hour | 230 | - | - | 230 |
| PM ₁₀ | Annual | - | 20 | - | 20 |
| | 24-hour | 120 | 50 | - | 50 |
| PM ₂₅ | 1-year | - | 10 | - | 10 |
| | 24-hour | - | 25 | - | 25 |
| SO ₂ | Annual | 50 | - | - | 50 |
| | 24-hour | 70 | 20 | - | 20 |
| | 10-minute | - | 500 | - | 500 |
| NO ₂ | 1-year | 40 | 40 | - | 40 |
| | 24-hour | 80 | - | - | 80 |
| | 1-hour | - | 200 | - | 200 |
| CO | 8-hour | 10,000 | - | 10,000 | 10,000 |
| | 15-minute | 100,000 | - | 100,000 | 100,000 |
| Pb | 1-year | 0.5 | - | 0.5 | 0.5 |
| Benzene | 1-year | 20 | - | - | 20 |

^a If less stringent levels or measures are appropriate in view of specific project circumstances, the PMO will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

*Due to short term duration of civil works, the shortest period will be more practical to use.

**as implementing rules on ambient air quality standards under the Environmental Protection Act, 1997. Summary available from Environment Statistics of Nepal 2011, Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal.

[^] Source: Environmental, Health and Safety General Guidelines, 2007. International Finance Corporation, World Bank Group.

^{^^} Source: Air Quality Guidelines for Europe, Second Edition, 2000; WHO Regional Office for Europe, Copenhagen

^{^^^} Subject to capacity of executing agency to do the test, including the availability of facilities to do the test in the country.

Table 9: Noise Level Standards

| Receptor/ Source | National Noise Standard Guidelines, 2012* (dB) | | WHO Guidelines Value For Noise Levels Measured Out of Doors** (One Hour LA _q in dBA) | | Standard values to be followed by subproject (footnote 24) (in dB) | |
|------------------------|--|-------|---|---------------|--|-------|
| | Day | Night | 07:00 – 22:00 | 22:00 – 07:00 | Day | Night |
| Industrial area | 75 | 70 | 70 | 70 | 70 | 70 |
| Commercial area | 65 | 55 | 70 | 70 | 65 | 55 |
| Rural residential area | 45 | 40 | 55 | 45 | 45 | 40 |
| Urban residential area | 55 | 50 | 55 | 45 | 55 | 45 |
| Mixed residential area | 63 | 55 | 55 | 45 | 55 | 45 |
| Quiet area | 50 | 40 | - | - | 50 | 40 |
| Water Pump | 65 | | - | | 65 | |
| Diesel generator | 90 | | - | | 90 | |

* Environmental Protection Act, 1997 (as implementing rules on noise standard guidelines). Source: Government of Nepal National Planning Commission Secretariat, CBS. 2014. *Environment Statistics of Nepal 2013*.

** Guidelines for Community Noise, WHO, 1999. Source: Environmental, Health and Safety General Guidelines, 2007. International Finance Corporation, World Bank Group.

Table 10: Drinking Water Quality Standards

| Group | National Drinking Water Quality Standards, 2006 | | | WHO Guidelines for Drinking-Water Quality, 4 th Edition, 2011* | Applicable ^a |
|-------------|---|-----------|----------------------------|---|---|
| | Parameter | Unit | Max. Concentration Limits | | |
| Physical | Turbidity | NTU | 5(10) ** | - | 5(10) ** |
| | pH | | 6.5 – 8.5 | none | 6.5 – 8.5 |
| | Color | TCU | 5 (15) | none | 5 (15) |
| | Taste & Odor | | Would not be objectionable | - | Would not be objectionable |
| | TDS | mg/l | 1000 | - | 1000 |
| | Electrical Conductivity | µc/cm | 1500 | - | 1500 |
| | Iron | mg/l | 0.3 (3) | - | 0.3 (3) |
| | Manganese | mg/l | 0.2 | - | 0.2 |
| | Arsenic | mg/l | 0.05 | 0.01 | 0.01 |
| | Cadmium | mg/l | 0.003 | 0.003 | 0.003 |
| | Chromium | mg/l | 0.05 | 0.05 | 0.05 |
| | Cyanide | mg/l | 0.07 | none | 0.07 |
| | Fluoride | mg/l | 0.5 – 1.5 ^ | 1.5 | 0.5 – 1.5 ^ |
| | Lead | mg/l | 0.01 | 0.01 | 0.01 |
| | Ammonia | mg/l | 1.5 | none established | 1.5 |
| Chemical | Chloride | mg/l | 250 | none established | 250 |
| | Sulphate | mg/l | 250 | none | 250 |
| | Nitrate | mg/l | 50 | 50 | 50 |
| | Copper | mg/l | 1 | 2 | More stringent |
| | Total Hardness | mg/l | 500 | - | 500 |
| | Calcium | mg/l | 200 | - | 200 |
| | Zinc | mg/l | 3 | none established | 3 |
| | Mercury | mg/l | 0.001 | 0.006 | 0.001 |
| | Aluminium | mg/l | 0.2 | none established | 0.2 |
| | Residual Chlorine | mg/l | 0.1 – 0.2 | 5 ^^ | 0.1 – 0.2 |
| Micro Germs | E-coli | MPN/100ml | 0 | Must not be detectable in any 100 ml sample | 0 |
| | Total Coliform | MPN/100ml | 0 in 95% of samples taken | | Must not be detectable in any 100 ml sample |

* Health-based guideline values

** Figures in parenthesis are upper range of the standards recommended.

^ These standards indicate the maximum and minimum limits.

^^ From WHO (2003) Chlorine in Drinking-water, which states that this value is conservative.

Parameter with WHO guideline value as more stringent than national standard value

National Drinking Water Quality Standards was obtained from the Environment Statistics of Nepal 2011, Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal.

Source: Environment Statistics of Nepal 2011, Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal

^a If less stringent levels or measures are appropriate in view of specific project circumstances, the PMO will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

D. International Environmental Agreements.

93. Table 11 below lists the relevant international environmental agreements that Nepal is party to, and their relevance to various subprojects under UWSSP.

Table 11: International Environmental Agreements Relevant to Urban Water Supply and Sanitation (Sector) Project

| International Environmental Agreement | Year* | Relevant Provisions | Remarks |
|--|--------------|---|--|
| World Heritage Convention | 1978 | Parties to ensure the protection and conservation of the cultural and natural heritage situated on territory of, and primarily belonging to, the State | Urban Water Supply and Sanitation (Sector) Project (UWSSP) will help the Government of Nepal comply with this agreement. UWSSP will not support subprojects that negatively impact cultural and natural heritage of the country. |
| Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) | 1987 | Parties to conserve and wisely use wetlands (i.e., maintaining their ecological character) as a contribution towards achieving sustainable development locally and throughout the world | UWSSP will help the Government of Nepal comply with this agreement. UWSSP will not support subprojects that will locate in wetlands and other protected areas of the country. |
| Convention on Biodiversity | 1992 | Parties to require the environmental assessment of projects that are likely to have significant adverse effects on biological diversity with a view of avoiding or minimizing such effects | UWSSP will help the Government of Nepal comply with this agreement. UWSSP will not support subprojects that impact biodiversity in the country. |
| UN Framework Convention on Climate Change | 1992 | Parties to take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. | UWSSP will help the Government of Nepal comply with this agreement. UWSSP will ensure implementation of environmental management plans (EMPs) as measure to minimize the causes of climate change. |
| Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal | 1996 | Parties to, among others, minimize the amount and toxicity of hazardous waste generated, manage the hazardous and other wastes they generate in an environmentally sound manner and as close as possible to the source of generation. | UWSSP will help the Government of Nepal comply with this agreement. UWSSP will ensure implementation of EMPs as measure to avoid or minimize the generation and disposal of hazardous wastes. |

*(Year) – Year last amended.

IV. ANALYSIS OF ALTERNATIVES

A. With- and Without-Subproject Alternatives

94. Though Mechi Highway passes through this Ilam Municipality, the municipality is still facing significant development challenges: (i) the capacity of the existing intermittent water supply system is insufficient for its rapidly increasing population and urban development; (ii) incidents of water-borne diseases are on the rise due to consumption of contaminated water; and (iii) public places are in need of maintained community toilets.

B. With subproject's location alternative:

95. With the Project, 2,798 households (2017) will have convenient access to reliable and adequate safe and potable water supply and the local people will have easy access to sanitation at public places so that it helps to improve health and sanitation. As a result, good hygiene and

sanitation practices will be promoted, and there will be reduced health and safety risks. Overall, the 'with project alternative' will bring about enhanced public health and living environment that will contribute to improve the quality of life in the project municipality. Improved water supply and sanitation will create an enabling environment for local economic development and improved social services that communities within the sphere of influence of project municipality will benefit from; thus, contributing to the overall local economic development of the District.

96. The 'with project' alternative will contribute to the realization of the Updated 15-Yr Development Plan for Small Towns Water Supply and Sanitation Sector and the delivery of Nepal's commitment to Sustainable Development Goal (SDG) 6.

97. **Without-project' or 'do-nothing' alternative:** Doing nothing about these challenges would be allowing the municipality to further develop as "under-serviced", the health of its residents and the general public at more risks, and its living environment, worsened. This would impede (i) further social and economic development of the municipality and (ii) Nepal's delivery of its commitment to SDG 6 to increase the proportion of the population with sustainable access to safe drinking water and basic sanitation.

C. Alternatives Related to Planning and Design

1. Alternative Sources

98. There are no alternative sources available in the nearby vicinity to meet the overall demand for this project.

2. Alternative Design

99. In all options, structures from WTP to the distribution network remain the same. All the options consider the same restructuring of subsystems and rehabilitation of local sources. The distribution network will be same for all options. Therefore, all the options aim to serve the wards 6 & 7 (fully) and 8 & 9 (partially). The total population of the service area for the base year is estimated to be 14,634 in all options. Similarly, the total water demand in the area is estimated to be 2,711,196 lpd in the base year and 3,836,111 lpd in the design year in all of the three options. The difference in options is mainly related to use of different sources and related transmission lines.

3. System Alternative I

100. The first alternative considers the use of existing sources (16 lps from Gitang Khola and 4 lps from Bhadi Khola) and tapping new sources (10 lps from Gitang Khola downstream of existing hydropower and 10 lps from Rate Khola). The system has been designed as gravity system in which water from all four sources is conveyed to the WTP under gravity.

101. The water from all four different sources would need to be treated at the existing water treatment plant (WTP) at Charkhade. The existing structures would be used to the greatest extent possible. The proposed components are Collection Tank, Sedimentation Tank, Roughening Filter, Slow Sand Filter, and Disinfection Unit.

4. System Alternative II

102. This second alternative considers the use of existing sources as in the first option (16 lps from Gitang Khola and 4 lps from Bhadi Khola) and tapping new sources (10 lps from Rate Khola and 10 lps from Mewa Khola).

5. System Alternative III

103. This third alternative considers the use of existing sources as in option 1 & option 2 and tapping new sources (10 lps from Puwa Khola and 10 lps from Rate Khola). The water from Puwa Khola is also collected through gravity system.

6. Selected Alternative for Detail Design / Proposed Subproject

104. Technically all the options are feasible. Environmentally they are not much different. Socially, all these options are on equal footing. The results of the financial analysis show that all options are financially feasible. However, the capital cost of the alternative II is lower than other two options. It has been clearly mentioned in the feasibility report prepared by PPTA team "given financial feasibility, stakeholder's interest and better sustainability of the system"; Option 2 has been chosen as the best option for the project. In this option, four water sources; Gitang, Bhadi, Rate & Mewa Khola, have been considered to utilize for the proposed llam water supply and sanitation project.

105. Altogether, there are three sub- transmission system has been categorized in adopted alternative II. The existing transmission system further divided into two transmission sub-system. The under construction (rather rehabilitation) existing Gitang Khola transmission system is first transmission system and referred as TL-1S. The second one (TL-2S) is Bhade Khola Transmission system. Similarly, the new transmission system is third transmission system and referred as TL-3S which transport water from newly proposed river Rate & Mewa. These two new proposed river for abstracting water are tributaries of Mai Khola. These both rivers are perennial rivers fed through springs.

106. The summary comparisons of cost and other parameters of two alternatives are given below:

Table 12: Cost Comparisons of Three Alternatives Based on Feasibility Report

| S.N. | Particular | Alternative I | Alterative II | Alterative III |
|------|--------------------------------------|----------------|----------------|----------------|
| 1 | Total Capital Cost of WS NRs | 621,469,238.07 | 581,211,702.95 | 608,591,632.00 |
| 2 | Annual O&M Cost (NRs) | 6,400,184.87 | 6,182,469.47 | 6,330,669.11 |
| 3 | Total Base year Population | 14,634 | 14,634 | 14,634 |
| 4 | Length of Transmission Mains (m) | 56,473 | 42,559 | 51,886 |
| 5 | Length of Sub Transmission Mains (m) | 11,002 | 10,947 | 11,002 |
| 5 | Capital cost/Population Served in BY | 42,467.49 | 39,716.53 | 41,587.51 |
| 6 | O&M Cost /Population Served | 437.35 | 422.47 | 432.60 |
| 7 | Remark | | Preferred | |

D. Water Quality

107. The Water Supply and Sanitation Divisional Office (WSSDO) constructed water treatment plant (WTP) at Charkhade to treat water from Bhadi Khola and Gitang Khola sources. Due to design deficiencies and poor construction, it does not function properly and is out of operation

most of the time. There is a disinfection unit at WTP site but is rarely used. So the Municipality is supplying water to consumers virtually without any treatment.

108. The municipality does not have any testing/monitoring facility and trained human resources to conduct water quality monitoring and management programs. Ilam WSSDO has some field testing kits for water quality testing, but they are unused due to the lack of some necessary chemicals and parts. It used to carry out testing of some physical parameters such as turbidity of the municipal supply. Reportedly, a local NGO named Namsaling Community Development Centre (NCDC) carries out water quality test, but reports are not available. The outcome of water quality tests is presented in Table 13.

Table 13: Result of Water Quality Tests

| SN | Parameters | Unit | Observed Values of Sample at HW | | National Drinking Water Quality Standards, Nepal |
|----|-------------------------|-----------|---------------------------------|-------------|--|
| | | | 20 September 2017 | | |
| | | | Gitang Khola | Bhadi Khola | |
| | Physical | | | | |
| 1 | pH (26°C) | - | 7.2 | 7.3 | 6.5-8.5 |
| 2 | Electrical Conductivity | umho s/cm | 90 | 90 | 1500 |
| 3 | Turbidity | NTU | <5 | <5 | 5(10) |
| 4 | Color | TCU | 0.08 | 0.08 | 5(15) |
| 5 | Taste | | N.O. | N.O. | N.O. |
| 6 | Odor | | N.O. | N.O. | N.O. |
| 7 | Total dissolved solids | mg/l | 55 | 53 | 1000 |
| 8 | Total hardness as CaCo3 | mg/l | 40 | 36 | 5(15) |
| | Chemical | | | | |
| 9 | Chloride | mg/l | 3.72 | 3.72 | 250 |
| 10 | Total Residual Chlorine | mg/l | <0.10 | <0.10 | 0.1-0.2 |
| 11 | Sulphate | mg/l | <1.0 | <1.0 | 250 |
| 12 | Ammonia | mg/l | 0.05 | 0.10 | 1.5 |
| 13 | Nitrate | mg/l | 2.51 | 2.53 | 50.0 |
| 14 | Aluminium | mg/l | 0.029 | 0.031 | 0.20 |
| 15 | Fluoride | mg/l | 0.08 | 0.14 | 0.5-1.5 |
| 16 | Calcium | mg/l | 6.4 | 6.4 | 200 |
| 17 | Arsenic (As) | mg/l | <0.01 | <0.01 | 0.05 |
| 18 | Mercury | mg/l | <0.001 | <0.001 | 0.001 |
| 19 | Iron | mg/l | <0.05 | <0.05 | 0.30(3) |
| 20 | Manganese | mg/l | <0.05 | <0.05 | 0.2 |
| 21 | Cadmium | mg/l | <0.003 | <0.003 | 0.003 |
| 22 | Chromium | mg/l | <0.05 | <0.05 | 0.05 |
| 23 | Lead | mg/l | <0.01 | <0.01 | 0.01 |
| 24 | Copper | mg/l | <0.05 | <0.05 | 1 |
| 25 | Zinc | mg/l | 0.12 | 0.09 | 3.0 |

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment and Resources

1. Landforms and Topography

109. The Project area lies in a hilly region. Geographically, it lies in the hilly region lies on 26°51'58" N to 26°56'46" N latitude and 87°53'30" to 87°57'46" E longitude with altitudes ranging between 401 m to 1,407 m above mean sea level (amsl) for whole municipal area. However, the main Ilam bazaar lies at an altitude of 1,228 m amsl.

110. The project area is bounded towards the east by Namsaling separated by Mai Khola (River), to the west Rajduwali by Puwa Khola, to the north by Barbote VDC and to the south by Sangrumba separated by Puwa Khola. However, presently, the judiciary boundary of the municipality has been changed during last election incorporating the areas of adjoining VDC.

2. Land Use Pattern

111. According to the detailed design report, out of total 2666.19-hectare land covered by the project area, 50.59% area is covered by agriculture followed by forest with 34.93%. The residential area covers 8% of the project area. Likewise, Riverine & Lake area and Public Service Area covers 3.43% and 2.29% respectively. Other coverage is not potentially significant. Hence, it shows that dominance of agricultural cultivation and forests surround the project area.

3. Geology and Soils

112. Ilam municipality lies in the southern part of the higher Himalayan crystallines dominated by the Precambrian to Cambrian Kyanite and sillimanite bearing genesis, biotite schist, Metaquartzite, amphibolites, calc-silicate genesis, orthogenesis and angiogenesis.

113. All fresh rocks are strong, weathering is pronounced along less steep terraces that are covered either by residual soils or colluviums. Urban stress on the hill slopes is already getting visible – there are numerous landslides and smaller landslips along the steep drainages .

4. Climate

114. The climate of the project area is essentially warm temperate or sub-tropical with the temperature ranging between a maximum of 31.5°C in the summer to a minimum of about 6°C in the winter. The annual rainfall in the area is about 1,545 mm. The huge difference in altitude influences the variation in climate within the municipality.

5. Water Quality

115. The WSSDO constructed Water Treatment Plant (WTP) at Charkhade to treat water from Bhadi Khola and Gitang Khola sources. Due to design deficiencies and poor construction, it does not function properly and is out of operation most of the time. There is a disinfection unit at WTP site but is rarely used. So the Municipality is supplying water to consumers virtually without any treatment.

116. The municipality does not have any testing/monitoring facility and trained human resources to conduct water quality monitoring and management programs. Ilam WSSDO has some field testing kits for water quality testing, but they are unused due to the lack of some necessary chemicals and parts. It used to carry out testing of some physical parameters such as turbidity of the municipal supply.

6. Air Quality

117. There are few small industries in the project area. Air pollution is caused by fugitive dust from vehicle movements e.g. old and over smoky buses, tractor, heavy and overloaded trucks, old jeeps particularly over unpaved roads, construction activities, and wind action on unpaved exposed surfaces and industrial emissions from the wood mill, rice mill, and furniture. Gas emissions come from household cooking, open burning, and moving vehicles. Emissions from these sources are scattered regarding both locations and timing.

7. Acoustic Environment

118. The sources of noise in the Project area are from the construction activities, vehicle movements, and industrial activities. The anthropogenic noise is confined in few clustered settlements and market places only in the daytime.

B. Ecology, Environment and Resources

1. Natural Resource Management

119. Ilam Municipality is endowed with many natural resources like rivers, climate, forests etc. which has helped to enhance the economic development of Ilam municipality. There are several surface water sources in and around the project area. There are series of hydropower stations in these rivers. This may overexploit such kind of resources. These rivers are also used for cultivation. The proposed project will consider natural resource management to ensure the sustainability of the project. The main sources of energy of the project are electricity, kerosene, wood, dry branches leaves.

2. Flora

120. Ilam District is blessed with natural beauty of floral diversity. The common species of plants within and around the proposed project area are shown in Table 14.

Table 14: List of Plants in the Project Area

| S. No. | Scientific Name | Local Name | Family |
|--------|-----------------------------|-------------|---------------|
| 1 | <i>Vepris bilocularis</i> | Ainselu | Rosaceae |
| 2 | <i>Emblica officinalis</i> | Amala | Euphorbiaceae |
| 3 | <i>Pieris ovalifolia</i> | Angeri | Ericaceae |
| 4 | <i>Cedrealla toona</i> | Tuni | Meliaceae |
| 5 | <i>Lagerstroemia indica</i> | Ashare phul | Lythraceae |
| 6 | <i>Adhatoda vasica</i> | Asuro | Acanthaceae |
| 7 | <i>Melia azedarach</i> | Bakaino | Meliaceae |
| 8 | <i>Ficus bengalensis</i> | Bar | Moraceae |
| 9 | <i>Terminalia bellirica</i> | Barro | Combretaceae |
| 10 | <i>Aegle marmelos</i> | Bel | Rutaceae |
| 11 | <i>Rhus wallichii</i> | Bhalayo | Anacardiaceae |
| 12 | <i>Populus ciliate</i> | Bhote Pipal | Salicaceae |

| | | | |
|----|----------------------------------|----------------|---------------|
| 13 | <i>Lagerstroemia Parviflora</i> | Bot Dhayaro | Lythraceae |
| 14 | <i>Schima wallichii</i> | Chilaune | Theaceae |
| 15 | <i>Bassia butyracea</i> | Chyuri | Sapotaceae |
| 16 | <i>Berberis aristata</i> | Chutro | Berberidaceae |
| 17 | <i>Debregeasia salicifolia</i> | Daar | Urticaceae |
| 18 | <i>Garuga pinnata</i> | Dabdabe | Burseraceae |
| 19 | <i>Mussaenda macrophylla</i> | Dhobeni | Rubiaceae |
| 20 | <i>Colebrookea oppositifolia</i> | Dhursul | Labiatae |
| 21 | <i>Dioscorea bulbifera</i> L. | Githa | Dioscoreaceae |
| 22 | <i>Callicarpa macrophylla</i> | Guyanlo | Verbenaceae |
| 23 | <i>Lannea coromandelica.</i> | Hallunde | Anacardiaceae |
| 24 | <i>Terminalia chebula</i> | Harro | Combretaceae |
| 25 | <i>Syzygium cumini</i> | Jamun | Myrtaceae |
| 26 | <i>Phoebe 31ulpes31se31</i> | Jhankri syaula | Lauraceae |
| 27 | <i>Ficus lacor</i> | Kabro | Moraceae |
| 28 | <i>Anthocephalus chinensis</i> | Kadam | Rubiaceae |
| 29 | <i>Myrica esculenta</i> | Kafal | |
| 30 | <i>Adina cordifolia</i> | Karam | Rubiaceae |
| 31 | <i>Acacia catechu</i> | Khayar | |
| 32 | <i>Ficus semicordata</i> | Khanayo | Moraceae |
| 33 | <i>Sapium insigne</i> | Khirro | Euphorbiaceae |
| 34 | <i>Morus alba</i> | Kimbu | Moraceae |
| 35 | <i>Litsea monopelata</i> | Kutmiro | Lauraceae |
| 36 | <i>Duabanga grandiflora</i> | Lampate | Lythraceae |
| 37 | <i>Engelhardtia spicata</i> | Mauwa | Juglandaceae |
| 38 | <i>Erythrina stricta</i> | Phaledo | Leguminosae |
| 39 | <i>Ficus 31ulpes31se</i> | Pipal | Moraceae |
| 40 | <i>Pinus roxiburghii</i> | Sallo | Coniferae |
| 41 | <i>Terminalia tomentosa</i> | Saj | |
| 42 | <i>Bombax ceiba</i> | Simal | Bombacacea |
| 43 | <i>Vitex negundo</i> | Simali | Verbenaceae |
| 44 | <i>Mallotus philippensis</i> | Sindure | Euphorbiaceae |
| 45 | <i>Albizia chinensis</i> | Siris | Leguminosae |
| 46 | <i>Dalbergia sisoo</i> | Sisoo | |
| 47 | <i>Bauhinia vareigata</i> | Tanki | Leguminosae |
| 48 | <i>Alnus nepalensis</i> | Uttis | Betulaceae |

Source: IEE Field Visit Source: IEE Field Visit, 2017.

121. Non-Timber Forest Products (NTFPs) are defined products derived from forest species other than timber and fuelwood. The main NTFP species found along the project area are Amala (*Phyllanthus emblica*), Asura (*Justicia adhatoda*), Bilaune (*Maesa chisia*), Kurilo (*Asparagus officinalis*), Dhasingare (*Gaultheria fragrantissima*).

3. Fauna

122. Some of the mammals reportedly present in the nearby forests are listed in Table 15.

Table 15: Mammals in the Project Area

| S. No. | Common Names | Scientific Names |
|--------|----------------|------------------------|
| 1 | Buanso | <i>Canis lupus</i> |
| 2 | Common Leopard | <i>Panthera pardus</i> |
| 3 | Dumsi | <i>Histrix indica</i> |
| 4 | Fox | <i>Vulpes 31ulpes</i> |
| 5 | Golden Jackal | <i>Canis aureus</i> |

| S. No. | Common Names | Scientific Names |
|--------|----------------------|----------------------------------|
| 6 | Hill Mouse | <i>Mos hosmour</i> |
| 7 | Jungle Cat | <i>Felis Chaus</i> |
| 8 | Lokharke | <i>Funambulus sp.</i> |
| 9 | Long-winged Tomb Bat | <i>Taphozous longimanus</i> |
| 10 | Malsapro | <i>Martes flavigula</i> |
| 11 | Monkey | <i>Macaca mulatta</i> |
| 12 | Nepal Grey Langur | <i>Semnopithecus schistaceus</i> |

Source: IEE Field Visit Survey, 2017.

123. Some of the birds reported in the forest areas are listed in Table 16 given below:

Table 16: List of Birds in the Project Area

| S.No. | Common Names | Scientific Names | Status of occurrence | | |
|-------|----------------------|--------------------------------|----------------------|--------|------|
| | | | Common | Sparse | Rare |
| 1 | Asain Koel | <i>Eudynamys scolopacea</i> | | √ | |
| 2 | Barn owl | <i>Tyto alba</i> | | √ | |
| 3 | Battai | | | √ | |
| 4 | Bhangera | <i>Passer domesticus</i> | √ | | |
| 5 | Bhudi Phor | <i>Ciconia espiscopos</i> | | √ | |
| 6 | Bhyakur | <i>Pellorneum ruticepa</i> | | | |
| 7 | Blue-throated Barbet | <i>Megalaima australis</i> | √ | | |
| 8 | Chil | <i>Ictinaetus malayensis</i> | | √ | |
| 9 | Chyakhura | <i>Arborophila torqueola</i> | | √ | |
| 10 | Common Myna | <i>Acridotheres tritis</i> | √ | | |
| 11 | Dangre | | √ | | |
| 12 | Dhukur | <i>Streptofelia sp</i> | √ | | |
| 13 | Huchil | <i>Bubo bubo</i> | | √ | |
| 14 | Indian Cuckoo | <i>Cuculus micropterus</i> | √ | | |
| 15 | Jureli | <i>Pycnotus cafen</i> | | √ | |
| 16 | Kag | <i>Crocvus macrorhynchos</i> | √ | | |
| 17 | Kalij | <i>Lophura leucomelano</i> | √ | | |
| 18 | Koili | <i>Cuculus micropterus</i> | √ | | |
| 19 | Lampuchure | <i>Caprimulgus macrurus</i> | | √ | |
| 20 | Lato Koshero | <i>Bubo nepalensis</i> | | | √ |
| 21 | Nyauli | <i>Megalaima species</i> | | √ | |
| 22 | Suga | <i>Psittacula cyanocephala</i> | √ | | |

Source: IEE Field Visit Survey, 2017.

124. The commonly found reptiles and amphibians observed in the project area are shown in Table 17 given below.

Table 17: List of Reptiles and Amphibians Found in the Project Area

| Common Name | Scientific Name |
|--------------------|-----------------------------|
| Rat snake | <i>Ptyas mucosus</i> |
| Mountain pit viper | <i>Ovophis monticola</i> |
| Green Pit viper | <i>T. albolabris</i> |
| Garden lizard | <i>Calotes versicular</i> |
| Common lizard | <i>Hemidactylus brookii</i> |
| Common toad | <i>Bufo melanostictus</i> |
| Stream frog | <i>Rana cyanophylectis</i> |

Source: IEE Field Visit, 2017.

4. Aquatic Life

125. Similarly, common fishes found in the project area are given in Table 18.

Table 18: List of Fishes Found in the Project Area

| SN | Scientific Name | Local Name | Migratory species | Economic Importance |
|----|---------------------------------------|----------------|-------------------|---------------------|
| 1 | <i>Barilius Vagra</i> | Faketa | R | Food |
| 2 | <i>Garra</i> sp | Buduna | R | Food |
| 3 | <i>Glyptothorax</i> sp | Kabre | R | Food |
| 4 | <i>Heteropneustes fossilis</i> | Singhi | R | Food |
| 5 | <i>Neolissocheilus hexagonolepis</i> | Katle | MM | Food |
| 6 | <i>Noemacheilus</i> sp | Gadela | R | Food |
| 7 | <i>Psilorhynchoides pseudecheneis</i> | Tite (Endemic) | R | Medicinal |
| 8 | <i>Schizothorachthys</i> sp | Asala | R to MM | Food |
| 9 | <i>Channa gachua</i> | Hile | R | Food |
| 10 | <i>Tor tor</i> | Sahar | R to MM | Food |

Source: IEE Field Visit, 2017.

5. Protected Areas

126. No national parks and protected areas exist in the project area. The proposed project intervention will affect none of the forest areas.

C. Socioeconomic and Cultural Environment

1. Settlement pattern

127. The town is located in a hilly area with heterogeneous ethnic composition. Most of the government and non-governmental offices are located in ward no 7, which is the most densely populated area in the service area.

128. Wards of the service area are comprised of many settlements. These settlements are referred as *Gaun* or *Tol* or *Chok* or Bhanjyang. Settlement hamlets located at the crossroads are referred as *Chok*. Likewise, the linear settlements along the main roads are referred as *Tol*. Other isolated or agglomerated settlements are normally called *Gaun* here although the distinctions are rather blurred.

2. Population and Household

129. The total population of the project town as per 2011 census was about 48,536 living in 11,383 households. The ward-wise population of the project area of the town according to the census, 2001 and 2011 has been presented below:

Table 19: Population of the Concern Ward of Project Town

| Ward | W. Area (ha) | Census 2001 | | | Census 2011 | | | Growth Rate |
|------|--------------|-------------|-------|---------------------|-------------|-------|---------------------|-------------|
| | | HHs | Pop | P. Densities (PPHA) | HHs | Pop | P. Densities (PPHA) | |
| 1 | 2,053 | 761 | 3,779 | 1.84 | 932 | 4,045 | 1.97 | 0.68 |
| 2 | 1,525 | 478 | 2,564 | 1.68 | 591 | 2,563 | 1.68 | 0.00 |
| 3 | 2,127 | 558 | 3,020 | 1.42 | 634 | 2,927 | 1.38 | -0.31 |
| 4 | 924 | 535 | 2,784 | 3.01 | 631 | 3,008 | 3.26 | 0.78 |
| 5 | 1,432 | 911 | 4,591 | 3.21 | 1,139 | 5,101 | 3.56 | 1.06 |
| 6 | 453 | 746 | 3,216 | 7.10 | 968 | 3,821 | 8.43 | 1.74 |
| 7 | 103 | 1,272 | 4,745 | 46.07 | 1,435 | 5,132 | 49.83 | 0.79 |
| 8 | 978 | 723 | 3,460 | 3.54 | 902 | 3,922 | 4.01 | 1.26 |

| Ward | W. Area (ha) | Census 2001 | | | Census 2011 | | | Growth Rate |
|-------|--------------|-------------|--------|---------------------|-------------|--------|---------------------|-------------|
| | | HHs | Pop | P. Densities (PPHA) | HHs | Pop | P. Densities (PPHA) | |
| 9 | 1,128 | 1,276 | 4,819 | 4.27 | 1,427 | 5,758 | 5.10 | 1.80 |
| 10 | 2,183 | 924 | 4,600 | 2.11 | 1,137 | 4,978 | 2.28 | 0.79 |
| 11 | 2,582 | 404 | 2,064 | 0.80 | 799 | 3,616 | 1.40 | 5.77 |
| 12 | 1,777 | 683 | 3,637 | 2.05 | 788 | 3,665 | 2.06 | 0.08 |
| Total | 17,265 | 9,271 | 43,279 | 2.51 | 11,383 | 48,536 | 2.81 | 1.15 |

Source: CBS 2001 and 2011.

130. The above tables show that average annual population growth rate of the project area is only 1.15%. Ward number 3 of the municipality has declining population growth in last one decade. The population density of this ward is lowest because of the comparatively declining population. The overall population density of the project area increased from 2.51 (2001 AD) to 2.81 (2011 AD) persons per hectare.

131. The average HHs size of the area has decreased from 4.67 in 2001 to 4.26 in 2011. Ward 7 of the municipality, old Ilam Bazaar area (former WN 1 and 2), is the only densely populated ward. The population density of this ward is comparatively high (about 50 PPHA). The population density of other remaining wards area is less than 10 PPHA. The overall population density of the municipality increased slightly from 2.51 PPHA (2001 AD) to 2.81 (2011 AD) PPHA. This may be due to increase in the area of the municipality. If we compare in the former scenario, the overall population density of the project area increased slightly from 6.10 PPHA (2001 AD) to 7.00 PPHA (2011 AD) persons per hectare.

132. The consultants conducted a socioeconomic survey in 2017 of the proposed service area. It shows that the total population of the service area is 20,704. The following table shows the coverage of the population, including beneficiary households in the project area.

Table 20: Beneficiaries households

| Ward | Households | Population |
|-------|------------|------------|
| 6 | 529 | 3,367 |
| 7 | 1,119 | 9,823 |
| 8 | 513 | 3,025 |
| 9 | 637 | 4,489 |
| Total | 2,798 | 20,704 |

Source: Socio-economic survey 2017.

3. Ethnicity and Caste

133. The composition of the community by caste/ethnic is heterogeneous. Therefore, diversity of cultures, customs, traditions, norms, and values exists in the project area. The household survey of the subproject area also reflects the cross-section of major ethnic groups of the country.

134. The survey revealed that Brahmin/Chhetri are major groups comprising of 57.3%(1604) households in the service area. Similarly, Janajati/ethnic (Limbu, Magar, Rai, Sherpa, Tamang, Gurung, Newar, etc.) are the second largest group comprising of 37% (1035) of total household whereas, Dalit and other cast (Madeshi, Musalman etc.) comprising 5% (137) and 0.8% (22) respectively. The details of information are presented in Table 21.

Table 21: Distribution of Households and Population by Ethnic composition

| S. No. | Caste/Ethnic Group | Ward | | | | Total | Percentage (%) |
|--------|---------------------------------|------|------|-----|-----|-------|----------------|
| | | 6 | 7 | 8 | 9 | | |
| 1 | Brahman/ Chhetri | 247 | 596 | 327 | 434 | 1604 | 57.3 |
| 2 | Janajati | 246 | 447 | 178 | 164 | 1035 | 37.0 |
| 3 | Dalit | 35 | 61 | 6 | 35 | 137 | 4.9 |
| 4 | Others (Madhesi, Musalman etc.) | 1 | 15 | 2 | 4 | 22 | 0.8 |
| | Grand Total | 529 | 1119 | 513 | 637 | 2798 | 100 |

Source: Socio-economic survey 2017.

4. Education and Health

a. Education

135. Various public and private institutions such as school and college, community-based organization/NGO, bank, financial institutions; hospitals, hotels, and lodge exist within the service area. According to the institutional data obtained from the survey, nine educational institutions including one diploma level college as well as eight schools with primary to a higher secondary level were recorded in the service area with 6112 people including students, staffs, and teachers. Similarly, most of the educational institutions depend on both taps and springs for the water supply.

b. Health

136. Medical facilities for diagnosis and treatments are available in the service area. One district hospital with 15-bed capacity exists in the service area. Likewise, more than 23 governmental, non-governmental and financial institutions exist in the area and provide services to the community. The existing financial institutions are Bank of Kathmandu, Agricultural Bank, Rastriya Banijya Bank, etc. Similarly, some cooperatives are also in operation in the area.

c. Water Borne and Communicable Diseases

137. The survey revealed that cases of waterborne diseases such as diarrhea, dysentery, stomachaches and skin disease, etc. are found to be very few. Similarly, cases of mortality by water-related diseases are nil. Visits to hospital and health posts within the service area crosschecked the information related to water-borne and communicable diseases. According to the survey, about 8.50% suffered from diarrhea whereas 5.60% were suffered from dysentery. Similarly, about 5.19% suffered from other diseases such as skin diseases, stomach pains, fever.

d. Economic Activities

138. Most households in the project area have more than one source of income. However, the socio-economic survey shows that the main occupation of the people is still agriculture which accounts for 45 % of the total households. The business sector is the second largest occupation (18%) followed by service sector (government or private sector) (17%), remittance (6%) and labor (6.6%).

139. There are more than 23 governmental, non governmental and financial institutions in the service area. Some of them are Bank of Kathmandu, Agricultural Bank, Rastriya Banijya Bank etc. Similarly, some cooperatives are also in operation in the area.

e. Income Level and Poverty Conditions

140. The survey revealed that main sources of household income of the service area are agriculture, service, remittance and wage labor, respectively. Among the total household, 41 percent have a monthly income of more than NRs20,001-50,000 and about 26% of household have a monthly income of NRs10,876-20,000. Likewise, 8.8% of households are earning more than NRs50,000. The study shows that only 7.7% of households fall under the poor category as they are only earning less than NRs7,500 per month. The monthly incomes of HHS in the service area are given in the Table 22.

Table 22: Income Level of Households by Ward

| S.N. | Income Level Range | Ward | | | | Total | Percentage (%) |
|------|--------------------|------|------|-----|-----|-------|----------------|
| | | 6 | 7 | 8 | 9 | | |
| 1 | < Rs. 7,500 | 59 | 96 | 23 | 37 | 215 | 7.7 |
| 2 | Rs.7501-10,875 | 92 | 208 | 84 | 78 | 462 | 16.5 |
| 3 | Rs. 10,876-20000 | 129 | 225 | 111 | 264 | 729 | 26.1 |
| 4 | Rs. 20,001-50,000 | 227 | 467 | 248 | 203 | 1,145 | 40.9 |
| 5 | >Rs.50,000 | 22 | 123 | 47 | 55 | 247 | 8.8 |
| | Grand Total | 529 | 1119 | 513 | 637 | 2,798 | 100 |

Source: Socio-economic Survey 2017.

f. Willingness to Pay

141. Assessing the income level of households, more than 92.3% of households can afford monthly water tariff and upfront cash contribution. However, the survey revealed that only 2.9 % of the households in the project area are found to be willing to pay more than NRs15,000 for connection charges. Similarly, 28.6 % of the households are willing to pay between NRs9,000 to NRs 15,000. Similarly, 5.7% and 15 % of the households are willing to pay between NRs3,001 to NRs6,000 and between NRs1,501 to NRs3,000, respectively. Those who are willing to pay less than NRs1,500 were 47.9 % of the total households.

D. Existing Sanitation Situation

1. Sanitation Facilities

142. The survey shows that 98% of the households have latrine facilities and only 2% of HHS do not have latrines in their house.

143. The survey also shows that about 72% of HHS have pour flush latrines whereas 12% of HHS have pit latrines. About 9% have ventilated pit latrines whereas only 4.4% of HHS are using cistern flush type of pit latrine. Table 23 presents the type of toilets in use in the project area.

**Table 23: Toilet Coverage
(HHS)**

| S.N. | Type of Toilet | Ward No. | | | | | Total | % |
|------|-----------------------|----------|------|-----|-----|-------|-------|---|
| | | 6 | 7 | 8 | 9 | | | |
| 1 | No Toilet | | 11 | 16 | 28 | 55 | 2.0 | |
| 2 | Pit Toilet | 36 | 159 | 7 | 139 | 341 | 12.2 | |
| 3 | Ventilated Pit Toilet | 5 | 39 | 50 | 164 | 258 | 9.2 | |
| 4 | Pour flush | 485 | 811 | 438 | 287 | 2,021 | 72.2 | |
| 5 | Cistern Flush | 3 | 99 | 2 | 19 | 123 | 4.4 | |
| | Grand Total | 529 | 1119 | 513 | 637 | 2,798 | 100 | |

Source: Field Survey 2017.

144. The existing latrines in individual houses and schools are not maintained properly. The community has very limited knowledge on the use of sanitary latrines and personal hygiene, especially in the city periphery.

2. Drainage Facilities

145. There is no proper drainage system for stormwater as well as for the domestic sewage in the project area. However, stormwater drainage is not a major problem in the project area because of its hilly nature and availability of steep gradients.

3. Wastewater Management Practices

146. There is no wastewater system in the service area. Wastewater from individuals is managed inside the house. The socio-economic survey conducted in 2017 shows that 97.1% HHs have their toilet. There is no wastewater treatment plant in the municipality to treat domestic sewage/septage. The survey shows that 99% of sampled HHs are interested in improving septage management system and in paying for it.

4. Solid Waste

147. There is no proper system of solid waste collection and disposal in the project area. 88.57% of HHs dispose of solid waste in the pit around the house while about 7.14% have private collectors for collecting solid waste. It was observed that the respondents have sufficient knowledge about improperly managed solid waste that may affect public health and the surrounding environment. The disposal of solid waste is done according to Table 24.

Table 24: Solid Waste Management Practice

| S. No. | Waste Management Practice | Ward | | | | Total | % |
|--------|---|------|----|----|----|-------|-------|
| | | 6 | 7 | 8 | 9 | | |
| 1 | Pit Near to House | 19 | 54 | 26 | 25 | 124 | 88.57 |
| 2 | Private Collector | 3 | 5 | 1 | 1 | 10 | 7.14 |
| 3 | Pit/Container managed by VDC/Municipality | 0 | 0 | 0 | 2 | 2 | 1.43 |
| 4 | Other | 0 | 4 | 0 | 0 | 4 | 2.86 |
| | Grand Total | 22 | 63 | 27 | 28 | 140 | |

Source: Sample Survey by PMO, 2017.

5. ODF Situation in Service Area

148. Ilam municipality has been declared as ODF area in February 26, 2015. This shows that all households in the town have latrines. Despite of this, our field survey shows that the community has very limited knowledge on the use of sanitary latrines and personal hygiene, especially in the city periphery.

6. Institutions Involved in Water Supply and Sanitation Field

149. The main institutions involved in water supply and sanitation in the project area are Division and Sub-division Offices of the Department of Water Supply and Sewerage (DWSS and WSSDO), Ilam Municipality, Nepal Water Supply and Sewerage Corporation (NWSC), JICA, SEAM-N, NCDC, NRCS and some others. NWSC in September 2013 approached the

municipality to operate the system, which has not materialized. JICA provided technical and financial assistance to expand the system during 1991/92. SEAM-N provided suction tanker and other support mainly to improve the sanitary and environmental condition of the area. Some local NGOs including NDCDC, NRCS, and others have been implementing community-based rural water supply and sanitation projects in the area and active in sanitary improvement activities. The Ilam branch of (Federation of Water Supply and Sanitation Users Committee Nepal (FEDWASUN)) is active in carrying out different activities to increase the community participation on these projects.

150. DWSS implemented an Ilam Water Supply Improvement Project in 1981 and again supplemented discharge from Gitang Khola in the system in 1998. It constructed Water Treatment Plant in Charkhade. The WSSDO Ilam prepared Detailed Engineering Study and Design of Ilam Water Supply Project Rehabilitation in 2012. Based on this report, it has been laying transmission line with an estimated investment of about NRs5 million per year. It has been providing guidance, supervision, and assistance for major repairs. It has been providing both financial and technical support for large-scale maintenance and providing pipes, bleaching powder and human resource as and when needed basis. The Ilam WSSDO has facilitated the development of this proposed subproject.

151. With formal agreement from WSSDO in 1998, Ilam Municipality has been managing the existing system. It is the only operator of the existing system, which includes main system (Bhadi Khola and Gitang Khola sources) and nine local sources. It has a separate section with specified responsibilities. It has been collecting water revenue and spending on the sector to maintain the system. It prepared Water Supply Management Guidelines in 2009 and had been operating the system.

7. Water Supply and Sanitation User's Association

152. The WUSC was registered in Water Resource Committee, Ilam as per the Water Resource Act-2049 and Water Resource Rule-2050 and involved in management and improvement of the water supply system in Ilam Bazaar. The name of current WUSC members and their designations are presented below:

Table 25: Members of Ilam Water Supply Users and Sanitation Committee

| S.N. | Name | Position |
|------|------------------------------|------------------|
| 1 | Mr. Kedar Thapa | Chairperson |
| 2 | Ms. Shanta Basnet | Vice Chairperson |
| 3 | Mr. Tilak Bahadur Thakuri | Secretary |
| 4 | Mr. Chhabilal Acharya | Treasurer |
| 5 | Mr. Rupdhan Rai | Member |
| 6 | Ms. Susila Sapkota | Member |
| 7 | Mr. Dhan Bahadur Thapa Magar | Member |
| 8 | Mr. Rudra Sampang | Member |
| 9 | Mr. Indra Ghimire | Member |

153. It is intended that the WUSC will assist the PMO to implement the proposed project and it will operate and maintain Ilam water supply system to provide regular and quality drinking water to the consumers.

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Beneficial Impacts

154. Availability of clean and adequate drinking water and sanitary facility are basic human needs. The development of water and sanitation facilities will have numerous beneficial impacts to individuals and communities. The quality of life of the project area will be significantly improved by improving water and sanitation needs. Some of the major beneficial impacts of the project are described below along with suggestions for achieving optimal benefits.

155. **Employment Generation.** The project will generate direct employment opportunities e.g. skilled and non-skilled work for the local people. Construction activities such as laying and joining of pipelines will create an opportunity for local people to get engaged. The earning will positively affect the local economy, thereby reducing the chances of seasonal migration of the local people. To obtain such benefits, priority will be given to local laborers. The impact is thus direct in nature, local in extent, medium in magnitude and short term in duration.

156. **Skill Enhancement.** The construction of the project will not only provide direct employment opportunities but also ensure the transfer of skills and technical proficiency to the local workforce. The project activities i.e. constructing mechanical treatment plants, surface drains, valve chambers and buildings will generate transferable skills. In future, these skills will be useful for locals to generate income as well as implement when the need arises. To obtain or augment such benefits, proper work plans and codes of conduct should be implemented during the construction. The impact is thus indirect in nature, local in extent, medium in magnitude and long-term in duration.

157. **Local Trade and Business Opportunity.** The proposed project creates business opportunities in the project area. Because construction work involves many workforces, sales from few shops with food items and agriculture and livestock products will increase around the construction site. This demand and supply chain will boost local trade and the business sector. The impact is thus direct in nature, local in extent, medium in magnitude and long-term in duration.

158. **Improved Health and Hygiene.** Deteriorating water quality and unsanitary conditions are often the causes of waterborne communicable diseases. After the implementation of the project, the hygiene of the local people will improve which will reduce the occurrence of waterborne diseases thereby improving the public health in the area. Regular maintenance of the project components needs to be carried out so that the project operates smoothly and the benefits are kept intact. The impact is thus direct in nature, local in extent, high in magnitude and long-term in duration.

159. **Local Trade and Business Opportunity.** The proposed project creates business opportunity in the project area. It is because construction work involves many workforces, few shops about food items and, agriculture and livestock product will gain a momentum around the vicinity of the construction site. This demand and supply chain will boost local trade and business sector. The impact is thus direct in nature, local in extent, medium in magnitude and long-term in duration.

160. **Increased economic opportunity.** After the completion of the project, migration from rural areas to this project town may increase in search of better facilities and opportunities. This will increase the value of the land, thereby uplifting the economic status of the local people. These benefits can be maximized by ensuring regular maintenance of water supply and sanitation

components and by promoting land development activities in the area. The impact is thus indirect in nature, local in extent, medium in magnitude and long-term in duration.

161. **Women Empowerment.** Women and girls are mainly responsible for household activities. Improved water supply and sanitation will contribute towards better health and hygiene of women, girls and the entire household members. The beneficial impacts to women and girls can be augmented by conducting health and awareness programs to the local community. The impact is thus indirect in nature, local in extent, low in magnitude and long-term in duration.

162. **Quality of Life Values.** The general provision of potable water and proper sanitation facilities will bring about better personal, household and community hygiene practices, resulting to better health for the family and community, and ultimately an overall improvement in the locals' quality of life.

163. Overall, the Project will lead to improved public health and environment, significantly improving the quality of life of the Bhimeshwor Municipality residents.

164. To sustain the positive outcomes, effective operation, and maintenance guided by an O&M manual that contains Water Safety Guide, among others, is essential. Continuing hands-on training of WUSC in EMP implementation particularly water quality monitoring is necessary.

Table 26: Summary of Impact Matrix of Beneficial Issues of BWSSP

| Beneficial Impacts | Impact Rating | | | | |
|-------------------------------|---------------|-----------|--------|----------|------------------------|
| | Nature | Magnitude | Extent | Duration | Rating |
| Construction Phase | | | | | |
| Employment Generation | D | M (20) | L (20) | ST (5) | Significant (45) |
| Skill Enhancement | IN | M (20) | L (20) | LT (20) | Significant (60) |
| Local Trade and Business | D | M (20) | L (20) | LT (20) | Significant (60) |
| Operation Phase | | | | | |
| Improved Health and Hygiene | D | H (60) | L (20) | LT (20) | Very Significant (100) |
| Increase Economic Opportunity | ID | M (20) | L (20) | LT (20) | Significant (60) |
| Women empowerment | ID | L (10) | L (20) | LT (20) | Significant (50) |

Note:

1. Scoring is done based on following;

Nature of Impact: D = Direct; IN = Indirect;

Magnitude, H = High (60); M = Medium/Moderate (20); and L = Low (10)

Extent, R = Regional (60), L = Local (20); and S = Site-specific (10)

Duration, LT = Long-term (20), MT = Medium-term (10); and ST = Short-term (5)

The points/scoring are taken from the National EIA Guidelines, 1993

2. Significance of Impact

Total Score:

More than 75 : Very Significant

50-75 : Significant

Less than 50 : Insignificant.

8. Assessment of Potential Impacts Due to the Subproject

165. The nature of this subproject and scope of the civil works will generate impacts, issues and concerns prior to construction, during construction and during operation. The potential impacts, issues and concerns from assessed sample subprojects and future subprojects using ADB REA checklist for water supply (Appendix 1) and "no mitigation measures scenario" checklist developed for UWSSP (Appendix 2) are presented in Table 27 below.

Table 27: Water Supply and Sanitation Subproject Potential Environmental Impacts, Issues and Concerns (No Mitigation Measures Scenario)

| Design | Construction | Operations and Maintenance |
|---|--|--|
| <p>inadequate protection of intake works or wells, leading to pollution of water supply</p> <p>increase in production of sewage beyond capabilities of community facilities</p> <p>inadequate buffer zone and treatment plants</p> <p>health hazards arising from inadequate design of facilities for receiving, storing and handling of chlorine and other hazardous chemicals</p> <p>increased sewage flow due to increased water supply</p> <p>disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups</p> <p>permanent or temporary change in land use or topography including increases in intensity of land use</p> | <p>noise</p> <p>dust</p> <p>traffic</p> <p>impairments associated with transmission lines and access roads</p> <p>health and safety hazards to workers</p> <p>continuing soil erosion/ silt runoff</p> <p>population influx that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)</p> <p>social conflicts if workers from other regions or countries are hired</p> <p>risks to community health and safety due to transport, and use and/or disposal of materials such as explosives, fuel and other chemicals</p> <p>community safety risks due to both accidental and natural hazards, especially where structural elements or components of the project are accessible to the members of the affected community or where failure could result in injury to the community</p> <p>clearance of existing land, vegetation or building</p> <p>pre-construction investigations (boreholes, soil testing, etc)</p> <p>construction works</p> <p>demolition works</p> <p>temporary sites used for construction works or housing of construction workers</p> <p>cut and fill or excavations</p> <p>working in stream crossings</p> <p>use of resources (materials, water, energy, etc.)</p> <p>changes in occurrence of disease or affect disease vectors (e.g. insect or water-borne disease) due to worker's camp</p> <p>solid wastes such as spoils, overburden, etc.</p> <p>solid wastes from worker's camp</p> <p>emission from burning of waste in open air (e.g. worker's camp, slash materials, construction debris)</p> | <p>unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)</p> <p>delivery of unsafe water to distribution system</p> <p>excessive algal growth in storage reservoir</p> <p>increase in production of sewage beyond capabilities of community facilities</p> <p>inadequate disposal of sludge from water treatment plants</p> <p>health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards</p> <p>delivery of unsafe water due to poor O&M treatment processes (especially mows accumulations in filters)</p> <p>inadequate chlorination due to lack of adequate monitoring of chlorine supply</p> <p>delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals</p> <p>accidental leakage/spillage of chlorine</p> <p>population influx that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)</p> <p>social conflicts if workers from other regions or countries are hired</p> <p>risks to community health and safety due to transport, and use and/or disposal of materials such as explosives, fuel and other chemicals</p> <p>community safety risks due to both accidental and natural hazards, especially where structural elements or components of the project are accessible to the members of the affected community or where failure could result in injury to the community</p> <p>use of resources (materials, water, energy, etc.)</p> <p>WTP sludge</p> <p>positive impacts – employment to local people; safe and easy access to improved water supply which will enhance people's health, and boost economic conditions of municipalitie</p> |

166. **Location and Design.** As subproject locations/sites are screened during selection process, environmental impacts due to location are not anticipated in llam water supply and sanitation subproject. The environmental assessment of the subproject shows that it is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Potential impacts are unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific and few if any of them are irreversible.

167. Planning principles, subproject selection criteria, and design considerations have been reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location were not significant (Table 28). Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result significant measures have already been included in the subproject designs.²³

168. In most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors. Once the subprojects are operating, the facilities will operate with routine maintenance, which shall not affect the environment. Improved system operation will comply with the operation and maintenance manual and standard operating procedures to be developed for all the subprojects.

Table 28: Impacts and Mitigation Measures during Design Phase

| Project Activity | Potential Environmental Impacts | Proposed Mitigation Measures | Responsibility |
|-------------------------|--|--|---|
| Detailed design | | | |
| Manual preparation | Health and safety of community and workers | <ul style="list-style-type: none"> Prepare training manuals in Nepali with sketches on community health and safety and potential occupational health and safety | Project management office (PMO), regional project management office (RPMO) and design, supervision and management consultant (DSMC) |

²³ For the water supply and sanitation subprojects, various design-related measures suggested for: providing safe water following WHO Guideline values, uninterrupted power supply provision; standard operating procedures for operation and maintenance; and imparting necessary training for WUCs and Municipality staff, personal protection equipment for workers and WTP sludge handling, and development of green buffer zone around the WTP, OHTs and GLSRs. For the sanitation subprojects, various design-related measures suggested for: providing safe disposal of treated wastewater; efficient treatment to meet disposal standards, odor control at facilities, uninterrupted power supply provision; standard operating procedures for operation and maintenance; and imparting necessary training for WUCs and municipality staff; providing necessary safety no manual cleaning of sewers, and personal protection equipment for workers (protection against oxygen deficiency, harmful gaseous emissions) and sludge handling, and development of green buffer zone around the DEWAT plant.

| Project Activity | Potential Environmental Impacts | Proposed Mitigation Measures | Responsibility |
|---|--|--|--------------------------------|
| Location of pipes and photographs of sites and utilities before construction, | False claims from people; water quality changes due to construction. Interference with other utilities | <ul style="list-style-type: none"> Place water pipes away from utilities during design Provide budget for restoration/replacement of damaged utilities Avoid placing alignment near heritage buildings Take Photographs of all sites within heritage areas to enable before and after comparison (note: all roads are to be reinstated to original character especially in heritage areas) Ensure compliance with any Department of Archaeology (DOA) rules during design including preparation of Archaeological Impact Assessment, or other agreed document by DOA if required. | PMO, RPMO and DSMC /Contractor |
| Sludge disposal | Inadequate disposal of sludge from reservoirs and treatment plant will cause nuisances to affected properties. | <ul style="list-style-type: none"> The design of sludge disposal sites will be made at designated sites approved by the municipalities. | PMO, RPMO and DSMC |

Table 29: Potential Impacts/Issues/Concerns and Mitigation Measures Taken during Project Preparation Phase

| Rapid Environmental Assessment Identified Impacts/Issues/Concerns | Measures taken during Feasibility Study/Detailed Engineering Design to mitigate impacts/issues/concerns |
|---|--|
| Unsatisfactory raw water quality | During the detailed engineering design stage, water sample from existing tube wells was tested. Tests revealed that the total hardness and alkalinity are significant. This information has guided the design of the water treatment |
| Delivery of unsafe water to the distribution system | Design proposes basic treatment using pressure filter, softening and disinfection. This IEE proposes “hands on” training by a licensed and accredited laboratory for the first few years of operation under the Water Safety Plan included in the sub project design and continuing training thereafter. |
| Health hazards arising from inadequate design of facilities for receiving, storing and handling of chlorine and other chemicals | Design has included a “housed” dosing unit. |
| Delivery of water to distribution system, which is corrosive due to inadequate | Design has proposed ductile iron, and High Density Polyethylene (HDPE) pipes. The PE pipes of class 6kgf is chosen to avoid any |

| Rapid Environmental Assessment Identified Impacts/Issues/Concerns | Measures taken during Feasibility Study/Detailed Engineering Design to mitigate impacts/issues/concerns |
|--|---|
| attention of feeding of corrective chemicals | leakage issues |
| Contamination of drinking water source and other environmental receptors from household and public toilets | The design of toilets includes septic tanks that are designed as per national standards and codes to allow for maximum retention of septage. This includes ensuring septic tanks are sealed and water tight. Toilets will be established at least 30m down-stream of the drinking water source. |
| Risk to public and environmental health due to inappropriate siting and design of septage disposal pit. | The septage disposal pit (similar to sludge drying bed technology) is to be designed and constructed in accordance to international best practice and acceptable standards (e.g. USEPA standards etc). This includes; (i) locating disposal pits at least 300 m away from the nearest dwelling, and 30m down-stream of the drinking water source; (ii) pits are to be only established in relatively flat land with no more than 8% slope; and (iii) site selected for establishment of pits should not be where food crops are grown. |

169. **Impacts during Pre-construction Phase.** The pre-construction works will involve field survey and investigation, development of design and detailed drawings, carrying out cost estimate etc. This also includes discussion with WUSC and revision of design if necessary. As there will be no construction activities involved; there will be no anticipated environmental impacts.

170. **Impacts during Construction Phase.** Except the pipelaying works, all other construction activities will be confined to the selected sites, and the interference with the public and community around is minimal. There will be temporary negative impacts, arising mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety), mining of construction material, occupation health and safety aspects. Impacts mainly arise from the construction dust and noise; from the disturbance of residents, businesses, traffic by the construction work, safety risk to workers, public and nearby buildings due to trench excavations, especially in narrow roads, dust, access impediment to houses and business, disposal of construction waste, etc. These are all general impacts of construction in urban areas, and there are well developed methods of mitigation that are suggested in the EMP. This section discusses the impacts and general approach to avoid and mitigate these impacts. The detailed mitigation measures are presented in the Section on EMP.

a. Physical Environment

171. **Erosion and Land Surface Disturbance.** Excavation and digging of trenches during construction has the potential to cause erosion and cave in thereby causing soil erosion, silt runoff and unsettling of street surfaces. Unorganized disposal of the excavated earth may disturb the street surface and decrease the aesthetic and economic value of the area. Such activity will create discomfort to the road users and inhabitants.

172. Quarrying activities operated to supply the aggregate demand of the Subproject may also disturb the land that could cause further erosion and landslide. The impact is thus direct in nature, local in extent, medium in magnitude and short term in duration.

173. During construction, precautionary measures will be taken; proper backfilling of trenches will be done. Temporary access, diversions, and signboards for pedestrians will be provided. The exposed soil will be stabilized and vegetated to prevent further soil erosion.

174. The contractor must coordinate with DDC & local authority and concerned Ministry on restrictions in quarrying and the legitimacy of extraction operations of identified sources. The contractor must secure permits for quarrying aggregates and implement a restoration plan, which should be part of the EMP.

175. **Impacts on air quality.** Dust will be generated from inadequately managed or haphazard: (i) earthworks such as clearing, grubbing, excavations, and drilling; (ii) demolition works; (iii) stockpiling of natural aggregates, excavated materials and spoils; (iii) transport, loading and unloading of natural aggregates; (iv) movement of construction-associated vehicles; and (v) on-site rock crushing and concrete mixing; (vi) burning of firewood for cooking & heating in work and labor camps. The impact is thus indirect in nature, local to regional in extent, medium in magnitude and short term in duration.

176. Mitigation measures include:

- (i) confining earthworks according to excavation segmentation plan that should be part of SEMP;
- (ii) watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, or as necessary;
- (iii) if re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces;
- (iv) during demolition, watering of exterior surfaces, unpaved ground in the immediate vicinity and demolition debris;
- (v) place signage at active work sites in populated areas;
- (vi) requiring trucks delivering aggregates and cement to have tarpaulin cover;
- (vii) limiting speed of construction vehicles on access roads and work sites to a maximum of 30 km/h;
- (viii) prohibit burning firewood in work and labor camps (promote liquified petroleum gas for cooking purposes and electric heater for heating purposes);
- (ix) use of vehicles complying with nvmes, 2069 enforcement, and green sticker standards; and
- (x) prohibit open burning of solid waste.

177. **Noise.** Noise-emitting construction activities include earthworks, concrete mixing, demolition works, movement and operation of construction vehicles and equipment, and loading and unloading of coarse aggregates. The significance of noise impact will be higher in areas where noise-sensitive institutions such as health care and educational facilities are situated. Noise levels should not exceed the national standards for noise or WHO noise level guidelines, whichever is more stringent, or result in increase in background noise level of 3 decibels at the nearest receptor location off-site.²⁴ The comparative illustration of national standards versus WHO guidelines is in Table 9 of Section III. The impact is thus direct in nature, local in extent, medium in magnitude and short term in duration.

178. Mitigation measures include:

- (i) using equipment that emits the least noise, well-maintained and with efficient mufflers;
- (ii) restricting noisy activities to day time;
- (iii) avoiding use of noisy equipment or doing noisy works at night time;

²⁴ World Bank Group. IFC. 2007. [*Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Environmental - Noise Management.*](#)

- (iv) limit engine idling to a maximum of one minute;
- (v) spread out the schedule of material, spoil and waste transport; and
- (vi) minimizing drop heights when loading and unloading coarse aggregates.

179. **Impacts on Surface Water Quality.** Some sections of the distribution pipeline will cross water bodies, exposing them to risks of pollution caused by: (i) poorly managed construction sediments, and waste materials; and (ii) poor sanitation practices of construction workers. Polluted water bodies will be harmful to aquatic life and people that depend upon such contaminated sources. The impact is thus direct in nature, local to regional in extent, medium in magnitude and short term in duration.

180. Some mitigation measures include: (i) excess spoils will be disposed as per Spoil Management Plan attached in Annex 2 (D); (ii) locating temporary storage areas on flat grounds and away from main surface drainage routes; (iii) shielding temporary storage areas with sandbags; and (iv) providing adequate water supply and sanitation facilities at work sites.

181. For management and final disposal of solid waste, the following mitigation measures will be applied:

- (i) Collection of recyclable solid wastes and supply to scrap vendors
- (ii) Ensuring all the camp wastes and construction wastes are disposed in the designated waste collection pits away from the water path.
- (iii) Establishment of separate bounded areas for the collection and storage of all the toxic material wastes, including batteries, oil filters, Mobil, burnt oils, etc. at the construction site
- (iv) Collection of biodegradable wastes in separate vessel and transfer to municipal waste stream
- (v) Application of various waste disposal systems for diverse wastes produced on site as per the consultation with environmentalists.

182. **Impacts on River Morphology and Hydrology.** Quarrying from riverbeds could cause the alteration of the river morphology and hydrology. The contractor will obtain quarry materials from the government approved area. The impact is thus direct in nature, local in extent, high in magnitude and short term in duration.

183. To mitigate the negative impact, the contractor needs to coordinate with Ministry of Water Supply (MOWS) and local authorities for any quarry related activities. Alternative sources should be identified before finalizing any quarry site approval. An Aggregates Management Plan must be part of the C-EMP. The contractors should be required to obtain aggregates only from sources with environmental clearance and licenses.

184. **Impacts on the Quality of Groundwater Resource.** There are no such private and community groundwater wells that will be affected by the subproject.

185. **Impacts on stored water in adjacent ground reservoir tanks (RVTs).** The construction of new ground reservoir tanks will potentially expose the water stored in adjacent existing reservoir tanks. Aside from applicable measures to mitigate impacts on surface water quality (mentioned above), place the signage at existing RVTs. Provide sandbags in existing RVTs perimeters to mitigate sedimentation and contamination of stored water in adjacent RVTs.

b. Impacts on Flora and Fauna

186. Haphazard site clearing, parking, and movement of construction vehicles and equipment stockpiling, will result in disturbance to the land in the project area. However, the project area does not include any forest, so the impacts to flora and fauna will be minimal. The impact is thus direct in nature, local in extent, low in magnitude and short term in duration.

187. During construction, few disturbances will occur. Some of the mitigation measures include: (i) installing clear signage and markers to direct traffic movement in sites, (ii) designating stockpiling areas, (iii) providing an alternative fuel to workers for cooking.

c. Impacts on Physical, Cultural Resources

188. The subproject will not encroach into, or be near physical, cultural resources.

d. Impacts on the Socioeconomic, Environment and Resources

189. The impacts will result from excavation works, stockpiling, the operation of construction vehicles and equipment, and accidental damage to utilities (e.g., power supply poles, open drains, and water taps or hoses). Nuisance and safety hazards are the indirect impacts. The impact is thus indirect in nature, local in extent, medium in magnitude and short term in duration.

190. Some mitigation measures include: (i) prepare a traffic management plan in collaboration with local authorities; (ii) where traffic congestion will likely occur, place a traffic flagmen during the working hours; (iii) provide compensation to affected people; (iv) manage to stockpile; (v) manage pumped water from excavations either to drains or drums for later use; (vi) relocate the affected power supply poles, and embedded private water hoses before excavation; and (vii) advise the concerned authority during accidental damage to utilities.

e. Community Health and Safety Hazards

191. Communities will be moderately exposed to threats due to impacts on air and water quality, ambient noise level; mobility of people, goods, and services; accesses to properties, economic activities, and social services; service disruptions, etc. Construction workers may potentially bring communicable diseases in the community. The impact is thus indirect in nature, local in extent, medium in magnitude and short term in duration.

192. Mitigation measures include:

- (i) contractor's implementation of SEMP;
- (ii) contractor's inclusion in the SEMP the implementation of community health and safety plan following international best practices on community health and safety such as those in Section 4.3 of World Bank's Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities.²⁵ As a minimum and whichever is applicable, the community health and safety plan shall ensure the following:
 - (a) implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning;

²⁵ World Bank Group. IFC. 2007. [Environmental, Health, And Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning](#).

- (b) restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community;
- (c) removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials; and
- (d) implement measure to prevent proliferation of vectors of diseases at work sites;
- (iii) adequate space and lighting, temporary fences, shining barriers and signage at active work sites;
- (iv) contractor's preparedness in emergency response;
- (v) adequate dissemination of GRM and contractor's observance and implementation of GRM; and
- (vi) upon availability, local people should be given an opportunity for work in the subproject activities.

f. Occupational Health and Safety Hazards

193. Workers will be exposed to the crosscutting threats of the impacts above during construction. Inadequate supply of safe and potable water and inadequate sanitation facilities; poor sanitation practices on site; poor housing conditions; the handling and operation of construction equipment; handling of hazardous substances; exposure to extreme weather and non-observance of health and safety measures, pose additional threats to the health and safety of construction workers. Mishandling of chemicals and other hazardous substances may pose health and safety hazards to the workers.

194. Construction workers may be potentially exposed to communicable and transmittable diseases in the community and the workforce. The impact is thus indirect in nature, local in extent, medium in magnitude and short term in duration.

195. Workers will be exposed to the crosscutting threats of the impacts above during construction. Inadequate supply of safe and potable water and inadequate sanitation facilities; poor sanitation practices on site; poor housing conditions; the handling and operation of construction equipment; handling of hazardous substances; exposure to extreme weather and non-observance of health and safety measures pose additional threats to the health and safety of construction workers. Construction workers may be potentially exposed to communicable and transmittable diseases in the community and the workforce. The impact is thus indirect in nature, local in extent, medium in magnitude and short term in duration.

196. Mitigation measures include implementation of an occupational health and safety plan to include international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS Guidelines on Construction and Decommissioning Activities (footnote 25). The occupational health and safety plan should be included in the SEMP. As minimum and whichever are applicable, the occupational health and safety plan shall ensure the following:

- (i) Communication and Training
 - (a) Training of all workers on occupational health and safety prior to construction works;

- (b) Conduct of orientation to visitors on health and safety procedures at work sites;
 - (c) Signages strategically installed to identify all areas at work sites, including hazard or danger areas;
 - (d) Proper labeling of equipment and containers at construction and storage sites; and
 - (e) Suitable arrangements to cater for emergencies, including: first aid equipment; personnel trained to administer first aid; communication with, and transport to, the nearest hospital with an accident/emergency department; monitoring equipment; rescue equipment; firefighting equipment; and communication with nearest fire brigade station;
- (ii) Physical Hazards
- (a) Use of personal protective equipment by all workers such as earplugs, safety shoes, hard hats, masks, goggles, etc. as applicable, and ensure these are used properly;
 - (b) Avoidance of slips and falls through good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths, cleaning up excessive waste debris and liquid spills regularly, locating electrical cords and ropes in common areas and marked corridors, and use of slip retardant footwear;
 - (c) Use of bracing or trench shoring on deep excavation works;
 - (d) Adequate lighting in dark working areas and areas with night works;
 - (e) Rotating and moving equipment inspected and tested prior to use during construction works. These shall be parked at designated areas and operated by qualified and trained operators only;
 - (f) Specific site traffic rules and routes in place and known to all personnel, workers, drivers, and equipment operators; and
 - (g) Use of air pollution source equipment and vehicles that are well maintained and with valid permits;
- (iii) General Facility Design and Operation
- (a) Regular checking of integrity of workplace structures to avoid collapse or failure;
 - (b) Ensuring workplace can withstand severe weather conditions;
 - (c) Enough work spaces available for workers, including exit routes during emergencies;
 - (d) Fire precautions and firefighting equipment installed;
 - (e) First aid stations and kits are available. Trained personnel should be available at all times who can provide first aid measures to victims of accidents;
 - (f) Secured storage areas for chemicals and other hazardous and flammable substances are installed and ensure access is limited to authorized personnel only;
 - (g) Good working environment temperature maintained;
 - (h) Worker camps and work sites provided with housekeeping facilities, such as separate toilets for male and female workers, drinking water supply, wash and bathing water, rest areas, and other lavatory and worker welfare facilities; and
 - (i) Maintain records and make reports concerning health, safety and welfare of persons, and damage to property. Take remedial action to prevent a recurrence of any accidents that may occur.

g. Impacts on the Sustainability of Works

197. During construction, seismic events may occur, causing damage to unfinished, or uncured and completed structures and affecting their structural integrity. The impact is thus direct in nature, local in extent, medium in magnitude and short term in duration.

198. Mitigation measures include: after every seismic event, the contractor must conduct engineering investigations of built structures and implement the necessary corrective actions immediately.

h. Generation of Waste Water and Sullage

199. The reliable and sufficient water supply will increase the generation of wastewater and sullage. If inadequately managed, this situation will lead to contamination of the water supplied through leaks or broken pipes in the distribution system. The impacts are thus indirect in nature, local in extent, medium in magnitude and long-term in duration.

200. Mitigation measures include: (i) prompt action to repair broken pipes and leaks; (ii) monitoring incidence of waterborne disease in the dry and wet seasons; and (iii) For management of waste water and sullage, methods like soakpit, diversion of waste water after treatment into natural drainages and infiltration trenches will be adopted considering the ground conditions, topography, quality and quantity of waste generated.

i. Socio-economic Environment

201. **Disturbance to community activities.** Construction activities, particularly construction works on roads will cause disturbances to the community activities, festivals and social events. The free movement of vehicular traffic and pedestrians will be affected. Noise produced due to the operation of machines may disturb the neighborhood in construction areas. The impacts to human settlement including villages, cattle sheds and farmlands will be very low.

202. Construction schedules will be shared with the locals and notice of any major works that might hinder public activities will be provided well in advance.

203. **Social Dispute and Dissatisfaction.** There is a possible influx of outside workforce, which may pose threats of disharmony with the local community workforce. Irresponsible behavior, such as gambling and excess drinking, may trigger social disputes. Irresponsible waste disposal and sanitation practices may also bring dissatisfaction to the local communities. The influx of migrants also poses competition for the locals in terms of the job market, which may be potential sources of dissatisfaction and conflicts.

204. **Occupational Health and Safety.** Health and safety of workers, particularly those involved in concreting, trench cutting, formwork and rebar fixing in the overhead tank, is of prime concern. Injuries, sicknesses and chances of communicable diseases are also anticipated. These risks may arise at different work fronts. Provision and use of safety equipment, first aid services and medical insurance will keep these risks to a minimum.

205. The records of PPE equipment provided and utilized will be filed and documented. Occupational health and safety (OHS) awareness activities will be conducted at all work fronts.

206. **Community Health and Safety.** Construction works, such as pipelaying, stockpile sites, spoil disposal sites, and vehicle movement, will take place near and along the settlements, which may be a cause of accidents, especially for children and the elderly. The onset of communicable diseases is also a concern.

207. **Resettlement, relocation and compensation issue.** The major structures will be constructed on land belonging to WUSC. The distribution system network falls within the public property line/ROW, therefore, resettlement or relocation is not required. Some cases of crop loss during pipelaying, damage to compound wall may arise. These will be avoided as much as possible.

208. **Impacts during operation and maintenance phase.** During operation, the facilities may generate noise, odor from sanitation and sewage treatment facilities and discharges to the environment. The facilities will also require repair from time to time.

209. **Non-compliance with relevant environmental legislation.** This issue will arise when there is a lack of awareness of Project staff and management of environmental safeguards requirements, compliance with the requirements and conditions specified in the IEE Report and approvals and permits for the use of water resources. The impact is thus direct in nature, local in extent, medium in magnitude and long-term in duration.

210. Measures to mitigate this concern include

- capacity strengthening of WUSC and continuing capacity strengthening of Project staff;
- ensuring compliance with EPA/EPR, NDWQS, applicable conditions in IEE approvals and registration for the use of water resources.

211. **Risk to exposure to chemicals.** Direct exposure to Bleaching Powder is toxic and the workers will have to deal with it during the operation of the system. Ingestions, inhalations, application to body parts, especially to the eyes, nose, and mouth are of extreme hazard to the workers handling chlorine and bleaching powder.

212. Mitigation measures include:

- installation of clear, visible signage in premises on the observance of safety measures;
- setting up of a mechanism for quick response to spills of chemical and hazardous substances; and
- Proper training and required safety gears will be made available for the use of worker involved in handling of bleaching powder.

213. **Impact on water bodies and aquatic life.** The effluent produced from the periodic backwashing of the filter plant, if discharged directly into the river course, may harm the water bodies and aquatic life, especially during dry season when the flow will be less.

214. **Risk of supply of contaminated water.** Contamination of source or in reservoir, leakage and contamination through pipelines and contamination at point-of-use during operation phase may adversely affect the health of the consumers. Lack of regular maintenance could be a concern.

215. Any leaks in pipes will be immediately maintained. Water Safety Plan (WSP) will be formed

for the project, and its team will be trained and mobilized affectively.

216. **Generation of Wastewater and Sullage.** Reliable and sufficient water supply will increase the generation of wastewater and sullage. If inadequately managed, this situation will lead to contamination of the water supplied through leaks or broken pipes in the distribution system. The impacts are thus indirect in nature, local in extent, medium in magnitude and long-term in duration.

217. Mitigation measures include:

- prompt action to repair broken pipes and leaks;
- monitoring incidence of waterborne disease in the dry and wet seasons;
- construction of soakpits, diversion of waster after treatment into natural drainages and infiltration trenches will be adopted considering the ground conditions, topography, quality and quantity of waste generated.

j. **Indirect, Induced and Cumulative Impacts**

218. **During Construction – Indirect and Induced Impacts.** The volume of vehicles that will be operated from the simultaneous construction at project component sites may create traffic jams on narrow access roads and hinder the mobility of people, good, and services, particularly in the bazaar areas. A greater number of people may be exposed to safety hazards from the constricted road space. Coupled with disruption of economic activities and social services from extended interruption of power supply due to the relocation of power poles or likely accidental damages, production outputs will suffer a slowdown. Dust on crops nearby project area would have some effect on the crops' yields. Apart from the applicable mitigation measures, proper coordination with relevant ward authorities, social service institutions and businesses would further mitigate indirect and induced impacts.

219. **Cumulative Impacts.** The cumulative impacts will arise mainly from the construction of the main Project components and associated facilities. The project's "main area of influence covers component sites, i.e. footprints and areas within 200 m from their edges, considering the potential reach of noise, dust and socio-economic impacts; "Point works" refer to such main components as pumps, RVTs, treatment units/ancillaries, public markets; "Horizontal works" refer to the transmission main and distribution pipes; the "Construction period" (excluding O&M) for horizontal works is estimated to be 1 year, and 6 months for the collection chamber and water treatment plant and RVT and DTW unit/ancillaries is six months.

220. Assuming all components are started simultaneously, without mitigation, cumulative impacts will be "moderate" in magnitude during the peak construction (for the first four months of the construction). After this, the magnitude of cumulative impacts will lessen to "low" magnitude. The sensitiveness of the resources, natural and artificial, within the main areas of influence has been taken into account, together with the types of works involved and their intensities.

221. The potential moderate and high cumulative impacts would be dust, noise, road space limitation leading to slow mobility, access blocking, disruption of social services and economic activities, community and workers' health and safety hazards, generation of solid wastes and spoils. To reduce the cumulative impacts down to acceptable levels:

- (i) civil works must be well planned, strategized and completed promptly;
- (ii) the contractor should implement SEMP fully, and key institutions should act their roles in EMP implementation effectively;
- (iii) there must be adequate consultations with stakeholders, including vehicle

operators, and local authorities and coordination, particularly regarding expected cumulative impacts. Vehicle operations should temporarily adjust to the circumstances to relieve some road space limitations and for public safety and convenience; and

- (iv) the GRM should be disclosed (through public meetings, display at strategic places and media) to the communities affected by the cumulative impacts.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Information Disclosure, Consultation and Participation

222. Stakeholder consultation and participation is an essential process in project preparation and IEE study. The process in engaging stakeholders and affected people involved key informant interviews, on-site discussions with WUSC, and random field interviews of stakeholders.

223. Concerns and issues raised regarding the construction of Subproject are summarized below:

1. Common Issues Raised by Stakeholders

224. The common issues raised by the local stakeholders during IEE Study are as follows:
- (i) The contractor should bring construction related materials (sand, gravel and boulder) from DDC approved crusher plant for the project;
 - (ii) The extraction of sand, gravel & boulder from unauthorized quarry/ river bed must be prohibited;
 - (iii) The project should give priority to local people while hiring for construction related jobs; and
 - (iv) The project must develop a solid waste management plan and a waste disposal plan.

VIII. ISSUES ADDRESSED BY THE STUDY TEAM

- (i) The law and the site specific EMP of the project will compel the contractor to bring construction related materials (sand, gravel and Boulder) from DDC approved sources;
- (ii) Whether the project conforms to the laws will be monitored by DDC, RPMO, etc. during the construction phase;
- (iii) The solid waste management plan will be developed for the construction phase of the project; and
- (iv) Local workers of Ilam municipality will be given priority for employment.

225. Stakeholder consultations will continue throughout the implementation of the subprojects and operation. All stakeholders must be invited and encouraged to participate in community consultations. To facilitate the engagement of stakeholders, the PMO and implementation core group (ICG) will maintain good communication and collaboration with WUSC and the Municipality. PMO, ICG, Contractors and/or WUSC will be open to the public to contact on matters concerning the progress of the subprojects, adverse impacts, mitigation measures and environmental monitoring and grievances. Future stakeholder consultations will be as follows:

- (i) During construction, if there would be a major change in design/alignment/location, the PMO and ICG will hold at least one public consultation meeting early on in the construction period to solicit perceived impacts, issues, concerns and

- recommendations from affected communities;
- (ii) Prior to construction, the PMO and ICG will conduct an intensive information, education and communication (IEC) campaign to ensure sufficient level of awareness/information among the affected communities regarding the upcoming construction, its anticipated impacts, the grievance redress mechanism, contact details and location of the PMO and ICG, and status of compliance with the Government's environmental safeguard requirements, among others, are attained/provided. Billboards about the subproject, implementation schedule and contact details of the executing agency, PMO-ES, implementing core group-environmental safeguard assistant (ICG-ESA) and Contractors will have been set up at strategic locations within the subprojects' main areas of influence. The grievance redress procedure and details will have been posted at the offices of the ICG, WUSC and Municipality;
- (iii) During construction, regular random interviews will be conducted by the ICG-ESA every month to monitor environmental concerns of subproject communities; and
- (iv) During operation, periodic random interviews will be conducted by the ICG and WUSC to monitor the environmental concerns of subproject communities.

226. The public consultations and information disclosure will be continuous throughout the project cycle. PMO and ICG will be responsible for designing and implementing such aspects on the ground.

227. The approved IEE report (in English), will be available at the offices of the PMO, ICG and WUSC for the perusal of interested parties. Copies may be made available upon formal request. The IEE and environmental monitoring reports will be disclosed on the ADB's and UWSSP website.

IX. GRIEVANCE REDRESS MECHANISM

228. A project-specific GRM will be established to receive, evaluate and facilitate resolution of affected persons' concerns, complaints, and grievances related to social, environmental and other concerns on the project. The GRM will aim to provide a time-bound and transparent mechanism to resolve such concerns. Grievances may be channelled through letters, emails, text messages (SMS), verbal narration, grievance boxes and registers. Suggested template for grievance redress form is in Appendix 7.

229. A common GRM will be in place for social, environmental or any other grievances related to the project. The GRM will provide an accessible forum for receiving and facilitating resolution of affected persons' grievances related to the project. Project will publish the sample grievance registration form on its website, and publish it in local language and/or indigenous people dialect, at the hoarding board of each of the participating WUA or municipalities' office. Every grievance shall be registered with careful documentation of process adopted for each of the grievance handled, as explained below. The environmental and social safeguards officer (ESO/SSO) at the project management office (PMO) will have the overall responsibility for timely grievance redress on environmental and social safeguards issues. The Social Safeguards Officer at the Regional Project Management Office (RPMO) will be the focal person for facilitating the grievance redress at the local level.

230. A municipal-level public awareness campaign will be conducted on a regular basis as per the communication strategy of the project to ensure awareness on the project and its GRM. The social and environmental safeguards experts of the project management and quality assurance

consultant (PMQAC) and regional design, supervision and management consultants (RDSMCs) will support the WUA or municipalities in conducting municipality-wide awareness campaigns, which will ensure that all stakeholders including poor and vulnerable are aware of the GRM and project's entitlements.

231. A grievance redress committee (GRC) will be formed at the Municipality level, comprising the Mayor as Chairperson of GRC, and Regional Project Manager RPMO as Secretary. The GRC members will comprise of (i) WUSC Secretary; (ii) RPMO Engineer; (iii) RPMO social/environmental (as relevant) officer; (iv) representative of affected persons; (v) RDSMC's safeguards specialist (social/environment as relevant); (vi) a representative of reputable and relevant CBO/SHG/organization working in the project area as invitee;²⁶ and (vii) contractor's representative. The secretary of the GRC will be responsible for convening timely meetings and maintaining minutes of meetings. The concerned social safeguards expert of RDSMC will support the RPMO safeguard's officer and Project Manager of RPMO to ensure that grievances, including those of the poor and vulnerable are addressed. All GRCs shall have at least two women committee members. Along with representatives of the affected persons, civil society and eminent citizens can be invited as observers in GRC meetings.

232. The functions of the local GRC are as follows: (i) provide support to affected persons on problems arising from environmental or social disruption; asset acquisition (if necessary); and eligibility for entitlements, compensation and assistance; (ii) record grievances of affected persons, categorize and prioritize them and provide solutions within 15 days of receipt of complaint by WUA or local bodies; and (iii) ensure feedback to the aggrieved parties about developments regarding their grievances and decisions of the GRC. The GRM procedure is depicted in Figure 3, and is outlined below in detail, with each step having time-bound schedules and responsible persons to address grievances and indicating appropriate persons whose advice is to be sought at each stage, as required. If affected persons are not satisfied with the response they can elevate it to the next level:

- (i) **First Level of GRM** (WUA level): The first-level, which is also the most accessible and immediate venue for quick resolution of grievances will be the contractors, RDSMC field engineers and RPMO supervision personnel, who will immediately inform the WUA. Any person with a grievance related to the project works can contact UWSSP to file a complaint. The municipal-level field office of the RPMO, in WUA's building, will document the complaint within 24 hours of receipt of complaint in the field, and WUA or local bodies will immediately address and resolve the issue at field-level with the contractor, supervision personnel of RPMO and RDSMC field engineers within 5 days of receipt of a complaint/grievance. The assigned RDSMC's Social Mobilizer will be responsible to fully document: (i) name of the person, (ii) date of complaint received, (iii) nature of complaint, (iv) location and (v) how the complaint was resolved as well as to provide feedback to the complainant. If the complaint remains unresolved at the local level within 5 days, the WUA will forward the complaint to the municipality level GRM;
- (ii) **Second Level of GRM** (Municipality level): The complainant will be notified by the WUA that the grievance is forwarded to the Municipality-level GRC. The Municipality-level GRC will be called for a meeting, called and chaired by the Mayor. The GRC will recommend corrective measures at the field level and assign clear responsibilities for implementing its decision within 10 days of receipt of complaint by WUA. If the grievance remains unresolved within 10 days of receipt

²⁶ If the complaints are related with IP/Dalits/other vulnerable groups, specific NGO/CBO that actively involved in development of these communities shall be involved.

of complaint by WUA, the matter will be referred to the third level. The RPMO Engineer will be responsible for processing and placing all papers before the GRC, recording decisions, issuing minutes of the meetings, providing feedback to complainants and taking follow up actions so that formal orders are issued and decisions are carried out; and

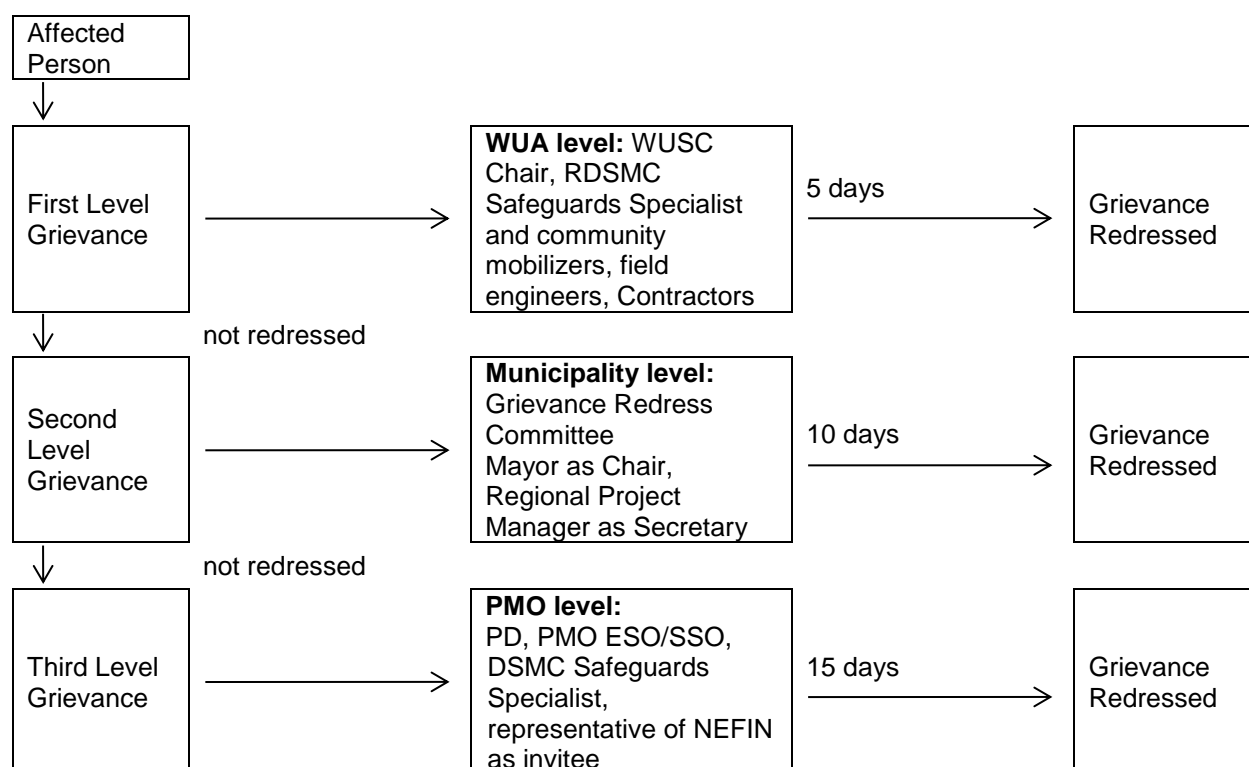
- (iii) **Third Level of GRM (PMO Level):** Any unresolved or major issues at Municipality level will be referred to the PMO for final solution. A representative of the Nepal Foundation for Indigenous Nationalities (NEFIN) will be invited to attend any meetings related to resolution of Indigenous Peoples grievances. Decision has to be made within 15 days of receipt of complaint from the Municipality-level GRC. The Project Director will sign off on all grievances received by the PMO. The concerned Deputy Project Director (DPD) and environmental and social safeguards officers (ESO and SSO) of PMO will be involved with support from the PMQAC's social/environment safeguards experts. The SSO will be responsible to convey the final decision to the complainant.

233. All paperwork (details of grievances) needs to be completed by the WUA member secretary assisted by RDSMC and circulated to the WUA Chairperson and members. At Municipality level, the RPMO Engineer will be responsible for circulation of grievances to the Regional Project Manager, DWSS, Mayor and other GRC members, prior to the scheduled meetings. The RPMO's Engineer will be responsible for follow-through of all escalated grievances. All decisions taken by the GRC will be communicated to the affected persons by the RPMO's SSO.

234. Despite the project GRM, an aggrieved person shall have access to the country's legal system at any stage and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

235. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use ADB's Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Nepal Resident Mission. The complaint can be submitted in any of the official languages of ADB's developing member countries (DMCs). The ADB's Accountability Mechanism information will be included in UWSSP Information Datasheet (PID), to be published in web and distributed to the affected communities, as part of the project GRM.

Figure 3: Grievance Redress Process



DSMC = design, supervision and management consultant; ESO = environmental safeguards officer; NEFIN = Nepal Federation of Indigenous Nationalities; PD = project director; PMO = project management office; RDSMC=regional design, supervision and management consultant; SSO = social safeguards officer; WUA = water users' association; WUSC = water users' and sanitation committee.

236. Record Keeping and Disclosure. Records at the municipal-level will be kept by the concerned WUA or local bodies member secretary, assisted by RDSMC, of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date of the incident and final outcome. The number of grievances recorded and resolved, and the outcomes will be displayed/disclosed in the PMO office, WUA, and on the web, as well as reported in the safeguards monitoring reports submitted to ADB on a semi-annual basis. For any grievance escalated to RPMO/ Municipality level, the RPMO's Engineer assigned as GRM focal person will be responsible for record-keeping, calling of GRC meetings and timely sharing of information with WUA or municipalities. For grievances escalated to PMO and above, the PMO's SSO will be responsible for maintenance of records, sending copies to RPMO and WUA for timely sharing of information with the person filing complaint.

237. Periodic Review and Documentation of Lessons Learned. The PMO's SSO will periodically review the functioning of the GRM at municipality or WUA level and field level and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances. Indicators pertaining to grievance redress (no. of grievances received, no. redressed/resolved to be reported by Member Secretary, WUA to RPMO SDO, and by RPMO to PMO SSO) in monthly and quarterly progress reports.

238. Costs. All costs involved in resolving the complaints (meetings, consultations,

communication and reporting/information dissemination) at local (field/ward/municipal) level will be borne by the concerned focal organizations at each level: WUA at local level, and municipality at municipal level; and PMO at central level. Cost estimates for grievance redress are included in resettlement cost estimates.

Table 30. Suggested Format for Record Keeping Of Grievances

| S. No. | Date of receipt of grievance | Name and contact details of complainant | Description of complaint | Nature of complaint | Decisions taken | Response given to complainant and date | Whether closed |
|--------|------------------------------|---|--------------------------|---------------------|-----------------|--|----------------|
| | | | | | | | |
| | | | | | | | |
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X. ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Arrangement

239. The Ministry of Water Supply (MOWS) will be the Executing Agency, working through the Department Water Supply and Sewerage (DWSS), which will establish a Project Management Office (PMO) for the project²⁷ headed by a Project Director. The DWSS will also establish two Regional PMOs (RPMOs).

240. The PMO will be responsible for overall project planning, management, implementation, monitoring and reporting for the project. The PMO will also be responsible for screening the proposed subprojects in accordance with the subproject selection criteria for the project,²⁸ assisting the municipalities in conducting feasibility studies,²⁹ reporting to and being point of liaison with ADB on the project; quality control of detailed design and construction supervision; procurement of civil works contractors; support for capacity building; and overseeing safeguard compliance. The PMO will liaise with WUSCs or municipalities to sign the management agreement prior to the award of contract for each subproject. The PMO will also engage all consultants under the project.

241. The RPMOs will be established using the existing infrastructure in (i) Itahari, Sunsari, for the eastern region, (ii) in Nepalgunj, Banke, for the western region, and (iii) PMO (Kathmandu) will act as RPMO for central region projects. The RPMOs will report to the PMO and be supported and monitored by PMO to implement the projects in the field and manage contractors and consultants. The RPMOs will manage the detailed design and construction supervision with support from DSMC that PMO would engage (DSMCs for eastern, western, and central region each). Each of the DSMCs will be based at the respective RPMO. For each subproject, a dedicated implementation core group will be established in the field, at each WUA's office,³⁰ headed by a qualified engineer from the RPMO to conduct day-to-day project management,

²⁷ DWSS will continue the existing PMO established and operational for the Third Small Towns Water Supply and Sanitation Sector project.

²⁸ Subproject selection criteria (covering all aspects of a proposed subproject other than the specific subproject selection criteria for environment as discussed in this EARF) is attached as Appendix 1 of the PAM.

²⁹ TDF will assist the municipalities in conducting financial appraisal of the subprojects and advice DWSS on its outcomes prior to the start of detailed design process.

³⁰ The implementation core group, as a minimum, comprises of (i) an Engineer, a Social mobilizer, and an EMP monitor, RPMO; (ii) an Administration Staff, a Finance Staff, and an Engineer or Junior Engineer, WUSC.

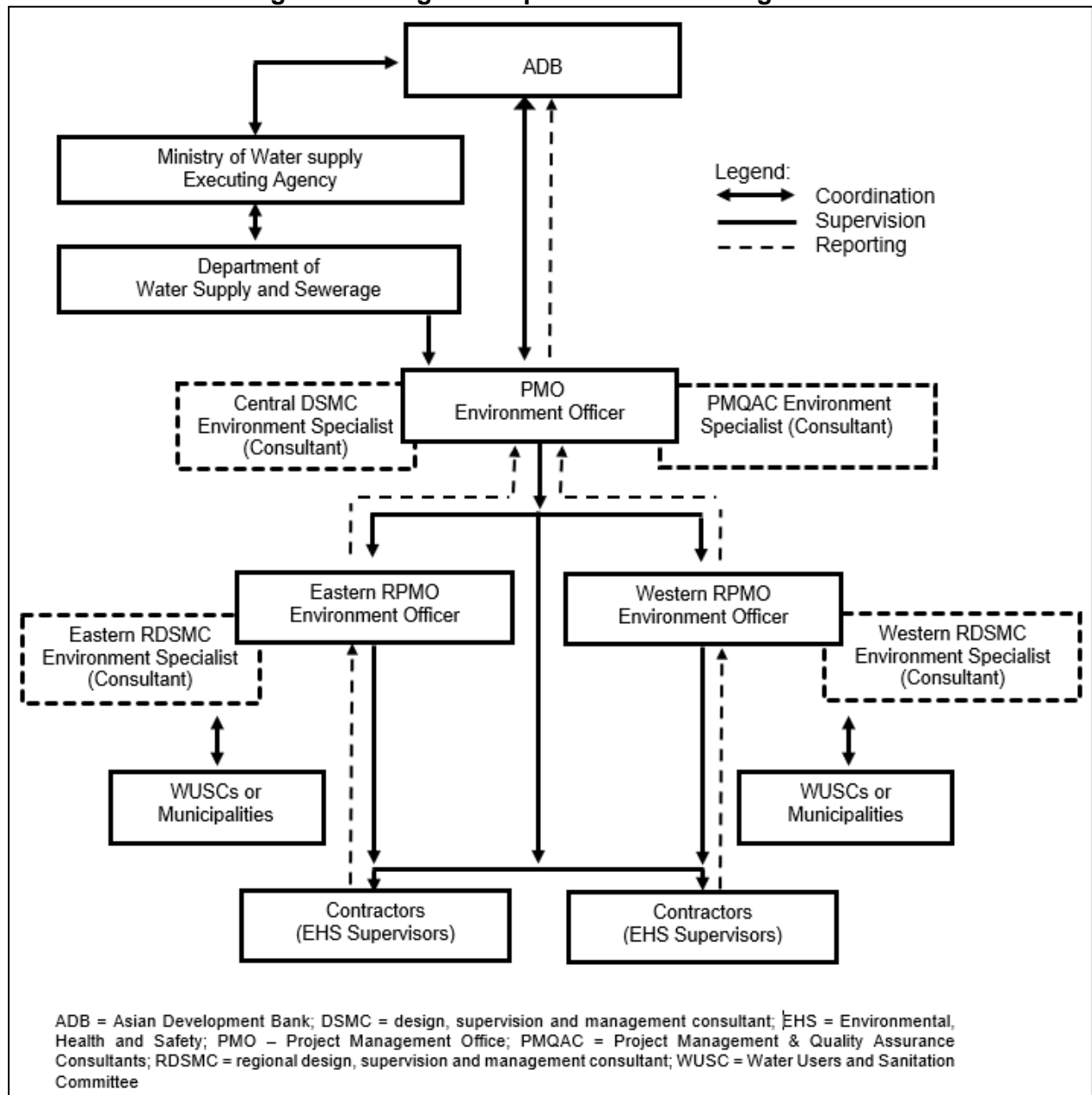
planning and construction supervision. The TDF will coordinate with RPMOs, WUSCs and municipalities at least on monthly basis.

242. The WUSC, on behalf of the WUA³¹ or the municipality³² will be responsible for operation and maintenance (O&M) of the water supply and sanitation facilities constructed, operating under a management agreement with DWSS. WUSCs consist of nine executive members,³³ at least three of whom are women. The project will fund the WUA's minimum prescribed staffing and other resource requirement, as outlined in the management agreement with DWSS for sustainable operations of the system during the project period. For the subprojects yet to be selected and where WUA does not exist initially, or when the municipality doesn't have the capacity and chooses to delegate the operation to user's representatives, an interim user committee (IUC) will be first established in the feasibility stage by representing potential consumers. The IUC will work with the RPMO and DSMC in undertaking a feasibility study, confirm the technical proposals and the boundaries of the service areas. WUAs will be developed from IUCs at the detailed design stage.

³¹ WUAs are registered with the district water resources committee as a user association under the Water Resources Act (1992).

³² As the project is a demand based open access project, the WUAs or the municipalities can apply for funding a proposed subproject that meets the subproject selection criteria.

³³ WUSCs will be formulated by ensuring proportional representation of gender, caste and ethnic groups. It shall include at least 33% representation of women.

Figure 4: Safeguard Implementation Arrangement

243. **Project Management Office.** A project officer (Environment) will be engaged in PMO to ensure implementation of environmental safeguards. He/ she will be provided with necessary consultant support, and capacity development and training. The responsibilities of the Environment Officer are:

- (i) review and confirm existing IEEs and EMPs are updated based on detailed designs, that new IEEs/EMPs prepared by DSMCs comply to exclusion criteria and project selection guidelines as stipulated in the environmental assessment and review framework (EARF) and government rules; and recommend for approval to PMO;
- (ii) approve subproject environmental category;
- (iii) ensure that EMPs are included in bidding documents and civil works contracts;

- (iv) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by RPMOs and contractors;
- (v) establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the EMP;
- (vi) facilitate and confirm overall compliance with all Government rules and regulations regarding site and environmental clearances as well as any other environmental requirements as relevant;
- (vii) supervise and provide guidance to the RPMOs to properly carry out the environmental monitoring and assessments as per the EARF;
- (viii) review, monitor and evaluate effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken;
- (ix) consolidate monthly environmental monitoring reports from RPMOs and submit semi-annual monitoring reports to ADB;
- (x) ensure timely disclosure of final IEEs/EMPs in project locations and in a form accessible to the public;
- (xi) assist with ongoing meaningful consultation and assist in setting up of GRM in respect of environment concerns;
- (xii) address any grievances brought about through the Grievance Redress Mechanism (GRM) in a timely manner as per the IEEs;
- (xiii) undertake regular review of safeguards-related loan covenants, and the compliance during program implementation; and
- (xiv) organize periodic capacity building and training programs on safeguards for project stakeholders, PMO, RPMOs, and WUAs.

244. **Regional Project Management Offices.** The environmental officer assigned by DWSS to the RPMOs will receive support from (i) the PMO environmental officer, (ii) environmental specialist from PMQAC; and (iii) the environmental specialist and EMP monitors of the regional DSMCs to carry out the following:

- (i) prepare new IEEs and EMPs in accordance with the EARF and government rules;
- (ii) include EMPs in bidding documents and civil works contracts;
- (iii) comply with all government rules and regulations;
- (iv) take necessary action for obtaining rights of way;
- (v) oversee implementation of EMPs including environmental monitoring by contractors;
- (vi) take corrective actions when necessary to ensure no environmental impacts;
- (vii) submit monthly environmental monitoring reports to PMO;
- (viii) assist with ongoing meaningful consultation and assist in setting up of GRM in respect of environment concerns; and
- (ix) address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.

245. **Project Management and Quality Assurance Consultant.** The Project Management and Quality Assurance Consultants (PMQAC) will provide support to the PMO in the following areas. The detailed TORs are in the PAM:

- (i) ensure that the quality of the designs and construction of all water supply and sanitation components implemented under the project are to the required standards; and
- (ii) assist the PMO with the overall planning, implementation and monitoring of the project during all stages of implementation including adherence to all environmental and social safeguards' requirements.

246. **Regional Design, Supervision and Management Consultants.** The RDSMCs will provide support to the RPMOs in the following areas. The detailed TORs are in the PAM:

- (i) prepare quality feasibility studies, detailed engineering designs, safeguards documents and bid documents;
- (ii) provide effective construction supervision and contract management of all water supply and sanitation components implemented under the project in its region;
- (iii) assist the RPMOs with the overall planning, implementation and monitoring of each subproject during all stages of implementation including adherence to all environmental and social safeguards requirements;
- (iv) work closely with the Water User and Sanitation Committees (WUSCs), respective project municipalities and communities to ensure that the citizens are aware of project benefits and their responsibilities; and
- (v) ensure that poor and vulnerable groups will benefit equally from the project.

247. **Civil Works Contracts and Contractors.** The contractor will be required to designate an Environment, Health and Safety (EHS) supervisor to ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract. The contractor will be required to submit to RPMO, for review and approval, a site-specific environmental management plan (SEMP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEMP; and (iv) budget for SEMP implementation. No works can commence prior to approval of SEMP. The contractor will be required to undertake day to day monitoring and report to the respective RPMO and DSMC.

248. A copy of the EMP or approved SEMP will be kept on site during the construction period at all times. Non-compliance with, or any deviation from, the conditions set out in the EMP or SEMP constitutes a failure in compliance and will require corrective actions. The EARF and IEEs specify responsibilities in EMP implementation during design, construction and O&M phases.

244. The PMO and RPMOs will ensure that bidding and contract documents include specific provisions requiring contractors to comply with: (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.

249. **Capacity Building.** The DRTAC safeguards experts (environmental and social) will be responsible for training the; (i) PMO's safeguards officers (environmental and social); (ii) RPMOs' engineers and social development officers. Training modules will need to cover safeguards awareness and management following both ADB and government requirements as specified below:

- (i) Introduction to environment and environmental consideration in water supply and wastewater projects;
- (ii) Review of IEEs and integration into the detailed project design;
- (iii) Improved coordination within nodal departments; and
- (iv) Monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers before deployment to work sites.

250. **Water Users' and Sanitation Committees (WUSCs):** WUSCs are the eventual operators of the completed projects. The key tasks and responsibilities of WUSCs are, but not limited to:

251. **Before construction**

- (i) Facilitate public consultation and participation, information dissemination and social preparation;
- (ii) Provide available data to DSMC-ESS during IEE;
- (iii) Assist in securing tree-cutting permits and/or registration of water source; and
- (iv) Participate in training programs.

252. **During construction**

- (i) Assist in the observance of the grievance redress mechanism;
- (ii) Actively participate in the monitoring of Contractor's compliance with the IEE and its EMP and the conditions set out with Government's approval of the IEE Reports; and
- (iii) Facilitate public consultations, as necessary.

253. **During operation**

- (i) Implement the Environmental Management Plan and Water Safety Plan;
- (i) If applicable, actively work with the engaged licensed and accredited laboratory in water quality monitoring;
- (ii) Prepare the environmental monitoring report as per IEE; and
- (iii) Ensure observance of the grievance redresses mechanism.

254. **Licensed and Accredited Laboratory.** It is recommended that a licensed and accredited laboratory be engaged to conduct water quality monitoring in the first few years of operation and to train WUSC. The laboratory will ensure that while carrying out the water quality monitoring as prescribed in the National Drinking Water Quality Standard and its Directives, 'hands-on' training is provided to WUSC.

B. Environmental Management Plan

255. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between PMO, RPMO, PIUs, consultants and contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (ii) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (iii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iv) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (v) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

256. The contractor will be required to (i) carry out all of the mitigation and monitoring measures set forth in the approved EMP; and (ii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE, EMP and SEMP. The contractor shall allocate budget for compliance with these IEE, EMP and SEMP measures, requirements and actions. The contractor will be required to submit to PIU, for review and approval, a site environmental management plan (SEMP) including (i) proposed sites/locations for construction work camps, storage areas, hauling

roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; and (iii) monitoring program as per EMP. No works can commence prior to approval of SEMP

Table 31: Environmental Management Plan Matrix

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|---|--|--|--|---|--|
| 1. Before Construction Activities | | | | | |
| Consents, permits, clearances, no objection certificate (NOC), etc. | Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and work stoppage | <ul style="list-style-type: none"> - Obtain all of the necessary consents, permits, clearance, NOCs, etc. before the start of civil works. - Include in detailed design drawings and documents all conditions and provisions if necessary | Project management office (PMO), regional project management offices (RPMOs), and design, supervision and management consultant (DSMC) | Incorporated in final design and communicated to contractors | Before award of contract |
| Existing utilities | Disruption of services | <ul style="list-style-type: none"> - Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction - Require construction contractors to prepare a contingency and spoil management plan | DSMC, RPMOS | List of affected utilities and operators; Bid document to include a requirement for a contingency plan for service interruptions, e.g. provision of water if disruption is more than 24 hours, spoil management plan | During detailed design phase Review of spoils management plan: Twice (once after first draft and once before final approval) |
| Drinking water supply | <p>Extraction of unsatisfactory raw water quality</p> <p>Delivery of unsafe water to the distribution system</p> <p>Inadequate protection of intake well</p> <p>Health Hazards arising from inadequate design of facilities for receiving, storing and handling of</p> | <ul style="list-style-type: none"> - Provision of water treatment plant to meet satisfactory water quality - Perimeter fencing around deep tube well location. - Tube well should be at least 30m upstream from sanitation facilities. - "Housed" dosing unit with ventilation for chlorine - Train operators for handling chlorine | PMO, RPMOS and DSMC | Incorporated in final design and communicated to contractors | Prior to award of contract |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|---|---|--|--------------------------------|---|--|
| | Chlorine and other chemicals | | | | |
| Construction work camps, stockpile areas, storage areas, and disposal areas | Disruption to traffic flow and sensitive receptors | <ul style="list-style-type: none"> - Determine locations before award of construction contracts | DSMC, RPMO | <p>List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.</p> <p>Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land</p> | During detailed design phase |
| Waste generation | Generation of solid waste, wastewater from labor camp and other construction waste may cause pollution | <ul style="list-style-type: none"> - Follow the principle of "Reduce, Reuse, Recycle, and Recover" - Prohibition of unwanted littering and discharge of waste. - Solid waste is either managed in a pit or disposed in municipal collection system. | Contractor | Contractor's records. Visual inspection | Visual inspection by RPMO and DSMC-ESS on monthly basis |
| Sources of materials | Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, resulting water logging, and water pollution | <ul style="list-style-type: none"> - Prepare list of approved quarry sites and sources of materials | DSMC, RPMOS | List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of quarry sites | During detailed design phase, as necessary with a discussion with detailed design engineers and PIUs suitability of sources and permit for additional quarry sites if necessary. |
| Siting of intake structure | Disruption of the aquatic ecology | <ul style="list-style-type: none"> - Ensure that the location of the intakes are located in areas and distance that will not disturb the aquatic ecosystem. Conduct study to justify the siting of intake structures. | PMO, RPMOs, and DSMC. | Result of study | During detailed design phase. |
| Quality of ambient air, surface water bodies, and noise | Construction activities and construction camps can impact the ambient quality of | <ul style="list-style-type: none"> - Conduct baseline data gathering for ambient air, surface water quality and noise level at all construction sites. - Compare all results of environmental | PMO, RPMOs and DSMC | Results of laboratory analyses | Once before construction works commence. |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|---|--|--|--|--|--|
| | air, quality of surface water bodies, and level of noise in the areas of works. | quality monitoring during construction and O&M phases with these baseline data to determine any negative impact. | | | |
| Environmental management plan (EMP) Implementation Training | Impact to the environment, workers, and community | - Project manager and contractors should be trained on EMP implementation, spoils management, standard operating procedures (SOP), health and safety (H&S), Labor Act (1992) | PMO, RPMOs, and DSMC. Contractor's Environmental Supervisor | Record of completion (Safeguards Compliance Orientation) Contractor records for EMP implementation at worksites | During the detailed design phase before the mobilization of workers to site |
| WTP operations | Impact to the environment, workers, and community due to accidents, leaks, etc. | - Development of O&M manual that is comprehensive by integrating international best practice and guidelines such as the WB EHS Guidelines on Water and Sanitation. | PMO, RPMOs, and DSMC. | Availability of final version of O&M manual | Ongoing basis until O&M manual is finalized, but prior to O&M phase. |
| 2. During Construction Activities | | | | | |
| A. Physical Characteristics | | | | | |
| Topography landforms, geology, and soils and river morphology and hydrology | Sand, gravel or crushed stone will be required for this subproject. Extraction of natural aggregate materials may cause localized changes in topography and landforms (if on land) or river morphology and hydrology (if on the river). | - Utilize readily available sources with environmental clearance and license - Borrow areas and quarries comply with environmental requirements - Coordinate with local authorities for quarrying from rivers. Alternative sources should be identified. | Contractor | Records of sources of materials | Monthly by RPMOS |
| Water quality | Trenching and excavation, run-off from stockpiled materials and chemical contamination from fuels and lubricants | - Spoils management plan. - Reuse excess spoils and materials - Disposal site in designated areas. - Earthworks during dry season - Stockyards at least 300m away from watercourses. | Contractor | Areas for stockpile storage of fuels and lubricants and waste materials; Number of silt traps installed along | Visual inspection by RPMOS and DSMC-ESS on weekly basis Frequency and sampling sites to be finalized during detailed design |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|----------------------|---|---|--------------------------------|---|---|
| | may result to silt-laden runoff during rainfall, which may cause siltation and reduction in the quality of adjacent bodies of water. | <ul style="list-style-type: none"> - Fuel storage area away from water drainage - Take precautions to minimize the overuse of water - Prevent wastewater into water sources. - Ensure safe water diversion - No obstruction in flowing water. | | trenches leading to water bodies; No visible degradation to nearby drainage, water bodies due to construction activities | and final location of subprojects components |
| Air quality | Work at the dry season and transporting construction materials may increase dust, carbon, monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons in air environment | <ul style="list-style-type: none"> - Use of physical controls, sprays, covers, compaction, screening, enclosure, windbreaks, binders and road surfacing - Cover delivery trucks during transportation - Construction vehicle's speed limited to 30kph. - Use of vehicles complying with NVMES, 2069 - Prohibition of open burning of solid waste. - Minimize stockpile height | Construction Contractor | Location of stockpiles; Number of complaints from sensitive receptors; Heavy equipment and machinery with air pollution control devices; A certification that vehicles are compliant with air quality standards. | Visual inspection by RPMOS and DSMC-ESS on monthly basis Frequency and sampling sites to be finalized during the detailed design stage and final location of Subproject components |
| Acoustic environment | Temporary increase in noise level and vibrations by excavation equipment, and the transportation of materials, equipment and people. However, the proposed subproject pipeline will follow right-of-way (ROW alignment | <ul style="list-style-type: none"> - Prepare work schedule with community consultation and local administration - Overtime work restricted low noise generating equipment. - Minimize drop heights - No horns until necessary - Use modern vehicles and machinery with low noise emissions - Maintain low noise levels - Warning signs in noise hazard areas. Workers must wear hearing protection there. - Identify vibration risk to nearby structures. Take caution working in such areas. | Contractor | Number of complaints from sensitive receptors; Use of silencers in noise-producing equipment and sound barriers; Equivalent day and night time noise levels | Visual inspection by RPMOS & DSMC-ESS on monthly basis |
| Aesthetics | Interference with the enjoyment of the area and creation of unsightly or offensive conditions | <ul style="list-style-type: none"> - Prepare a debris disposal plan. - Minimize stockpile size - Clear wastes regularly - Avoid stockpiling of excess spoils. | Contractor | Number of complaints from sensitive receptors; | Visual inspection by RPMOS & DSMC-ESS on monthly basis |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|--|--|---|--------------------------------|---|--|
| | | <ul style="list-style-type: none"> - Cover delivery trucks during transportation. - Clean roads. - Use screening enclosure shade cloth, temporary walls - Clean site regularly. - Follow the principle of "Reduce, Reuse, Recycle, and Recover" | | <p>Worksite clear of hazardous wastes</p> <p>Worksite clear of any wastes unutilized materials, and debris</p> <p>Transport route and worksite cleared of dirt</p> | |
| B. Biological Characteristics | | | | | |
| Biodiversity | Activities in WUSC acquired area. There are no protected areas in or around subproject sites. | <ul style="list-style-type: none"> - Tree cutting will not be required for this project. | Contractor | <p>PIU and PMO to report in writing the number of trees cut and planted if any (during detailed design stage)</p> <p>Some complaints from sensitive receptors on disturbance of vegetation, poaching fishing, etc.</p> | Visual inspection by RPMOS & DSMC-ESS on monthly basis |
| C. Socioeconomic Characteristics | | | | | |
| Existing provisions for pedestrians and other forms of transport | The road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject's pipeline will follow ROW alignment. | <ul style="list-style-type: none"> - Prepare suitable transportation routes - Safe passage for vehicles and pedestrians - Schedule material deliveries on low traffic. - Erect and maintain barricades if required - Inform through display board about nature, duration of construction and contact for complaints - Complete the work quickly nearby institution, place of worship, business, hospitals, and schools. - Consult with business and institutions for work schedules. - Restore damaged properties and utilities | Construction Contractor | Traffic route during construction works, including number of permanent signs, barricades, and flagmen on worksite; Number of complaints from sensitive receptors; Some signage placed at the project location. Number of walkways, signage, and metal sheets placed at project location | Visual inspection by RPMOS and DSMC-ESS on monthly basis |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|---------------------------------------|---|---|--------------------------------|--|---|
| Socioeconomic status | Staffing will be required during construction. This can result in an increase in local revenue. | <ul style="list-style-type: none"> - Engage the local workforce. - Secure construction materials from local market. | Construction Contractor | Employment records; Records of sources of materials Records of compliance to Nepal Labor Act (1992), district wages | Visual inspection by RPMOS & DSMC-ESS on monthly basis |
| Other amenities for community welfare | Civil works may result in an impact to the sensitive receptors such as residents, businesses, and the communities. Excavation may also damage infrastructure located alongside the roads. | <ul style="list-style-type: none"> - Identify location and nature of existing infrastructure before excavation - Minimize repeated disturbance to locals by integrating other forms of infrastructures. - Inform local about nature, duration and possible impacts of the construction and integrate their concerns - Promptly relocate infrastructure materials - Take prior permission from local authority for water use - Restore damaged properties and utilities to pre-work conditions. - | Construction contractor | Utilities Contingency Plan Number of complaints from sensitive receptors | Visual inspection by RPMOS and DSMC-ESS on monthly basis |
| Community health and safety | Construction works will impede the access of residents and business in limited cases | <ul style="list-style-type: none"> - Restrict work force in designated areas. - Identify stockyard areas in consultation with local administration - Work on private land requires written permission of landowners and DSMC. - Prefer small mechanical excavator for trenching - Construct gender friendly toilets for workers - Prohibit alcohol and drugs on site - Prevent excessive noise; - Code of conduct for workers includes restricting workers in designated areas, no open defecation, no littering, no firewood collection, no fire except designated places, no trespassing, no residence at | Contractor | The number of permanent signs, barricades, and flagmen on worksites as per Traffic Management Plan (see Annex for sample); Number of complaints from sensitive receptors; Number of walkways, signs, and metal sheets placed at the project location Agreement between landowner and contractors in case of using private land as | Visual inspection by RPMOS & DSMC-ESS on weekly basis Frequency and sampling sites to be finalized during detailed design and final location of sub-project components |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|--|--|--|--------------------------------|---|--|
| | | <ul style="list-style-type: none"> - construction sites, and no obligation to potentially dangerous work - Maintain a complaint logbook in workers camp and take action promptly of complaints | | work camps storage areas etc. | |
| Workers Health & Safety | There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working at height and excavation works. | <ul style="list-style-type: none"> - Comply Labor Act (1992) of Government of Nepal - Train all site personnel on environmental health and safety - Exclude public from worksites - Provide personal protective equipment to workers and ensure their effective usage - Document procedures to be followed for site activities; and - Maintain accident reports and records. - Make first aid kits readily available - Maintain hygienic accommodation in work camps. - Ensure uncontaminated water for drinking, cooking and washing, - Assure clean eating areas - Make sure sanitation facilities are readily available - Provide medical insurance coverage for workers; - Provide orientation for guest visitors - Ensure that visitors do not enter hazard areas unescorted; - Require workers to wear high visibility clothes - Ensure moving equipment is outfitted with audible backup alarms; - Chemical and material storage areas need to be marked clearly - Hearing protection equipment enforced in noisy environment | Contractor | <ul style="list-style-type: none"> - Site –Specific H&S plan - Equipped first-aid stations - Medical insurance coverage for workers - Number of accidents - Records of supply of uncontaminated water - Condition of eating areas of workers - Record of H&S orientation training - Availability of personal protective equipment at construction site - % of moving equipment outfitted with audible back-up alarms - Signage for storage and disposal areas - Condition of sanitation facilities for workers | <ul style="list-style-type: none"> - Visual inspection by RPMOS (monthly) and DSMC-ESS on a weekly basis. - Frequency and sampling sites to be finalized during detailed design and final location of sub-project components |
| D. Historical, Cultural, and Archaeological Characteristics | | | | | |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|---|--|---|--------------------------------|--|---|
| Physical and cultural heritage | There are no archaeological, paleontological, or architectural sites of significance listed by local, national authority and UNESCO. | - Stop work immediately to allow further investigation if any findings are suspected. | Contractor | Records of chance finds | Visual inspection by RPMOS and DSMC-ESS on Monthly basis. |
| E. Others | | | | | |
| Submission of EMP implementation Report | Unsatisfactory compliance to EMP | - Appointment of EMP supervisor - Timely monitoring reports with field photographs | Contractor | Availability and competency of appointed supervisor Monthly report | Monthly monitoring report to be submitted by RPMOS to PMO PMO to submit semi-annual monitoring report to ADB |
| Post Construction Activities | Damage due to debris, spoils, excess construction materials | - Remove spoils wreckage, rubbish, or temporary structures no longer required; - All excavated roads shall be reinstated to original condition. - All disrupted utilities should be restored - All affected structures rehabilitated /compensated - The construction camp needs to clear of spills e.g. oil, paint, etc. and other pollutants after dismantling - All hardened surfaces shall be ripped; all imported materials shall be removed and all temporary services shall be cancelled - Request PMO/PIU in writing that worksites and camps are vacated and restored to pre-project conditions | Contractor | RPMOS/PMO report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed, and (iv) worksite cleanup is satisfactory. | Before turnover of completed works to WUSC |
| Environmental legislation compliance | Lack of awareness in project managers and WUSC about legislations and IEE requirements | - Strengthen capacity of WUSC and project staffs - Ensure compliance with NDWQS | PMO, RPMOs, DSMC, and WUSC | Monitoring reports and checking operations against O&M manuals and permits/clearances | After commissioning of systems and semi-annually |
| Drinking water supply system | Delivery of unsafe Water | - Prepare operations and maintenance plan - Proper handling and storage of calcium Hypochlorite | PMO, RPMOs, DSMC, and WUSC | Water Quality reports WTP records in the log book | During O&M of the system Quarterly monitoring |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|---|--|---|--------------------------------|--|---|
| | | <ul style="list-style-type: none"> - Ensure qualified persons to handle disinfection, safe storage of chemicals - Ensure capacity of WUSC to implement quick response to hazardous chemical spills - Implement SPS-complaint EMP and a water safety plan - Monitor water quality | | | |
| | Excessive algal growth in reservoirs. | <ul style="list-style-type: none"> - Close water tanks all the time - Clean reservoirs as per the O&M schedule. | WUSC | Water quality results | During O&M of the system. Daily maintenance of chlorine residual, cleaning. |
| Mishandling of chlorine | Excessive exposure to chlorine, hypochlorous acid, and hypochlorite ion results in irritation of the esophagus, a burning sensation in the mouth and throat, and spontaneous vomiting. | <ul style="list-style-type: none"> - Ensure proper storage and handling practices for chemicals - Ensure the knowledgeable and skilled person is in charge of chlorine handling - Ensure use of PPE while using chemicals; - Use of chlorine as per WHO guideline | WUSC | Water quality test | |
| Sanitation (Toilets and septage disposal) | <p>Contamination of drinking water source and other environmental receptors from household and community toilets</p> <p>Risk to public and environmental health due to inappropriate siting and design of septage disposal pit</p> | <ul style="list-style-type: none"> - The design of toilets includes septic tanks that are designed as per national standards and codes to allow for maximum retention of septage. This includes ensuring septic tanks are sealed and water tight. Toilets will be established at least 30m downstream of the drinking water source. - The septage disposal pit (similar to sludge drying bed technology) is to be designed and constructed in accordance to international best practice and acceptable standards (e.g., US EPA standards etc). This includes; (i) locating disposal pits at least 300m away from the nearest dwelling, and 30 m downstream of | PMO, RPMOS, and DSMC | Incorporated in final design and communicated to contractors | Prior to award of contract |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring |
|-------|---------|--|--------------------------------|----------------------|-------------------------|
| | | <p>the drinking water source; (ii) pits are to be only established in relatively flat land with no more than 8% slope; and (iii) site selected for establishment of pits should not be where food crops are grown.</p> <ul style="list-style-type: none"> - The sanitation condition will be maintained to deter flies, mosquitos, and other vectors for breeding, free from odor and aesthetically pleasing. - A proper septage management shall be developed and followed. | | | |

C. Environmental Monitoring Program

257. Environmental monitoring will be done during construction at three levels:
- (i) Monitoring development of project performance indicators by the PMO-ESS;
 - (ii) Monitoring implementation of mitigation measures by the Contractor; and
 - (iii) Overall regulatory monitoring of environmental issues by the PMO.

258. In addition to regular monitoring onsite (at town level) by the ICG and DSMC-ESS on the EMP implementation of the mitigation measures, monitoring of key environmental parameters is proposed. Table VIII-2 presents the indicative environmental monitoring plan for the subproject which includes relevant environmental parameters, with a description of the sampling stations, frequency of monitoring, applicable standards, and responsible agencies. This will be updated during detailed design to ensure EMP and monitoring program is commensurate to the impacts of the subproject.

Table 32:

| SN | Field | Stage | Parameters | Location | Frequency | Standards | Responsibility |
|----|----------------------------|--|---|--|---|---|----------------|
| 1. | Air quality | Before construction to establish baseline Construction phase | PM ₁₀ SO ₂ NO _x | Intake and/or worksite locations Along water transmission main 1-km interval from intake locations Construction campsite locations | 24-hour monitoring once in a season (except monsoons) during the construction | National Ambient Air Quality Standards, 2003 | Contractor |
| 2. | Noise and vibration levels | Before construction to establish baseline Construction phase | Equivalent day and night time noise levels | Intake and/or worksite locations Along water transmission main 1-km interval from intake locations Construction campsite locations | Once in a season (except monsoons) during construction | National Noise Standard Guidelines, 2012 | Contractor |
| 3. | Surface Water quality | Before construction to establish baseline Construction phase Operation phase | TDS, TSS, pH, hardness, BOD, total coliform, E-coli, total nitrogen, total phosphorus, heavy metals, temperature, DO, hydrocarbons, mineral oils, phenols, cyanide, temperature | Adjacent to construction sites (to be identified by the DSMC) | Twice a year (pre-monsoon and post-monsoon) during construction | National Drinking Water Quality Standards, 2006 | Contractor |

| SN | Field | Stage | Parameters | Location | Frequency | Standards | Responsibility |
|----|---|---------------------------------|--|---|-----------------------------------|---|---|
| 4. | Treated Water quality | Operation phase | All NDWQS and WHO standard parameters, and follow whichever are more stringent. ^a | End of WTP line (after final disinfection) | Daily or as often as practicable. | National Drinking Water Quality Standards, 2006 | WUSC |
| 5. | Survival rate of landscaping, tree plantation | O&M phase | Survival rate | In the areas where re-plantation/ landscaping is proposed | Twice a year for 2 years | None | WUSC |
| 6. | Community and occupational health and safety | Construction phase O&M phase | Incidence and types of health and safety issues | Work sites | Twice a year | Zero incidence | Contractor – construction phase WUSC or municipality – in the whole period of O&M of the plants. |

BOD = Biochemical Oxygen Demand; DO = Dissolved Oxygen; km = kilometer; NO_x = nitrogen oxide; O&M = operation and maintenance; PM₁₀ = particles equal to or smaller than 10 microns; pH = potential of hydrogen; SO₂ = Sulphur Dioxide; TDS = total dissolved solids; TSS = total suspended solids; WTP = water treatment plant; WUSC = water users' sanitation committee.

^a Depending on what parameters laboratories in Nepal can test or analyze.

D. Institutional Capacity Development Program

259. Considering the limited capability of the Project's key players in environmental management, technical assistance from environmental specialists and capacity development during loan implementation will be needed. Capacity development will consist of hands-on training in implementing the responsibilities in EMP (as well as in EARF) implementation, complemented with a short-term series of lectures or seminars.

260. WUSC does not have the capacity to monitor the quality of supplied water as prescribed in the NDWQS and its Directives. Although monitoring kits and laboratory rooms will be provided, it does not guarantee that WUSC would be able to handle them for effective monitoring. DWSS has five regional laboratories; however, some are not functioning well due to lack of human resources. For effective monitoring, it is recommended that a licensed and accredited laboratory be engaged in water quality monitoring during the first 2-3 years of operation during when WUSC will enhance its capacity by actively participating. After the engagement period and initial phase of "learning by doing", there should be continuing periodic training to sustain WUSC's capacity. The cost of monitoring during operation takes account of a licensed laboratory for water quality monitoring and training WUSC. A Water Safety Plan is included in subproject design and will oblige the operator to carry out water quality monitoring, accordingly. The amount of NRs500,000 will be provided annually to implement the Plan. There will be sufficient fund to include training by the licensed and accredited lab while monitoring water quality.

261. The PMO-ESS will be responsible for environmental awareness training and management in accordance with both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. Typical modules would be as follows: (i) sensitization; (ii) introduction

to the environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers before deployment to work sites. The proposed training project along with the frequency of sessions is presented in Table 33.

Table 33: Training Program for Environmental Management

| Items | Pre-construction/prior to construction | Construction | |
|----------------|--|--|---|
| Training Title | Orientation workshop | Orientation program/ workshop for contractors and supervisory staff | Experiences and best practices sharing |
| Purpose | To make the participants aware of the environmental safeguard requirements of ADB and Government of Nepal and how the project will meet these requirements | To build the capacity of the staffs for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and the government. | To share the experiences and best practices aimed at learning lessons and improving implementation of EMP |
| Contents | <p>Module 1: Orientation</p> <ul style="list-style-type: none"> • ADB Safeguards Policy Statement • Government of Nepal Environmental Laws and Regulations <p>Module 2: Environmental Assessment Process</p> <ul style="list-style-type: none"> • ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements • Review of environmental assessment report to comply with ADB requirements • Incorporation of EMP into the project design and contracts | <ul style="list-style-type: none"> • Roles and responsibilities of officials/contractors/consultants towards protection of the environment • Environmental issues during construction • Implementation of EMP • Monitoring of EMP implementation • Reporting requirements | Experiences on EMP implementation – issues and challenges Best practices followed |
| Duration | 1 day | 1 day | 1 day on a regular period to be determined by PMO, ICGs, and (provide if DRTAC or DSMC) |
| Participants | Executing and implementing agencies, PMO, and PMO staff (technical and environmental) involved in the project implementation | PMO ICGs Contractors | PMO ICGs Contractors |

E. Staffing Requirement and Budget

262. Costs required for implementing the EMP will cover the following activities:
- (i) Updating IEE, preparing and submitting reports and public consultation and disclosure;
 - (ii) Application for environmental clearances; and
 - (iii) Implementation of EMP, environmental monitoring program and long-term surveys.
263. Environmental monitoring during construction will also be straightforward and will involve periodic site observations and interviews with workers and others, plus checks of reports and other documents. This will be conducted by PMO-ESS assisted by the PMO environmental safeguard officer. Therefore, no separate budget is required for the PMO-ESS.
264. The cost of mitigation measures and surveys during construction stage will be incorporated into the contractor's costs, which will be binding on him for implementation. The surveys will be conducted by the contractors.
265. The operation phase for mitigation measures are good operating practices to mitigate the environmental impacts of this phase and the responsibility remains to WUSC. All monitoring during the operation and maintenance phase will be conducted by WUSC. The Water Safety Plan, included in the project design, will allocate NRs 500,000 annually for operation and maintenance particularly water quality monitoring. If a licensed laboratory will be engaged for the first 2-3 years of operation for training purposes, the cost can be accommodated under the Water Safety Plan.
266. The indicative costs of EMP implementation are shown in Tables 34 (by source of funds).

Table 34: Indicative Cost Of Environmental Management Plan Implementation and Its Monitoring

| SN | Particulars | Stages | Unit | Total Number | Rate (NRs) | Cost (NRs) | Cost covered by |
|----|---|--|---|--------------|-----------------------|------------|---|
| A. | Monitoring Measures | | | | | | |
| 1. | Air quality monitoring | - Pre-construction - Construction | Per location | 3 | 100,000.00 | 300,000.00 | Civil works contract |
| 2. | Noise levels monitoring | - Pre-construction - Construction | Per location | 2 | 25,000.00 | 50,000.00 | Civil works contract |
| B | Capacity Building | | | | | | |
| 1. | (i) Orientation workshop for officials involved in the project implementation on ADB Safeguards Policy Statement, Government of Nepal environmental laws and regulations, and environmental assessment process; (ii) induction course contractors, preparing them for EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during implementation; and (iii) lessons learned information sharing | Module 1 – immediately upon engagement of the (provide if DRTAC or DSMC) environmental specialists Module 2 – before award of civil works contracts (twice a year for 4 years) Module 3 – before start of Phase 2 and upon completion of the project | lump sum | 1 | Module 1 – 300,000.00 | 300,000.00 | DRTAC |
| C. | Human Resources Costs | | | | | | |
| 1 | ICG Environment Safeguard Assistants | Construction phase | 1 | 20 | 25000.00 | 500,000.00 | Budget covered through DSMC |
| 2 | DSMC Environmental Safeguard Specialist | Responsible for environmental safeguards of the project at ICG level | person months (spread over entire project implementation on period) | 20 | 30000.00 | 600,000.00 | Remuneration and budget for travel covered by the DSMC contract |
| D. | Administrative Costs | | | | | | |
| 1. | Legislation, permits, and agreements | Permit for excavation, tree-cutting permits, etc. | Lump sum | | | | These consents are to be obtained by the contractor at his expense. |
| | | Environmental assessment and | Lump sum | 1 | 50,000 | 50,000 | 50,000 |

| SN | Particulars | Stages | Unit | Total Number | Rate (NRs) | Cost (NRs) | Cost covered by |
|--------------|--|---|--------------------|--------------|------------------------|------------------------------|---|
| | | environmental clearances as per EPA 1996 and EPR, IEE presentation at review committee related expenses | | | | | |
| E. | Other Costs | | | | | | |
| 1. | Public consultations and information disclosure | Information disclosure and consultations during preconstruction and construction phase, including public awareness campaign through media | As per requirement | Lump sum | | 100,000 | Covered under DSM Contract |
| 2. | GRM implementation | Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information dissemination) | | Lump sum | | 100,000 | PMO cost |
| 3. | Any unanticipated impact due to project implementation | Mitigation of any unanticipated impact arising during construction | | Lump sum | Contractor's liability | As per insurance requirement | Civil works contract – contractor's insurance defect liability period |
| TOTAL | | | | | | 2,000,000.00 | |

DSMC = design, supervision and management consultant, DRTAC = design review and technical audit consultant, EMP = environmental management plan, EPA = Environmental Protection Act, EPR = Environmental Protection Rules, ICG = implementation core group, GRM = grievance redress mechanism, IEE = initial environmental examination, PMO = project management office.

267. Hence, the provisional amount of NRs2,000,000.00 has been provided to execute all necessary environmental mitigation measures.

F. Implementation Schedule

268. Environmental management will be implemented from the detailed design phase through to procurement, construction, and operation. Table 35 presents the indicative timeframe of key EMP activities about the subproject implementation schedule. Similarly, Table 36 presents training for capacity building programs for the project.

Table 35: Environmental Management Implementation Schedule

| Activity | | Indicative Time Frame |
|--|--|--|
| Subproject Implementation | | |
| | Detailed Design and Bidding Documents | |
| | Procurement | |
| | Construction | |
| | Defects Liability Period | |
| | Operation and Maintenance | |
| Environmental Management | | |
| | Overall | |
| 1. | Design Review and Technical Audit Consultant of Environmental Specialist | Starting (4 yrs of intermittent inputs) |
| 2. | Project Management Office's submission of Environmental Monitoring Report (EMR) | |
| | Monthly EMR for Subproject's Monthly Progress Report | Eighth day after effective month |
| | Semi-Annual EMR during construction for submission to ADB | Eighth day after effective 6-months |
| | Semi-Annual EMR for submission to ADB during O&M until ADB issues a Project Completion Report. | Eighth day after effective year |
| Before Construction Mobilization | | |
| 1. | Finalization of EMP, (if applicable) revision of IEE | |
| 2. | ADB review and approval of revised IEE and EMP. | |
| 3. | Obtaining Government's approval of IEE Report | |
| 4. | Community preparation (including disclosure of final IEE and its EMP) | |
| 5. | Establishment of baseline data (as set out in the EMP) | (shall have been done before award of contract) |
| 6. | Preparation of C-EMP by selected Contractor, review of C-EMP against SPS-compliant EMP. | before start of works on site |
| | | or establishment of construction-related facilities. |
| Construction | | |
| | Mobilization to Demobilization | |
| 1. | Implementation of mitigation measures and conduct of environmental effects monitoring following the C-EMP. | |
| 2. | Submission of Environmental Monitoring Report (EMR) | |
| | Monthly, by Contractor | Fifth day of the month following the effective month |
| | Quarterly, by Contractor or by Licensed Laboratory | Third day of the month following the effective quarter |
| Operation (potentially could start even before DLP is over) | | |
| 1. | Implementation of mitigation measures and monitoring activities as specified in the EMP | Starting Q/Q Y |
| 2. | Submission of EMR | Starting Q/Q Y |

| Activity | | Indicative Time Frame |
|----------|--|--|
| | Monthly, by Operator | Fifth day of the month following the effective month |
| | Quarterly, by Operator or (if applicable) by Licensed Laboratory | Third day of the month following the effective quarter |

Table 36: Proposed Topics for Capacity Building/Training

| Topic | | Target Participants | Timing |
|-------|--|------------------------|------------------------|
| 1. | By Environmental Specialists | | |
| | 1.1 Legal Framework | DWSS, PMO, | Early stage |
| | ▪ Relevant national laws, regulations and standards on executing agency and management | WSSDO, ICG, | of Output 2 |
| | ▪ ADB SPS 2009 | RMSO, WUSC (15-18) | |
| | ▪ Executing agency and review procedure under the Project | | |
| | 1.2 Environmental Assessment | | |
| | ▪ Rapid environmental assessment | | |
| | ▪ Initial environmental examination | | |
| | 1.3 Some Aspects of executive agency Process and Environmental Management | | |
| | ▪ Meaningful consultation and info disclosure | | |
| | ▪ Grievance redress mechanism | | |
| | ▪ Environmentally responsible procurement | | |
| | ▪ Occupational and community health and safety | | |
| | 1.4 EMP Implementation, part 1 | DWSS, PMO, | Early stage |
| | ▪ Institution arrangements and responsibilities | WSSDO, ICG, | of Output 2 |
| | ▪ Environmental quality monitoring | RMSO, WUSC, | |
| | ▪ Emergency response | (15-18) | |
| | 1.5 EMP Implementation, part 2 | | |
| | ▪ Performance monitoring and indicators | | |
| | ▪ Environmental monitoring report | | |
| 2. | By External Experts | | |
| | 2.1 Other topics, such as: | MWSS, DWSS, | During |
| | A Good engineering and construction practices as mitigation measures | PMO, ICG, | Project's |
| | B Climate change adaptation (applicable to eligible activities/works under the Project) | WSSDO, RMSO, DSMC (30) | Capacity Devt. Program |
| | B.1 Climate change impacts on infrastructure | | |
| | B.2 Climate-proofing of infrastructure | | |
| | C Strategic environmental assessment of WSS sector policy, development plans, and programs | | |
| | D Other topics that may be suggested by MWSS, DWSS, PMO, ICG & WSSDO | | |

DWSS = Department of Water Supply and Sewerage, EMP = environmental management plan, ICG = implementation core group, PMO = project management office, WSSDO = Water Supply and Sanitation Divisional Office, WUSC = water users' and sanitation committee.

XI. MONITORING AND REPORTING

269. RPMO will monitor and measure the progress of EMP implementation. The monitoring activities will correspond with the project's risks and impacts, as indicated in the IEEs for the projects. In addition to recording information on the work and deviation of work components from the original scope PMO, ICGs will undertake site inspections and document review to verify compliance with EMP and progress toward the expected outcome.

270. RPMO will submit monthly monitoring and implementation reports to PMO, who will take follow-up actions, if necessary. PMO will submit semi-annual monitoring reports to ADB. The suggested monitoring report format is in Appendix 11. Subproject budgets will reflect the costs of monitoring and reporting requirements. For the projects likely to have significant adverse environmental impacts during operation phase, reporting will be continued at bio-annual & annual basis. Monitoring reports will be posted in a location accessible to the public.

271. For subprojects likely to have significant adverse environmental impacts, PMO will retain qualified and experienced external experts to verify its monitoring information. PMO-ESS will document monitoring results, identify the necessary corrective actions, reflect them in a corrective action plan, and for each quarter, will study the compliance with the action plan developed in the previous quarter. Compliance with loan covenants will be screened by the PMO-ESO, with support from the PMO-ESS.

272. ADB will review project performance against the MOWS's commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. ADB will monitor projects on an ongoing basis until a project completion report is issued. ADB will carry out the following monitoring actions to supervise project implementation:

- (i) Conduct periodic site visits for projects with adverse environmental or social impacts;
- (ii) Conduct supervision missions with detailed review by ADB's safeguard specialists/officers or consultants for projects with significant adverse social or environmental impacts;
- (iii) Review the periodic monitoring reports submitted by executing agencies to ensure that adverse impacts and risks are mitigated, as planned and as agreed with ADB;
- (iv) Work with executing agencies to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies to re-establish compliance as appropriate; and
- (v) Prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

273. ADB's monitoring and supervision activities are carried out on an on-going basis until a Project Completion Report (PCR) is issued. ADB issues a PCR within 1-2 years after the project is physically completed and in operation.

XII. CONCLUSION AND RECOMMENDATIONS

274. Field study and analysis of the environmental aspects of the proposed project shows that the proposed project is not an environmentally critical intervention. The IEE shows that:

- (i) The proposed Ilam (Ilaam) water supply and sanitation subproject and its components are not within environmentally sensitive area;
- (ii) There will be some negative impacts however the extent of these impacts is expected to be local, confined within the projects' main areas of influence, and the routes to and from these sites. With the EMP in place, the potential impacts will either be eliminated or minimized to insignificant levels;
- (iii) The significance of impacts during construction will be temporary and short-termed (i.e. most likely to occur only during peak construction periods). These will not be

- (iv) sufficient to threaten or weaken the surrounding resources; During operation, the potential delivery of unsafe water can be mitigated with good operation and maintenance, prompt action on leaks, and complying with the required quality monitoring of supplied water as prescribed in the National Drinking Water Quality Standards Directives; and
- (v) The proposed subproject will bring about: (a) the benefits of access to reliable supply of safe and potable water; (b) promotion of good hygiene and sanitation practices and reduced health and safety risks as positive impacts; and (c) enhanced community health, improved quality of life and safe communities as outcomes. Since it is near Birendranagar Municipality, the implementation of the project will help attract more development and investments in that belt of Province 7.

275. Based on the above findings, the classification of Ilam (Ilaam) Water Supply Subproject as Category B per ADB SPS is confirmed, and no further special study or detailed EIA needs to be undertaken.

276. However, this IEE shall be updated based on the final detailed design and shall consider the following recommendations:

- (i) Result of the impact of the water intakes to the aquatic ecology in the area, including fish survey in all surface water bodies where raw water will be drawn from;
- (ii) Assessment of the amount of waste generated during the construction activities, including the volume of spoils and detailed information of disposal site;
- (iii) Avoidance or minimal (when avoidance is not possible) cutting of trees;
- (iv) Additional information on environmental audit of existing facilities, such as environmental clearances, results of water quality sampling, etc.;
- (v) Determination of the users of river water downstream the proposed intake sources and assessment of any impact of the subproject on these users; and
- (vi) Site-specific details for location of WTP, river crossings, RVT and water supply pipes. For all components, should confirm land use, habitat types present, nearest property, any physical cultural resources, and if any surface water or groundwater well within 500 m.

277. The updated IEE shall be submitted to ADB for final review and disclosure on ADB website. Ultimately, the updated IEE shall be attached to the bid and contract documents. No works shall commence until ADB clears the updated IEE, including the SEMP.

XIII. LITERATURE REVIEWED

- (i) *ADB, 2003. Environmental Assessment Guidelines.*
- (ii) *ADB, 2010. Handbook of Style and Usage.*
- (iii) *Constitution of Nepal (2015). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu.*
- (iv) *District Development profile of Nepal 2010/11 with VDC Profile. A Socio-Economic Development.*
- (v) *District Health Office, Ilam 2062/63.*

- (vi) *Environment Protection Act, (1997). Ministry of Science, Technology and Environment Kathmandu.*
- (vii) *Environment Protection Rules, (1997), Ministry of Science, Technology, and Environment, Kathmandu.*
- (viii) *Environment Statistics of Nepal, CBS, 2011.*
- (ix) *Environmental Impact Assessment Guidelines, (1993). National Conservation Strategy Implementation Project, National Planning Commission, His Majesty's Government, Nepal.*
- (x) *Final Feasibility Study of Ilam Water Supply and Sanitation Project, 2014.*
- (xi) *Detailed Engineering Design Report of Ilam Water Supply Sub-Project, 2017.*
- (xii) *Labor Act (1991), Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu.*
- (xiii) *Local Self-Governance Act, (1999). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu.*
- (xiv) *Ministry of Population and Environment, 1999. Environmental Protection Act, 1997 and Environment Protection Rules, 1999. (Amendment, 1999). Ministry of Law, Justice and Parliament Affairs, Nepal.*
- (xv) *Profile and baseline information of Ilam Municipality, and National Population and Housing 2011, CBS, 2012.*
- (xvi) *National Transport Policy, (2001). Ministry of Physical Infrastructure and Transport, Government of Nepal, Nepal.*
- (xvii) *National Urban Policy (2007). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu.*
- (xviii) *Shrestha K 1998. Dictionary of Nepalese Plant names. Mandala Book Point, Kathmandu, Nepal.*
- (xix) *Solid Waste Management Act (2011). Ministry of Science and Technology and Environment, Kathmandu.*
- (xx) *The Updated Fifteen-Year Development Plan for Small Towns' Water Supply and Sanitation Sector, 2009.*
- (xxi) *Uprety, B.K (2003). Safeguard the Resources, Environmental Impact Assessment Process and Practice, Kathmandu.*
- (xxii) *Water Resource Act (1992). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu.*

**RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST FOR ILAM PROJECT AND
PRELIMINARY CLIMATE RISK SCREENING CHECKLIST FOR SAMPLE SUBPROJECTS**

| Screening Questions | Yes | No | Remarks |
|--|-----|----|--|
| A. Project Siting | | | |
| Is the project area | | | |
| Densely populated? | √ | | Ilam Municipality has moderate population density. |
| Heavy with development activities? | √ | | The distribution pipeline will partially go through the RoW in core bazaar areas of Ilam Municipality. Development activities are of low moderate intensity. |
| Adjacent to or within any environmentally sensitive areas? | | | |
| Cultural heritage site | | √ | |
| Protected Area | | √ | |
| Wetland | | √ | |
| Mangrove | | √ | |
| Estuarine | | √ | |
| Buffer zone of protected area | | √ | |
| Special area for protecting biodiversity | | √ | |
| Bay | | √ | |
| B. Potential Environmental Impacts | | | |
| Will the Project cause... | | | |
| Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff? | | √ | |
| Impairment of historical/cultural monuments/areas and loss/damage to these sites? | | √ | |
| Hazard of land subsidence caused by excessive ground water pumping? | | √ | |
| Social conflicts arising from displacement of communities? | | √ | No displacement |
| Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters? | | √ | No local water use disputes |
| Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)? | √ | | Basic water treatment is proposed under the Subproject. EMP recommends water quality monitoring as prescribed in the NDWQS & its Directives. |
| Delivery of unsafe water to distribution system? | √ | | Design proposes office building that also comprises water quality laboratory to deliver safe water. EMP recommends continuing training of WUSC in water quality monitoring, as prescribed in the NDWQS Directives. |
| Inadequate protection of intake works or wells, leading to pollution of water supply? | √ | | Design has considered the safest site for intake regarding environmental pollution and proposes enough measures to mitigate contamination. |
| Over pumping of ground water, leading to salinization and ground subsidence? | | √ | |
| Excessive algal growth in storage reservoir? | | √ | EMP provides mitigation measures |
| Increase in production of sewage beyond capabilities of community facilities? | | √ | EMP provides mitigation measures |

| Screening Questions | Yes | No | Remarks |
|---|-----|----|---|
| Inadequate disposal of sludge from water treatment plants? | | √ | Minimal sludge expected. EMP provides mitigation measures. |
| Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? | | √ | |
| Impairments associated with transmission lines and access roads? | √ | | EMP provides measures to mitigate impacts on power supply poles in the bazaar that are immediately adjacent to, or onto, road carriageways. |
| Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals. | √ | | EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing. |
| Health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation? | | √ | |
| Dislocation or involuntary resettlement of people? | | √ | |
| Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? | | √ | |
| Noise and dust from construction activities? | √ | | EMP provides mitigation measures. |
| Increased road traffic due to interference of construction activities? | | √ | EMP provides mitigation measures. |
| Continuing soil erosion/silt runoff from construction operations? | | √ | |
| Delivery of unsafe water due to poor O&M treatment processes (especially MWSS accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems? | √ | | EMP incorporates monitoring of distributed water according to the Directives for the NDWQS. |
| Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals? | √ | | Concern for corrosion of G.I. pipes caused by the chlorine content in treated water is low. EMP provides mitigation measures. |
| Accidental leakage of chlorine gas? | | √ | |
| Excessive abstraction of water affecting downstream water users? | | √ | |
| Competing uses of water? | | √ | |
| Increased sewage flow due to increased water supply | √ | | Municipality plans for drainage management |
| Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant | √ | | There is no wastewater collection & treatment system. EMP provides mitigation measures. |
| Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? | | √ | |
| Social conflicts if workers from other regions or countries are hired? | √ | | Expected as low concern. Priority will be given to local workers. |
| Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction? | √ | | EMP provides mitigation measures. |
| Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project | √ | | EMP provides mitigation measures. |

| Screening Questions | Yes | No | Remarks |
|--|-----|----|---------|
| are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? | | | |

Preliminary Climate Risk Screening Checklist for Sample Sub-project Town

| Screening Questions | Score | Remarks |
|--|-------|---|
| Location and design of project Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides | 1 | Subproject sites for water supply and sanitation infrastructure are highly sensitive to floods and earthquakes and have medium sensitivity to droughts |
| Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g. sea-level, peak river flow, reliable water level, peak wind speed etc.) | 0 | Not required |
| Materials and maintenance Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity, and hydro metrological parameters) affect the selection of project inputs over the life of project outputs (i.e. construction materials) | 0 | Not likely |
| Performance of Project Outputs Would climate/weather conditions and related extreme events likely to affect the performance throughout their design life time? | 1 | Temperature increase would likely contribute to the reduced capacity of existing infrastructure pumps to meet increased demands and substandard water quality due to algal blooms and pathogens. Increased intensity of precipitation and storm evens will increase turbidity in reservoirs, faster runoff due to less groundwater recharge, and damage or inundate structures. Prolonged droughts will reduce capacity of water resources to absorb and dilute pollution due to lower flows in receiving streams, resulting to reduced treatment performance due to lower flows. |

Options for answers and corresponding scores are given below.

| Response | Score |
|-------------|-------|
| Not Likely | 0 |
| Likely | 1 |
| Very Likely | 2 |

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned as medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as highrisk project.

Result of Initial Screening (Low, Medium, High): Medium
Other comments: None

ILAM (ILAAM) SUBPROJECT NO MITIGATION MEASURES SCENARIO

Detailed Guidance Saww Environment Safeguards Team Checklist When Reviewing an IEE Or EIA No Mitigation Measures Scenario

Package No. - W05 (ILAM SUBPROJECT)

Checklist 1: Scoping Checklist Part 1 - Questions on Project Characteristics

| No. | Questions to be considered in Scoping | Yes/No/? | Which Characteristics of the Project Environment could be affected and how? | Is the effect likely to be significant? Why? |
|---|---|----------|--|--|
| 1. Will construction, operation or decommissioning of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in waterbodies, etc)? | | | | |
| 1.1 | Permanent or temporary change in land use, land cover or topography including increases in intensity of land use? | Yes | Temporary change in land use at the designated stockyards by disposing excess of excavated materials | No, it is short term and is limited to construction period only |
| 1.2 | Clearance of existing land, vegetation and buildings? | No | | |
| 1.3 | Creation of new land uses? | No | | |
| 1.4 | Pre-construction investigations e.g. boreholes, soil testing? | No | | |
| 1.5 | Construction works? | Yes | Same as 1.1 | |
| 1.6 | Demolition works? | Yes | Will require demolition of existing Shikhar Danda RVT and Gadhi Barrack RVT for the construction of new RVT and also require demolition of ROW for excavation works for distribution pipelines | No. The new RVT will be immediately constructed and the demolished ROW will also be readily rehabilitated. |
| 1.7 | Temporary sites used for construction works or housing of construction workers? | Yes | Possibility of disposal of the daily wastes to the nearby land or water bodies by the construction workers | No, there will be provision to prohibit such actions. |
| 1.8 | Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations? | Yes | Earthworks may bring change in land use disrupting the access to roadside shops and houses. | No, the spoils will be readily disposed, and the immediate backfilling works will be done. |
| 1.9 | Underground works including mining or tunnelling? | No | | |
| 1.10 | Reclamation works? | No | | |
| 1.11 | Dredging? | No | | |
| 1.12 | Coastal structures eg seawalls, piers? | No | | |
| 1.13 | Offshore structures? | No | | |
| 1.14 | Production and manufacturing processes? | No | | |
| 1.15 | Facilities for storage of goods or materials? | No | | |
| 1.16 | Facilities for treatment or disposal of solid wastes or liquid effluents? | No | | |

| No. | Questions to be considered in Scoping | Yes/No/? | Which Characteristics of the Project Environment could be affected and how? | Is the effect likely to be significant? Why? |
|------|--|----------|---|--|
| 1.17 | Facilities for long term housing of operational workers? | No | | |
| 1.18 | New road, rail or sea traffic during construction or operation? | No | | |
| 1.19 | New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc? | No | | |
| 1.20 | Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements? | No | | |
| 1.21 | New or diverted transmission lines or pipelines? | | | |
| 1.22 | Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers? | No | | |
| 1.23 | Stream crossings? | Yes | It may affect the integrity of biological habitat of the encountered rivers & streams. | No, care will be taken during laying of transmission line. |
| 1.24 | Abstraction or transfers of water from ground or surface waters? | Yes | It will abstract water from surface water sources i.e., river which may affect the availability of water. | No, design of this system has been done on the basis of assessment of average monthly flows of the source and the design confirms the reliability of the source. |
| 1.25 | Changes in water bodies or the land surface affecting drainage or run-off? | No | | |
| 1.26 | Transport of personnel or materials for construction, operation or decommissioning? | Yes | Will generate dust and noise by vehicles for transportation of construction materials | No, because transportation of materials will be intermittent. |
| 1.27 | Long term dismantling or decommissioning or restoration works? | No | | |
| 1.28 | Ongoing activity during decommissioning which could have an impact on the environment? | No | | |
| 1.29 | Influx of people to an area in either temporarily or permanently? | No | | |

| No. | Questions to be considered in Scoping | Yes/No/? | Which Characteristics of the Project Environment could be affected and how? | Is the effect likely to be significant? Why? |
|--|---|----------|---|--|
| 1.30 | Introduction of alien species? | No | | |
| 1.31 | Loss of native species or genetic diversity? | No | | |
| 1.32 | Any other actions? | No | | |
| 2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply? | | | | |
| 2.1 | Land especially undeveloped or agricultural land? | No | | |
| 2.2 | Water? | No | | |
| 2.3 | Minerals? | No | | |
| 2.4 | Aggregates? | No | | |
| 2.5 | Forests and timber? | No | | |
| 2.6 | Energy including electricity and fuels? | No | | |
| 2.7 | Any other resources? | No | | |
| 3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health? | | | | |
| 3.1 | Will the project involve use of substances or materials which are hazardous or toxic to human health or the environment (flora, fauna, water supplies)? | No | | |
| 3.2 | Will the project result in changes in occurrence of disease or affect disease vectors (eg insect or water borne diseases)? | Yes | The surroundings of the worker's camp may be affected as they may not have access to safe supply of water and good sanitation practice. | No because it is limited to construction period only and it can also be avoided by provision of safe access to water, sanitation and health care |
| 3.3 | Will the project affect the welfare of people eg by changing living conditions? | No | | |
| 3.4 | Are there especially vulnerable groups of people who could be affected by the project eg hospital patients, the elderly? | No | | |
| 3.5 | Any other causes? | No | | |
| 4. Will the Project produce solid wastes during construction or operation or decommissioning? | | | | |
| 4.1 | Spoil, overburden or mine wastes? | Yes | The spoil if not readily disposed at safe site, it will occupy the land and may create discomfort to the passer-by. | No, because it is short term and can also be avoided by provision of immediate disposal of the spoils at safe site |
| 4.2 | Municipal waste (household and or commercial wastes)? | Yes | The living environment of worker's camp may be polluted by the waste generated by the workers. | No, it is short term |

| No. | Questions to be considered in Scoping | Yes/No/? | Which Characteristics of the Project Environment could be affected and how? | Is the effect likely to be significant? Why? |
|---|---|----------|--|---|
| 4.3 | Hazardous or toxic wastes (including radioactive wastes)? | No | | |
| 4.4 | Other industrial process wastes? | No | | |
| 4.5 | Surplus product? | No | | |
| 4.6 | Sewage sludge or other sludge from effluent treatment? | No | | |
| 4.7 | Construction or demolition wastes? | Yes | <ul style="list-style-type: none"> Air Pollution by the dust generated from the wastes Discomfort to the passer-by if the wastes are not safely disposed | No, because it is limited to the construction phase only and there will be provision of immediate waste disposal |
| 4.8 | Redundant machinery or equipment? | No | | |
| 4.9 | Contaminated soils or other material? | No | | |
| 4.10 | Agricultural wastes? | No | | |
| 4.11 | Any other solid wastes? | No | | |
| 5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air? | | | | |
| 5.1 | Emissions from combustion of fossil fuels from stationary or mobile sources? | No | | |
| 5.2 | Emissions from production processes? | No | | |
| 5.3 | Emissions from materials handling including storage or transport? | Yes | Dust generation by the unloading of materials like cement, aggregates etc. | No -there will be regular monitoring |
| 5.4 | Emissions from construction activities including plant and equipment? | Yes | Dust generation by construction works like earthworks | No -there will be regular monitoring |
| 5.5 | Dust or odours from handling of materials including construction materials, sewage and waste? | Yes | Air pollution by the dust generation during unloading of materials like aggregates. | No -there will be regular monitoring |
| 5.6 | Emissions from incineration of waste? | | | |
| 5.7 | Emissions from burning of waste in open air (eg slash material, construction debris)? | Yes | The locality of the worker's camp may be affected by the open burning of waste generated from the worker's camp. | No, because it is limited to the local area only and is limited to the duration up to which the labours will be residing. |
| 5.8 | Emissions from any other sources? | No | | |
| 6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation? | | | | |
| 6.1 | From operation of equipment eg engines, ventilation plant, crushers? | No | | |
| 6.2 | From industrial or similar processes? | No | | |
| 6.3 | From construction or | Yes | <ul style="list-style-type: none"> The noise generated | No because it is |

| No. | Questions to be considered in Scoping | Yes/No/? | Which Characteristics of the Project Environment could be affected and how? | Is the effect likely to be significant? Why? |
|--|---|----------|--|--|
| | demolition? | | from the demolition of ROW for distribution lines may disturb the people residing at core bazaar area. | short term (limited to construction phase) |
| 6.4 | From blasting or piling? | No | | |
| 6.5 | From construction or operational traffic? | Yes | Moving of vehicles carrying construction materials may affect core area like Ilam Bazaar | No- because it is short term |
| 6.6 | From lighting or cooling systems? | No | | |
| 6.7 | From sources of electromagnetic radiation (consider effects on nearby sensitive equipment as well as people)? | No | | |
| 6.8 | From any other sources? | No | | |
| 7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into sewers, surface waters, groundwater, coastal waters or the sea? | | | | |
| 7.1 | From handling, storage, use or spillage of hazardous or toxic materials? | No | | |
| 7.2 | From discharge of sewage or other effluents (whether treated or untreated) to water or the land? | Yes | The proposed project may attract people from rural areas that will increase the population of the project area which in turn increase the generation of municipal sewage | No, there will be provision of treatment facilities and there will be also regular monitoring of this issue. |
| 7.3 | By deposition of pollutants emitted to air, onto the land or into water? | Yes | The land nearby the workers camp may be polluted by the daily activities of the workers residing there temporarily. | No because there will be provision of strict monitoring of this area. |
| 7.4 | From any other sources? | No | | |
| 7.5 | Is there a risk of long term build up of pollutants in the environment from these sources? | No | | |
| 8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment? | | | | |
| 8.1 | From explosions, spillages, fires etc from storage, handling, use or production of hazardous or toxic substances? | No | | |
| 8.2 | From events beyond the limits of normal environmental protection eg failure of pollution control systems? | No | | |
| 8.3 | From any other causes? | No | | |
| 8.4 | Could the project be affected by natural disasters causing environmental damage (eg floods, | No | | |

| No. | Questions to be considered in Scoping | Yes/No/? | Which Characteristics of the Project Environment could be affected and how? | Is the effect likely to be significant? Why? |
|--|---|----------|--|---|
| | earthquakes, landslip, etc)? | | | |
| 9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment? | | | | |
| 9.1 | Changes in population size, age, structure, social groups etc? | Yes | There is chance of in migration due to this project that will affect the existing community, cultural identity, economic conditions etc. | Yes, the entry of new community may bother the existing community groups. The survey also shows that the diversity of culture, custom, tradition, norms and values exist in the project area. |
| 9.2 | By resettlement of people or demolition of homes or communities or community facilities eg schools, hospitals, social facilities? | No | | |
| 9.3 | Through in-migration of new residents or creation of new communities? | Yes | Easy & Safe access to water supply and sanitation will attract people from the neighbouring remote areas to achieve improved living standards. | Yes, the entry of new community may hurt the sentiments of the existing community. |
| 9.4 | By placing increased demands on local facilities or services eg housing, education, health? | | | |
| 9.5 | By creating jobs during construction or operation or causing the loss of jobs with effects on unemployment and the economy? | Yes | Requirement of labour for the construction works prioritize the local people hence, providing employment opportunities to the local people. | Yes, because the skills they learnt during their employment period can be utilized in the future in other similar kind of works. |
| 9.6 | Any other causes? | No | | |
| 10. Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality? | | | | |
| 10.1 | Will the project lead to pressure for consequential development which could have significant impact on the environment eg more housing, new roads, new supporting industries or utilities, etc? | No | | |
| 10.2 | Will the project lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: | No | | |

| No. | Questions to be considered in Scoping | Yes/No/? | Which Characteristics of the Project Environment could be affected and how? | Is the effect likely to be significant? Why? |
|------|---|----------|--|---|
| | <ul style="list-style-type: none"> • supporting infrastructure (roads, power supply, waste or waste water treatment, etc) • housing development • extractive industries • supply industries • other? | | | |
| 10.3 | Will the project lead to after-use of the site which could have an impact on the environment? | No | | |
| 10.4 | Will the project set a precedent for later developments? | Yes | The safe access to water supply and sanitation by this project may create opportunities for other development infrastructures. | Yes, because it will be the important factor for the sustainable development of the town. |
| 10.5 | Will the project have cumulative effects due to proximity to other existing or planned projects with similar effects? | No | | |

Checklist 2: Scoping Checklist Part 2 - Characteristics of the Project Environment (Environmental Sensitivity)

| | |
|--|--|
| <p>Question - Are there features of the local environment on or around the Project location which could be affected by the Project?</p> <ul style="list-style-type: none"> • Areas which are protected under international or national or local legislation for their ecological, landscape, cultural or other value, which could be affected by the project? <ul style="list-style-type: none"> • Other areas which are important or sensitive for reasons of their ecology e.g. <ul style="list-style-type: none"> • Wetlands, • Watercourses or other waterbodies, • the coastal zone, • mountains, • forests or woodlands • Areas used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project? • Inland, coastal, marine or underground waters? • Areas or features of high landscape or scenic value? • Routes or facilities used by the public for access to recreation or other facilities? • Transport routes which are susceptible to congestion or which cause environmental problems? • Areas or features of historic or cultural importance? | <p>Yes, the core llam bazaar area may be susceptible to traffic congestion during distribution pipeline laying works that may provide discomfort to the passer-by and also may disrupt the access to the roadside shops & houses. Similarly, as the topography of the service area of this project is sloped terrain due to which during pipeline laying works, there is possibility of erosion. Hence, it should be ensured that the trench for pipeline should not be abandoned and the contractor should be recommended to backfill the trench immediately.</p> |
| <p>Question - Is the Project in a location where it is likely to be highly visible to many people?</p> | <p>Yes. The project area is proposed to serve the llam town which includes the core bazaar area due to which it will be highly visible to many people.</p> |

| | |
|---|--|
| <p>Question - Is the Project located in a previously undeveloped area where there will be loss of greenfield land?</p> | <p>No</p> |
| <p>Question - Are there existing land uses on or around the Project location which could be affected by the Project? For example:</p> <ul style="list-style-type: none"> • Homes, gardens, other private property, • Industry, • Commerce, • Recreation, • public open space, • community facilities, • agriculture, • forestry, • tourism, • mining or quarrying | <p>No</p> |
| <p>Question - Are there any plans for future land uses on or around the location which could be affected by the Project?</p> | <p>No</p> |
| <p>Question - Are there any areas on or around the location which are densely populated or built-up, which could be affected by the Project?</p> | <p>No</p> |
| <p>Question - Are there any areas on or around the location which are occupied by sensitive land uses which could be affected by the Project?</p> <ul style="list-style-type: none"> • hospitals, • schools, • places of worship, • community facilities | <p>No</p> |
| <p>Question - Are there any areas on or around the location which contain important, high quality or scarce resources which could be affected by the Project? For example:</p> <ul style="list-style-type: none"> • groundwater resources, • surface waters, • forestry, • agriculture, • fisheries, • tourism, • minerals. | <p>No</p> |
| <p>Question - Are there any areas on or around the location of the Project which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?</p> | <p>No</p> |
| <p>Question - Is the Project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?</p> | <p>No</p> |
| <p>Question - Is the Project likely to affect the physical condition of any environmental media?</p> <ul style="list-style-type: none"> • The atmospheric environment including microclimate and local and larger scale climatic conditions? • Water - eg quantities, flows or levels of rivers, lakes, groundwater. Estuaries, coastal waters or the sea? • Soils - eg quantities, depths, humidity, stability or erodibility of soils? • Geological and ground conditions? | <p>Yes, the sloped terrain of the project areas indicates the susceptibility to the soil erosion however if precautions are made, the effects can be made insignificant.</p> |
| <p>Question - Are releases from the Project likely to have effects on the quality of any environmental media?</p> <ul style="list-style-type: none"> • Local air quality? | <p>Yes, the construction activities may affect local air quality through dust emissions especially during dry</p> |

| | |
|---|--|
| <ul style="list-style-type: none"> • Global air quality including climate change and ozone depletion • Water quality – rivers, lakes, groundwater. Estuaries, coastal waters or the sea? • Nutrient status and eutrophication of waters? • Acidification of soils or waters? • Soils • Noise? • Temperature, light or electromagnetic radiation including electrical interference? • Productivity of natural or agricultural systems? | <p>season. It also generate noise pollution by the movement of vehicles for transporting materials, and demolition works of ROW for distribution pipe laying works.</p> |
| <p>Question - Is the Project likely to affect the availability or scarcity of any resources either locally or globally?</p> <ul style="list-style-type: none"> • Fossil fuels? • Water? • Minerals and aggregates? • Timber? • Other non-renewable resources? • Infrastructure capacity in the locality - water, sewerage, power generation and transmission, telecommunications, waste disposal roads, rail? | <p>No</p> |
| <p>Question - Is the Project likely to affect human or community health or welfare?</p> <ul style="list-style-type: none"> • The quality or toxicity of air, water, foodstuffs and other products consumed by humans? • Morbidity or mortality of individuals, communities or populations by exposure to pollution? • Occurrence or distribution of disease vectors including insects? • Vulnerability of individuals, communities or populations to disease? • Individuals' sense of personal security? • Community cohesion and identity? • Cultural identity and associations? • Minority rights? • Housing conditions? • Employment and quality of employment? • Economic conditions? • Social institutions? | <p>Yes,</p> <ul style="list-style-type: none"> • This project may offer employment to the local people to involve as a construction worker. This can be viewed as positive impact of the project. • This project also may result in the occurrence or distribution of disease vector due to the temporary settlement of workers as they may not have access to safe water supply and sanitation. |

Checklist 3: Significance of Impacts

| Questions to be Considered | |
|--|----|
| 1. Will there be a large change in environmental conditions? | No |
| 2. Will new features be out-of-scale with the existing environment? | No |
| 3. Will the effect be unusual in the area or particularly complex? | No |
| 4. Will the effect extend over a large area? | No |
| 5. Will there be any potential for trans boundary impact? | No |
| 6. Will many people be affected? | No |
| 7. Will many receptors of other types (fauna and flora, businesses, facilities) be affected? | No |
| 8. Will valuable or scarce features or resources be affected? | No |
| 9. Is there a risk that environmental standards will be breached? | No |
| 10. Is there a risk that protected sites, areas, features will be affected? | No |
| 11. Is there a high probability of the effect occurring? | No |

| | |
|--|----|
| 12. Will the effect continue for a long time? | No |
| 13. Will the effect be permanent rather than temporary? | No |
| 14. Will the impact be continuous rather than intermittent? | No |
| 15. If it is intermittent will it be frequent rather than rare? | No |
| 16. Will the impact be irreversible? | No |
| 17. Will it be difficult to avoid, or reduce or repair or compensate for the effect? | No |

PUBLIC CONSULTATION
Minutes of Meeting-1

भाषा मिति २०७४/२/२१ गतेका दिन इलाम नगरपालिकाका नगर प्रमुख जी प्रदेव खरेल एवं कोषाध्यक्षमा निम्न व्यक्तिको उपस्थितिमा बैठक वरिपरि निम्न अनुसार छलफल तथा निर्णय गरियो।

उपस्थित

१. नगर प्रमुख :- श्री प्रदेव खरेल
२. उपमेयर :- श्री दिनेश खरेल
३. उ.स.सचिव :- श्री तिलक ठकुरी
४. डि. इन्जिनियर :- श्री सजल कार्की
५. सा.सु. विज्ञ :- श्री बाल अधिकारी
६. इन्जिनियर :- श्री देवा प्रसाद शर्मा
७. उपमेयर :- श्री विष्णु राज शर्मा
८. सा.स.सचिव :- श्री दिनेश कार्की
९. सदस्य :- श्री रमेश शर्मा
१०. वडा अध्यक्ष वडा नं. ९ :- श्री ब्यामकुमार शर्मा

प्रस्ताव नं. १ :- नैसर्गिक स्रोतको आयोगको सम्बन्धी छलफल

प्रस्ताव नं. २ :- आयोगको निर्धारण सम्बन्धमा

प्रस्ताव नं. ३ :- आयोगलाई आवश्यक पर्ने जग्गा अभिलेखिकरण/सांख्यिक सुसंगत सम्बन्धमा छलफल

प्रस्ताव नं. ४ :- टैम्पोरल तथा सांख्यिक सर्वे गर्नका लागि आवश्यक जानकारी स्थानिय स्तरबाट प्राप्त गर्ने सम्बन्धमा।

प्रस्ताव नं. ५ :- वातावरण सम्बन्धमा,

निर्णय नं. १ :- आयोगको लागि डिजिटल डिप्लोमेटको लागि सर्वेक्षणको बैठक आइकेन कन्सल्टेन्टबाट सजल कार्कीको नेतृत्वमा सर्वेक्षणको तेशले आयोगको सम्बन्धी छलफल गरी आयोगको विस्तृत जानकारी गराई सांख्यिक तथा सांख्यिक सर्वे गर्ने निर्णय गरियो।

निर्णय नं. २ :- आयोगलाई सांख्यिक इलाम नगरपालिका तथा हालको वडा नं. ६, ७, ८ र ९ को नगर प्रमुख

गुण

सेक्टर को विस्तृत क्षेत्र तथा अनुसूचित क्षेत्र निर्धारित किया।

निर्णय नं. 3 :- आयोजना क्षेत्र में मित्र आवस्यक मौखिक संरचना
के निर्माण कार्य के लिये सम्बन्धी विवरणों में आवस्य-
कता अनुसार जंगल भूमि की आवस्यक स्थानिय
निकाशों को समाप्त करने साथ ही उक्त आवस्यक जंगल
भूमि उपरि वर्णित भूमि सामाजिक सुरक्षा निधि
अनुसूचित क्षेत्र निर्धारित किया।

निर्णय नं. 4 :- टैक्नीकल तथा सामाजिक क्षेत्र वर्ग के लिये
आवस्यक अनुसूचित (राष्ट्रीय क्षेत्र वर्ग के लिये)
90 टैक्नी 92 जंगल स्थानिय महिला तथा बूढ़ों
अनुसूचित क्षेत्र निर्धारित किया साथ ही
कामकाय उपरि निर्धारित किया।

निर्णय नं. 5 :- माफि उपलब्ध सम्पूर्ण कार्यक जंगल आयो-
जना के निर्माण कार्य जंगल वातावरण लार्ड ध्यान
में रखते वातावरण को ध्यान में रखते जंगल तथा
प्रभाव क्षेत्रों को ध्यान में रखते निर्धारित
किया।

English Translation of Minute of Meeting-1

A meeting was organized under the chairmanship of the mayor of Ilam Municipality, Mr. Mahesh Basnet on 6th Septemeber, 2017 in the presence of the following mentioned participants. Similarly, discussions were made on the following mentioned topics and decisions were made accordingly under the consent of all.

Participants:

| | |
|----------------------------------|---------------------------|
| Mayor of the municipality: | Mr. Mahesh Basnet |
| User's Committee Representative: | Mr. Dhiren Chemjong |
| Secretary: | Mr. Tilak Thakuri |
| Design Engineer: | Mr. Srijan Aryal |
| Social Expert: | Mr. Shiva Adhikari |
| Engineer: | Mr. Durga Baniya |
| Surveyor: | Mr. Tirtha Raj Bhatta |
| | Mr. Dinesh Kafle |
| Member: | Mr. Rup Dhan Rai |
| Chairman of Ward no. 9: | Mr. Shyam Krishna Ghimire |

Discussions were made on the following mentioned proposals:

- (a) About the proposed project
- (b) Proposed Project Area Allocation
- (c) Land Requirement for the proposed project
- (d) Requirement of Local Manpower for technical & social survey
- (e) Environmental Related Issues

The following decisions were made concerning the above-mentioned proposals:

- (a) The consultant team (TAEC/ICON JV) led by Mr. Srijan Aryal carried out discussions regarding the proposed project and it has been decided to carry out social & technical survey for the proposed project.
- (b) Whole area of ward no. 6 & 7 and partial area of ward no. 8 & 9 of Ilam Municipality has been demarcated for the proposed project.
- (c) The concerned local body should manage Land required for the construction of various structural components of this proposed project and if the land needs to be purchased, it should be done according to the Social Protection Policy.
- (d) 10 to 12 local human resources (both female & male) required for technical & social (household) survey is to be provided by the concerned local body.
- (e) The proposed project construction works will be carried out smoothly ensuring environmental safety & protection.

Minutes of Meeting-2

2062/19/86

अभिगति 2062, वैशाख २०१९, शनिवार तेजे सातारादी
 शासनाची तथा सडकपुराणे (सडक) विभाग ही सेवा आपाची
 रोडशासना विभाग वर ADB हा प्रतिनीध हा मन्त्री प्रधान
 DPMO Sociologist ही फुलपाजनी राणा DRTAC को सुरक्षा किता
 ही वल्लभ मायाल, परामखारा सामाजिक सुरक्षा किता ही
 शिक्षण अधिकाारी जे साथ शासना शासनाची मुद्दा सात क्षेत्रा
 समाजिक तासिन्दाहउ, रचनाय सरोकार समन्वय समिति, लोकोज ही
 तुलनाम गुडउ- सडकपुर गावपा का ते २ का का लखिन ही
 ही जहाद खनाल जे को उपरिखतिमा आयेजताडा लागी मुद्दा
 फाणे गने त्रिषम माभि इलफल गरी लखिन वनजीमको त्रिषम
 गरीमा ।

उपस्थिति :-

- अध्यक्ष श्री केदार भापा
- सचिव - श्री दिलीप न. कुते
- डोपार्षद - श्री इकीलाल आकार
- सदस्य श्री राज राई
- सदस्य श्री सुपकात राई
- श्री श लखिनालम लखन - श्री दिलीप ठाकरे
- DPMO - Sociologist - श्री फुलपाजनी राणा
- DRTAC सामाजिक सुरक्षा किता - श्री वल्लभ मायाल
- ADB हा प्रतिनीध श्री मन्त्री प्रधान
- परामखारा सामाजिक सुरक्षा किता - श्री शिक्षण अधिकाारी
- सडकपुर गावपा. का ते २ का का लखिन - श्री देवीप्रसाद खनाल
- समाजिक सरोकार समन्वय समिति लोकोज - श्री तुलनाम गुडउ
- समाजिक तासिन्दाहउ - श्री दिलीप राई
- " " - श्री भमल गुडउ
- " " - श्री राजवकार राई
- " " - श्री के. गुडउ
- " " - श्री परत गुडउ (तेजा के गुडउ)
- श्री खनाल के गुडउ
- श्री आदित कि. उ.
- श्री इल व गुडउ
- श्री उजर के राई
- श्री IS मन्त्री

दुष्का न गठस
दिले ल. पुंरुड

[Handwritten signature]



प्रस्ताव

गीतास, शेत २ भेवा खोला महानका प्रत्यक्ष शरोकरवाला एवातिथ लासिका तथा एवातिथ आधीवाली अनुजैत्रिका महानमानक (लंग) मुहान (पानी) ही मुहान शीत प्रयोगा गते विषमताहि इलाफुल वारे

उक्त प्रस्ताव भावि दलदुला गदी इलाम शहरी शनानेपानी आभोजना लाई आभोज्य खानेपानही मुहान (शोफ) गीतास, खोला, भेवाखोला २ शेतखोला ही शेत उपयोगा गते विषमताहि लिएर भेवान हीज ही प्रत्यक्ष शरोकरवालाचको भेटघार लमप लमममा भई आएको एताहि वहाँका एवातिथ लासिकाचको रमि पुकानि तथा पलि फुयलत वारे महानका शीत प्रयोगा गते दिने थपल आधिके निर्णयचड भई लहमति भई लडेको तमा लकडालिवा अलुसभामा भविमकना गावणी लको आपोलाम वारे शीत प्रयोगा गते शिकावेश फा लमते शोफ भई लडेकोले हलिका बदलिवा पदस्थितिमा पुन मुहान वासीचु लह लघापड इलाफुल गते, इलाम शहरी शनानेपानी आभोज्यमा लारे आभोज्य पानीही शीत गीतखोला वारे प्रतिहेकुड १३ लिठ, शेतखोलामार प्रतिहेकुड १० लिठ २ भेवा खोलावारे प्रतिहेकुड १० लिठ हा दलेपानी उपलब्ध गराउवा हलिको ल-दकपड गाठ कलिका हिनत हामी उपस्थित कागपिड हकुले धेवा कते किलीमडी लमलम तरहेने हेविलको हुवा धल आभोज्यमा लार्डे योजुता कुमानवमत गते निनिनाद शीत उपलब्ध गराउवत हामी लकडो लामा लहमति रडेको त्रिणय गरोमा ।

[Multiple handwritten signatures and stamps at the bottom of the page]

English Translation of Minute of Meeting-2

Today dated 9th May, 2018 , a meeting regarding the use of water source for UWSSP in the presence of Mr. Kedar Thapa (Chairman, Ilam Bazaar, WUSC), Ms. Munni Pradhan(ADB representative), Ms. Pushpanjali Rana (PMO Sociologist), Mr. Balaram Mayalu (DRTAC Safeguard Specialist), Mr. Shiva Adhikari (Sageguard Expert from the consultant), local people residing nearby the water source area, Tularam Gurung (Local Stakeholders Committee Facilitator) and Mr. Devi Prasad Khanal (Secretary of ward no. 2 of Sandakpur rural municipality). Similarly, decisions were made accordingly under the consent of all.

Participants:

Mr. Kedar Thapa (Chairman, Ilam Bazaar, WUSC)
 Mr. Tilak Bahadur Thakuri (Secretary, Ilam Bazaar, WUSC)
 Mr. Chhabilal Acharya (Treasurer, Ilam Bazaar, WUSC)
 Mr. Raju Rai (Member, Ilam Bazaar, WUSC)
 Mr. Rupdhan Rai (Member, Ilam Bazaar, WUSC)
 Mr. Dinesh Kafle (Member, Small Town Secretariat)
 Ms. Pushpanjali Rana (PMO Sociologist)
 Mr. Balaram Mayalu (DRTAC Safeguard Expert)
 Ms. Munni Pradhan (ADB Representative)
 Mr. Shiva Adhikari (Sageguard Expert from the consultant)
 Mr. Devi Prasad Khanal (Secretary of ward no. 2 of Sandakpur Rural Municipality)
 Tularam Gurung (Local Stakeholders Committee Facilitator)
 Mr. Dilip Rai, Local Resident
 Mr. Kamal Gurung, Local Resident
 Mr. rajkumar Rai, Local Resident
 Mr. Keshu Gurung, Local Resident
 Mr. Puran Gurung, Local Resident
 Mr. Khadga Bahadur Gurung, Local Resident
 Mr. Aaita Bishwokarma, Local Resident
 Mr. Indra Bahadur Gurung, Local Resident
 Mr. Ujar Bahadur Rai Local Resident
 Mr. Dilli Gurung Local Resident
 Mr. Kush Bahadur Gurung, Local Resident
 Mr. Dil Bahadur Gurung, Local Resident

Proposal 1: Regarding the discussion with the concerned local people residing nearby the sources: Gitang, Rate and Mewa Khola for the use of water resources

Decision: The issues raised in the proposal 1 had been repeatedly discussed in the previous meetings and consent has been obtained for the use of concerned water sources from the local people of the source area. For confirmation, this issue has been again raised in this meeting. Decision from the representatives of local people from the source area i.e., Sandakpur Rural Municipality regarding the extraction of 16 lps from Gitang Khola, 10lps from Rate Khola and 10lps from Mewa Khola has been made to allow the use of water resources for the implementation of the proposed UWSSP.

Minutes of Meeting 3

आज मिति २०७३ बैशाख २६ गते इलाम बजार गैरो
 तानाशाही खानेपानी तथा हाइड्रोपाई उपभोक्ता संघको अध्यक्ष श्री
 देवरा थापाको अध्यक्षतामा एशियाली विकास बैंक का प्रतिनी
 श्री मुन्नी प्रधान, PMO का Sociologist श्री पुष्पावती
 राणा एवं DRTAC का सामाजिक सुरक्षा विज्ञ श्री कलराम
 थापाको अध्यक्षतामा परामर्शदाता तानाशाही सुरसो निवा श्री शिव
 उद्विगारी को साथ जिल्ला लिबर जरीडा प्रतिनी श्री एम
 लल्लाहाहाल समिति का सदस्यहरू एवंवाङ्गरी & प्रा. ए. १९६३
 को उपस्थितिमा विभिन्न विषयमा छलफल गरी निर्णय गरियो।

उपस्थितिः

- अध्यक्ष श्री देवरा थापा
- उपाध्यक्ष - श्री शान्ता कलाल
- सचिव - श्री तिलक व. पन्थरी
- उपसचिव - श्री इन्दिरा आचार्य
- सदस्य - श्री सुधन शर्मा
- सदस्य - श्री अनिमया गुड्डा
- सदस्य - श्री शशिमा खामाङ्ग
- सदस्य - श्री धन के. म्याग्
- " - श्री रजु शर्मा



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- ADB का प्रतिनी श्री मुन्नी प्रधान
- PMO का सामाजिक सुर - श्री पुष्पावती राणा
- DRTAC का " " - श्री कलराम थापा
- परामर्शदाता " " - श्री शिव उद्विगारी
- नेपाली कोङ्ग्रेस जि. ब. के. समिति सचिव - श्री रजु शर्मा
- ने. को. माओवादी के. उ. का. म. ल. सचिव - श्री रजु शर्मा
- जिल्ला स. स. का. - श्री रिता खिमरे
- जिल्ला स. स. का. समिति सदस्य - श्री विष्णु फाल
- " " " " श्री
- संस्थापक अध्यक्ष श्री सोम खरेली
- संस्थापक अध्यक्ष समिति सदस्य - श्री सुन्दर शर्मा

प्रस्तुत वेबपमा इलाफल गर्दा इलाका वजार तेलु लानाशारी
 हलि इलाका शहरी स्वामिपानी तथा लरलपारे आधीजनाडा विषय-
 मा आज बनेनु शक्य पक्षिय लकठमा प्राप्त राय ६७७७
 सुडरात्मड रड्डाके थरु आधीजनाले आवाधुत रड्डा
 पानीडा भएन (शान्त) गीताड. खोलावाह प्रतिरड्डा १३ मि०
 शहरीखोलावाह प्रतिरड्डा १० मि० मेवारखोलावाह प्रति-
 रड्डा १० मि० ठा परले शान्त उपलव्ध गराने विषयमा
 धरु आधि शहमति भई हाल सुदुपु गड पानिडा
 ठामालपकार लिखित शिफारीत समेत खेमालाके प्राप्त
 भई शक्यता आधीजनाले आन्धुत अण्ण इलाका सार-
 पानिडा गगलाध पानिडावाह लिखित पत्र प्राप्त भइलुमा
 उपमाकाधले वेदाने इच्छाके २% शक्य राड के.
 ३८८३१०००१- अक्षरेपी तीन करोड अक्षरी लावु रड्डा-
 डर हजार रड्डा समेत उपमाका लमितिडा त्रे.व.ले.
 मा अक्का भईसकेडा. TDF लेणको जमानत कुणकी
 लागि इलाका सारपालिडा कारकायपानिडाके प्रतिक्रमा
 अहेर गरी सकेकाले इलाका शहरी स्वामिपानी तथा लर-
 लपारे आधीजना (इ.न.न. ६६८२९) का) लाई दिने
 का-थानपपतडा लागि सम्बन्ध निडाय. APD तथा
 तेलु लाना शहरी स्वामिपानी तथा लरलपारे विषयमा
 (ठामाका - पानीपारेकी महारजण्ड) अनुशोध जति
 निर्णय जरीमा ।

(Handwritten signature)



English Translation of Minute of Meeting-3

Today dated 10th May, 2018 , a meeting regarding various issues in the presence of Mr. Kedar Thapa (Chairman, Ilam Bazaar, WUSC), Ms. Munni Pradhan(ADB representative), Ms. Pushpanjali Rana (PMO Sociologist), Mr. Balaram Mayalu (DRTAC Safeguard Specialist), Mr. Shiva Adhikari (Sageguard Expert from the consultant), District Level Representatives from the Political Parties, Members from Advisors Committee and the media persons. Similarly, decisions were made accordingly under the consent of all.

Participants:

Mr. Kedar Thapa (Chairman, Ilam Bazaar WUSC)
 Mr. Shanta Basnet (Vice Chairman, Ilam Bazaar WUSC)
 Mr. Tilak Bahadur Thakuri (Secretary, Ilam Bazaar WUSC)
 Mr. Chhabilal Acharya (Treasurer, Ilam Bazaar WUSC)
 Ms. Pabimaya Gurung, (Member, Ilam Bazaar WUSC)
 Ms. Sushila Sapkota, (Member, Ilam Bazaar WUSC)
 Mr. Dhan Bahadur Magar , (Member, Ilam Bazaar WUSC)
 Mr. Raju Rai (Member, Ilam Bazaar, WUSC)
 Mr. Rupdhan Rai (Member, Ilam Bazaar, WUSC)
 Ms. Pushpanjali Rana (PMO Sociologist)
 Mr. Balaram Mayalu (DRTAC Safeguard Expert)
 Ms. Munni Pradhan (ADB Representative)
 Mr. Shiva Adhikari (Sageguard Expert from the consultant)
 Mr. Bhakta K.C. (Executive Chairman, Nepal Communist Party)
 Mr. Khagendra Dewan (Secretary, Nepal Congress District Committee)
 Secretary of Nepal Maoist Central Office
 Mr. Tika Ghimire, District Incharge
 Mr. Bishnu Dahal, Member, District Advisor Committee
 Mr. Som Susheli, Member, District Advisor Committee
 Mr. Krishna Shrestha, Member, District Advisor Committee
 Mr. Kedar Shrestha, Facilitator, Upfront Cash Collection Sub Committee
 Ms. Anjana Shrestha, Member, Upfront Cash Collection Sub Committee
 Mr. Pashupati Bhakta Raj, Member, Upfront Cash Collection Sub Committee
 Mr. Khem Bhujel, Secretary, Federation of Nepali Journalists, Ilam
 Mr. B Bhandari, Sandakpur Dainik
 Mr. Jeevan Sharma, Ilam Municipality-6
 Ms. Mukshya Devi Dahal, Social Mobilizer
 Mr. Prakash Nepal, Media Person
 Mr. Tika Khatiwada, Media Person
 Mr. Ram Thonghang, Media Person, Naya Bualnd Dot Com)

Proposal 1: Regarding the field visit of the required source area for the proposed project

Decision: All the information about the source area visit including the discussion with the local people and their consent for the use of water source has been disclosed to all the participants of the meeting.

Proposal 2: Regarding the request to the concerned authority for the rapid implementation of the propose project

Decision: Regarding the proposal 2, request has been made to the concerned authority, ADB and DRTAC representatives for rapid implementation of the proposed UWSSP (Ilam ward no. 6,7 8 and 9) as there is no interference from the local people regarding source use and land required for the proposed project. Similarly, 5% upfront cash contribution from beneficiaries i.e., NRe 38,851,000.00 has already been deposited in the bank account of WUSC at Nepal Bank Limited and Ilam Municipality has already assured to avail TDF loan.

PHOTOGRAPHS



1. Existing RVT to be demolished



2. Existing condition of distribution pipelines



3. Existing Horizontal Roughening Filter



4. Non-functioning Existing Slow Sand Filter



5. Training to the social mobilizers for socio-economic survey



6. Meeting with the Mayor of Ilam Municipality

WATER QUALITY TEST REPORTS

NS Lab Accreditation No.: 09-2068/69

Regd. No. 53675/064/065



AASTHA SCIENTIFIC RESEARCH SERVICE PVT. LTD.

P.O. Box No. 4316, Dillibazar, Kathmandu, Nepal
Tel: +977-1-4433748, E-mail: aasthalab2065@gmail.com

(Center for complete scientific solution)

Test Report/Certificate

Report No. : 459/2074
Entry No. : AASTHA – 358 – 2074
Sample : Water
Client : TAFC-ICON JV
Source : Geetang Khola, Geetang, Ilam



Date received : 02 – 06 – 2074
Date completed : 04 – 06 – 2074
Sampled By : Client

| S. N. | Parameters | Method | Observed Values | National Drinking Water Quality Standard |
|-------|--|--|-----------------|--|
| 1. | pH at 26°C | 4500-H APHA-AWWA-WEF 2012, 22 nd Edition | 7.2 | 6.5 - 8.5 |
| 2. | Electrical Conductivity, (µmhos/cm) | 2510 B, APHA-AWWA-WEF 2012, 22 nd Edition | 90 | 1500 |
| 3. | Turbidity, (NTU) | 2130 B, APHA-AWWA-WEF 2012, 22 nd Edition | <5 | 5 [10] |
| 4. | Taste and Odor | | N. O. | Not Objectionable |
| 5. | Color, [TCU] | 2120 C, APHA - AWWA - WEF 2012, 22nd Edition | 0.08 | 5[15] |
| 6. | Total Hardness as CaCO ₃ , (mg/l) | 2940 C, APHA-AWWA-WEF 2012, 22 nd Edition | 40 | 500 |
| 7. | Total Dissolved Solid, (mg/l) | 2540 C, APHA - AWWA - WEF 2012, 22nd Edition | 55 | 1000 |
| 8. | Total Residual Chlorine, (mg/l) | 4500 - Cl B, APHA - AWWA - WEF 2012, 22nd Edition | <0.10 | 0.1 - 0.2 |
| 9. | Chloride, (mg/l) | 4500-Cl-B, APHA-AWWA-WEF 2012, 22 nd Edition | 3.72 | 250 |
| 10. | Ammonia, (mg/l) | 4500-NH3 D, APHA, AWWA, WPCF, 17th Edition | 0.05 | 1.5 |
| 11. | Nitrate, (mg/l) | 4500-NO ₃ -B, APHA-AWWA-WEF 2012, 22 nd Edition | 2.51 | 50.0 |
| 12. | Aluminum, (mg/l) | 3500-Al B, APHA, AWWA, WEF, 22nd Edition | 0.029 | 0.20 |
| 13. | Fluoride, (mg/l) | 4500-F D, APHA - AWWA - WEF 2012, 22nd Edition | 0.08 | 0.5-1.5 |
| 14. | Sulfate, (mg/l) | 4500-SO ₄ ²⁻ C, APHA - AWWA - WEF 2012, 22nd Edition | <1.0 | 250 |
| 15. | Mercury*, (mg/l) | 3500-Hg-C, APHA-AWWA-WEF, WPCF, 17th Edition | <0.001 | 0.001 |
| 16. | Calcium, (mg/l) | 3500 Ca B, APHA-AWWA-WEF 2012, 22 nd Edition | 6.4 | 200 |
| 17. | Iron*, (mg/l) | | <0.05 | 0.30[3] |
| 18. | Manganese*, (mg/l) | | <0.05 | 0.20 |
| 19. | Lead*, (mg/l) | | <0.01 | 0.01 |
| 20. | Cadmium*, (mg/l) | 3111 B, APHA - AWWA - WEF 2012, 22nd Edition | <0.003 | 0.003 |
| 21. | Chromium*, (mg/l) | | <0.05 | 0.05 |
| 22. | Copper*, (mg/l) | | <0.05 | 1.0 |
| 23. | Zinc*, (mg/l) | | 0.12 | 3.0 |
| 24. | Arsenic, (mg/l) | 3500-As B, APHA - AWWA - WEF 2012, 22nd Edition | <0.01 | 0.05 |

Remarks: Water quality meets NDWQS specified limit.

[Signature]
Analyzed By

[Signature]
Checked By

[Signature]
Authorized By

Note : 1. The issued report refers only to the tested sample and applicable parameters. Endorsement of products is neither inferred nor implied.
2. This report is neither to be reproduced wholly or partially nor can be used as an evidence in the court of law.
3. Liability of our institute is limited to the invoiced determinands and amount only.
4. Even in the case of stable samples such as limestone, minerals, soil etc. they will not be stored more than six months. 219/220
5. Parameters in * are not accredited by NBSM.

CHLORINE GUIDELINE VALUE

GUIDELINE VALUE

1. In humans and animals exposed to chlorine in drinking-water, specific adverse treatment related effects have not been observed.
2. Chlorine in drinking water is safe for consumption. The small amount of chlorine typically used to disinfect water does not pose risks to human health. The World Health Organization (WHO) has established a guideline value of 5 mg/L for chlorine in drinking water, meaning that such concentrations are considered acceptable for lifelong human consumption. Furthermore, WHO concludes that this value is “conservative,” as no adverse effects from chlorine in drinking water were observed in studies reviewed by WHO.

Guideline values for chlorine WHO Guidelines for drinking water quality (2004)

| | |
|-----------------|---|
| Chlorine | below 5 milligrams per liter (mg/L)* |
|-----------------|---|

*For effective disinfection, there should be a residual concentration of free chlorine of 0.5 mg/L after at least 30 min contact time at pH<8.0

Chlorination Does Not Harm Aquatic Environments

3. Chlorinated drinking water is unlikely to be harmful when discharged into aquatic environments. An extensive risk assessment conducted under European Union guidelines examined potential harm from various processes to make drinking water using sodium hypochlorite. This assessment found no significant environmental risks from chlorine or byproducts formed during drinking water chlorination. The DBPs formed in drinking water depend on the nature and quantity of organic matter present as well as on the disinfectant and other treatments used. In drinking water, the principal byproducts are trihalomethanes (THMs; mainly chloroform) and haloacetic acids (HAAs), with smaller amounts of other byproducts. Direct ‘whole effluent’ experiments representing various uses, including drinking water, have shown that no significant amounts of persistent and potentially bioaccumulative substances are formed. Toxicity tests on these mixtures demonstrated that the presence of DBPs did not increase the toxicity.
4. A major concern from the past was the formation of some highly-chlorinated, high-hazard molecules, such as dioxins, resulting from chlorine used in paper pulp bleaching. However, dioxins were only formed from ‘active chlorine’ under specific conditions: acid pH and in the presence of certain phenols such as those abundant in the lignin component of wood. There is no significant formation of dioxins or other high-hazard molecules at neutral or alkaline pH. All current uses of ‘active chlorine’ for microbial control and cleaning take place at alkaline or neutral pH.

SAMPLE GRIEVANCE REDRESS FORM
(To be available in Nepalese and English)

The _____ Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback. Should you choose to include your personal details but want that information remain confidential, please inform us by writing/typing* (CONFIDENTIAL)* above your name. Thank you.

| | | | | |
|---|--------|-----------------------|-----|--|
| Date | | Place of registration | | |
| Contact Information/personal details | | | | |
| Name | Gender | *Male *Female | Age | |
| Home Address | | | | |
| Place | | | | |
| Phone No. | | | | |
| E-mail | | | | |
| Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below: | | | | |
| If includes as attachment/note/letter, please tick here: | | | | |
| How do you want us to reach you for feedback or update on your comment/grievance? | | | | |

FOR OFFICIAL USE ONLY

| | |
|--|-----------|
| Registered by: (Names of official registering grievance) | |
| Mode of communication: Note/Letter E-mail Verbal/Telephonic | |
| Reviewed by: (Names/positions of official(s) reviewing grievance) | |
| Action Taken: | |
| Whether Action Taken Disclosed: | Yes No |
| Means of Disclosure: | |

SAMPLE TRAFFIC MANAGEMENT PLAN

A. Principles

1. One of the prime objectives of this traffic management plan (TMP) is to ensure the safety of all the road users along the work zone, and to address the following issues:
 - the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
 - protection of work crews from hazards associated with moving traffic;
 - mitigation of the adverse impact on road capacity and delays to the road users;
 - maintenance of access to adjoining properties
 - Avoid hazards in addressing issues that may delay the project.

B. Operating Policies for Traffic Management Plan

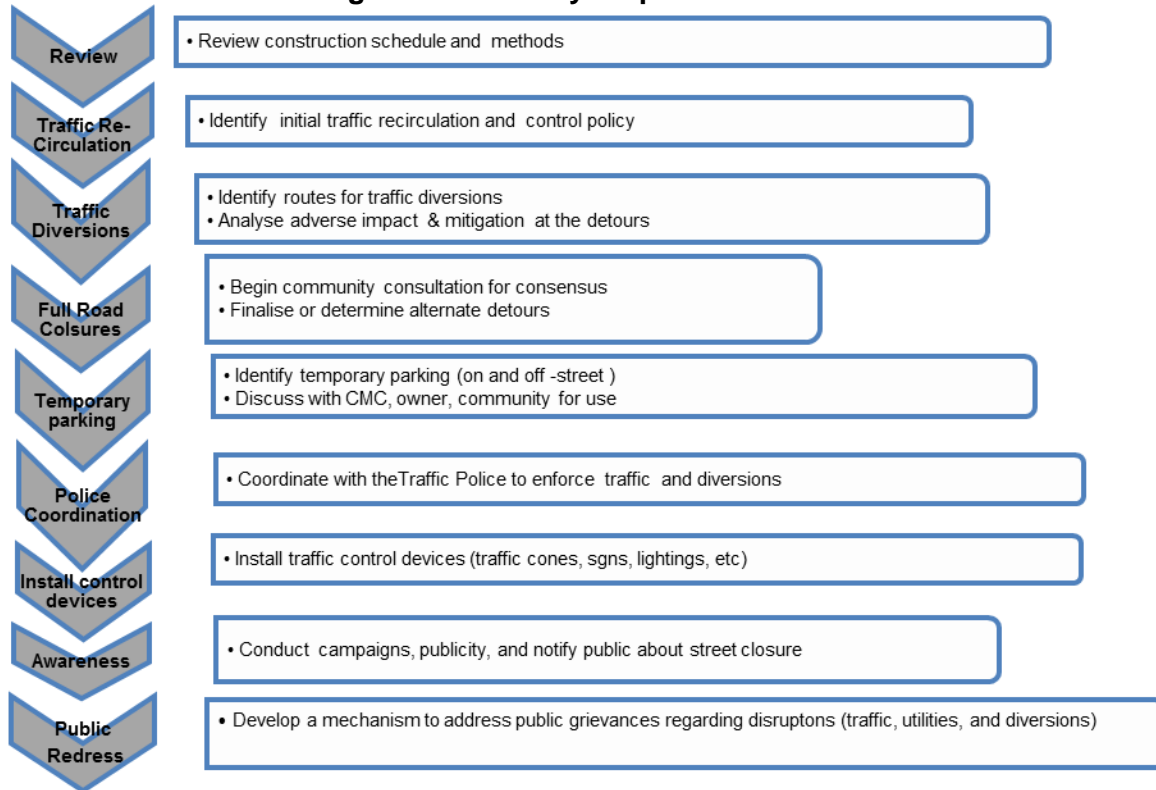
2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.
 - Make traffic safety and temporary traffic control an integral and high-priority element of every project from planning through design, construction, and maintenance.
 - Inhibit traffic movement as little as possible.
 - Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
 - Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
 - Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
 - Train all persons that select, place, and maintain temporary traffic control devices.
 - Keep the public well informed.
 - Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

C. Analyze the Impact Due to Street Closure

3. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:
 - approval from the ICG, local administration to use the local streets as detours;
 - consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
 - determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
 - determining if additional traffic control or temporary improvements are needed along the detour route;
 - considering how access will be provided to the worksite;
 - contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
 - developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

4. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the Detour Street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A8.1: Policy Steps for the TMP



D. Public awareness and notifications

5. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

7. The ICG will also conduct an awareness campaign to educate the public about the following issues:

- traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
- defensive driving behavior along the work zones; and
- reduced speeds enforced at the work zones and traffic diversions.

8. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

9. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the ICG, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

- Explain why the brochure was prepared, along with a brief description of the project;
- Advise the public to expect the unexpected;
- Educate the public about the various traffic control devices and safety measures adopted at the work zones;
- Educate the public about the safe road user behavior to emulate at the work zones;
- Tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
- Indicate the office hours of relevant offices.

E. Vehicle Maintenance and Safety

10. A vehicle maintenance and safety program shall be implemented by the construction contractor. The contractor should ensure that all the vehicles are in proper running condition and it comply with roadworthy and meet certification standards of GON. All vehicles to be used at STWSSP shall be in perfect condition meeting pollution standards of GON. The vehicle operator requires a prestate of shift checklist. Additional safety precautions will include the requirement for:

- Driver will follow the special code of conduct and road safety rules of Government of Nepal.
- Drivers to ensure that all loads are covered and secured drivers to ensure operation equipment can't leak materials hauled
- Vehicles will be cleaned and maintained in designed places.

F. Install traffic control devices at the work zones and traffic diversion routes

11. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

12. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

13. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

14. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

15. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

16. The ICG and contractor will coordinate with the local administration and traffic police regarding the traffic signs, detour, and any other matters related to traffic. The contractor will prepare the traffic management plan in detail and submit it along with the EMP for the final approval.

SPOIL MANAGEMENT PLAN

A. Spoil Management Plan

1. **Purpose and application:** SMP is to describe how STWSSP will manage the spoil generated and reuse related to design and construction works. This is an integral part of EMP. The objective of SMP is to reuse of spoil from works in accordance with the spoil management hierarchy outlined in this document.

2. **Objectives of Spoil Management Plan:** The objectives of SMP are:
- To minimize spoil generation where possible
 - Maximize beneficial reuse of spoil from construction works in accordance with spoil management hierarchy
 - Manage onsite spoil handling to minimize environmental impacts on resident and other receivers
 - Minimize any further site contamination of land, water, soil
 - Manage the transportation of spoil with consideration of traffic impacts and transport related emissions

3. **Structure of SMP:**

Section 1: Introduction of SMP

Section 2: Legal and other requirements

Section 3: Roles and responsibilities

Section 4: Identification and assessment of spoil aspects and impacts

Section 5: Spoil volumes, characteristics and minimization

Section 6: Spoil reuses opportunities, identification and assessment

Section 7: On site spoil management approach

Section 8: Spoil transportation methodology

Section 9: Monitoring, Reporting, Review, and Improvements

4. **Aspects and Potential Impacts.** The key aspects of potential impacts in relation to SMP are listed in table below

Table A9. Aspects of Potential Impacts

| Aspects | Potential Impacts |
|-------------------------|--|
| Air Quality | Potential for high winds generating airborne dust from the stock piles |
| Sedimentation | Potential for sediment laden site runoff from spoil stockpiles and potential for spillage of spoil from truck on roads |
| Surface and Groundwater | Contamination of water (surface and ground water) |
| Noise | Associated with spoil handling and haulage and storage |
| Traffic | Impacts associated with spoil haulage |
| Land Use | Potential for spoil to be transported to a receivable site that doesn't have permission for storage/disposal |
| Design specifications | Limitations on opportunities to minimize spoil generation |
| Sustainability | Limited sites for storage, reuse opportunities |

B. Spoil volumes, Characteristics and Minimization

5. **Spoil volume calculations:** Estimate the volumes of spoils produced from each of the construction sites.

6. **Characterization of spoil:** Based on the type of spoil; characterization is done (sand stone, MWSS mix materials, reusable materials)

7. **Adopt Spoil Reduce, Reuse Opportunities.** An overview of the assessment methodology to be used is mentioned below.

- Consideration of likely spoil characteristics
- Identification of possible reuse sites
- Screening of possible reuse opportunities

8. **Identification of possible safe disposal sites for spoil:** Those spoils which can't be reuse shall be properly disposed in designated areas, such disposal areas should be identified in project locations. Such disposal areas should be safe from environmental aspects and there should be any legal and resettlement related issues. Such areas need to be identified and prior cliental approval should be obtained to use it as spoil disposal area. The local administration must be consulted and if required permission should be obtained from them.

C. Storage and Stock Piling

9. **Transportation and haulage route.** Based on the above, the contractor will prepare a SMP as an integral part of EMP and submit it to the DSMC for their review and approval.

10. **Summary of Key Issues and Remedial Actions.** Summary of follow up time-bound actions to be taken within a set timeframe.

WATER QUALITY STANDARDS

B.3 National Drinking Water Quality Standards, 2006

| Group | National Drinking Water Quality Standards, 2006 | | | WHO Guidelines for Drinking-water Quality, 4th Edition, 2011* |
|-------------|---|-----------|----------------------------|---|
| | Parameter | Unit | Max. Concentration Limits | |
| Physical | Turbidity | NTU | 5 (10) ** | - |
| | pH | | 6.5 - 8.5 | none |
| | Color | TCU | 5 (15) | none |
| | Taste & Odor | | Would not be objectionable | - |
| | TDS | mg/l | 1000 | - |
| | Electrical Conductivity | µc/cm | 1500 | - |
| | Iron | mg/l | 0.3 (3) | - |
| | Manganese | mg/l | 0.2 | - |
| | Arsenic | mg/l | 0.05 | 0.01 |
| | Cadmium | mg/l | 0.003 | 0.003 |
| | Chromium | mg/l | 0.05 | 0.05 |
| | Cyanide | mg/l | 0.07 | none |
| | Fluoride | mg/l | 0.5 - 1.5 ^ | 1.5 |
| | Lead | mg/l | 0.01 | 0.01 |
| | Ammonia | mg/l | 1.5 | none established |
| Chemical | Chloride | mg/l | 250 | none established |
| | Sulphate | mg/l | 250 | none |
| | Nitrate | mg/l | 50 | 50 |
| | Copper | mg/l | 1 | 2 |
| | Total Hardness | mg/l | 500 | - |
| | Calcium | mg/l | 200 | - |
| | Zinc | mg/l | 3 | none established |
| | Mercury | mg/l | 0.001 | 0.006 |
| | Aluminum | mg/l | 0.2 | none established |
| | Residual Chlorine | mg/l | 0.1 - 0.2 | 5 ^^ |
| Micro Germs | E-coli | MPN/100ml | 0 | must not be detectable in any 100 ml sample |
| | Total Coliform | MPN/100ml | 0 in 95% of samples taken | |

* Health-based guideline values

** Figures in parenthesis are upper range of the standards recommended.

^ These standards indicate the maximum and minimum limits.

^^ From WHO (2003) Chlorine in Drinking-water, which states that this value is conservative.

Parameter with WHO guideline value as more stringent than national standard value.

National Drinking Water Quality Standards was obtained from the Environment Statistics of Nepal 2011, Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal.

SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

I. INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

| Name | Designation/Office | Email Address | Contact Number |
|----------------|--------------------|---------------|----------------|
| 1. PMU | | | |
| | | | |
| | | | |
| 2. PIUs | | | |
| | | | |
| | | | |
| | | | |
| 3. Consultants | | | |
| | | | |
| | | | |
| | | | |

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

| Package Number | Components/List of Works | Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M) ^a | Contract Status (specify if under bidding or contract awarded) | If On-going Construction | |
|----------------|--------------------------|--|--|--------------------------|--------------------------|
| | | | | %Physical Progress | Expected Completion Date |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

^aIf on-going construction, include %physical progress and expected date of completion.

- Identify the role/s of Safeguards Team including schedule of on-site verification of reports submitted by consultants and contractors.
- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.
- Include as appendix all supporting documents including **signed** monthly environmental site inspection reports prepared by consultants and/or contractors.
- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below
- Provide the monitoring results as per the parameters outlined in the approved EMP (or site-specific EMP/construction EMP when applicable).
- In addition to the table on EMP implementation, the main text of the report should discuss in details the following items:
 - (i) **Grievance Redress Mechanism.** Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).
 - (ii) **Complaints Received during the Reporting Period.** Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).
 - Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
 - Identify muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads.
 - Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these were intact following heavy rain;
 - Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area.
 - Confirm spill kits on site and site procedure for handling emergencies.
 - Identify any chemical stored on site and provide information on storage condition. Attach photograph.
 - Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
 - Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
 - Provide information on barricades, signages, and on-site boards. Provide photographs.
 - Provide information on
 - Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary of Environmental Monitoring Activities (for the Reporting Period)^a

| Impacts (List from IEE) | Mitigation Measures (List from IEE) | Parameters Monitored (As a minimum those identified in the IEE should be monitored) | Method of Monitoring | Location of Monitoring | Date of Monitoring Conducted | Name of Person Who Conducted the Monitoring |
|--|--|--|---------------------------------|-----------------------------------|---|--|
| Design Phase | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Pre-Construction Phase | | | | | | |
| | | | | | | |
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| | | | | | | |
| Construction Phase | | | | | | |
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| | | | | | | |
| | | | | | | |
| Operational Phase | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

^a Attach Laboratory Results and Sampling Map/Locations.

Noise Quality Results

| Site No. | Date of Testing | Site Location | LA _{eq} (dBA) (Government Standard) | |
|----------|-----------------|---------------|--|------------|
| | | | Day Time | Night Time |
| | | | | |
| | | | | |

| Site No. | Date of Testing | Site Location | LA _{eq} (dBA) (Monitoring Results) | |
|----------|-----------------|---------------|---|------------|
| | | | Day Time | Night Time |
| | | | | |
| | | | | |

VIII. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- Summary of follow up time-bound actions to be taken within a set timeframe.

IX. APPENDIXES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

NAME: _____ DATE: _____
 TITLE: _____ DMA: _____
 LOCATION: _____ GROUP: _____

WEATHER CONDITION:

INITIAL SITE CONDITION: _____

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory _____ Incident _____ Resolved _____
 Unresolved _____

INCIDENT:
Nature of incident:

Intervention Steps:

Incident Issues

| | | | |
|------------|------------------------|-------------------|--|
| Resolution | Project Activity Stage | Survey | |
| | | Design | |
| | | Implementation | |
| | | Pre-Commissioning | |
| | | Guarantee Period | |

Inspection

| | |
|----------------------|-------------------------|
| Emissions | Waste Minimization |
| Air Quality | Reuse and Recycling |
| Noise pollution | Dust and Litter Control |
| Hazardous Substances | Trees and Vegetation |

Site Restored to Original Condition Yes No

Signature _____

Sign off

Name
Position

Name
Position

RESULTS OF THE ENVIRONMENTAL AUDIT OF WATER TREATMENT PLANTS

| Details of the Existing Reservoir Tanks to be Demolished. | Required Environmental Clearances per Government of Nepal Laws and Regulations | Status of Monitoring of Raw and Treated Water (per Government of Nepal and WHO guideline values) | Sludge Management (if sludge is being generated) | Management of Reservoir | Operation and maintenance (roles and responsibilities, availability of O&M manual, environmental monitoring being conducted) |
|--|--|---|--|--|---|
| <p>This existing reservoir tank (RVT) is referred as Shikharnagar RVT. There are 4 existing RVTs among which one is in damaged condition. Each of 3 RVTs has 165 cum, 38m³ and 42m³ capacities. According to the locals, it is said that this existing system was constructed around 1940 A.D. during Rana regime. Hence, it has become quite out dated. It was further damaged by the massive earthquake that took place on April 25, 2015. This led to leakage problems.</p> | <p>process of getting initial environmental examination (IEE) clearances by Government of Nepal, it takes 2-3 months</p> | <p>Raw water taken from the concerned sources meets NDWQS. During rainy season turbidity became high and chances of E. coli is increased. During the operation of treatment plant, the tap water meets both NDWQS and WHO guidelines.</p> | <p>Sludge generated is very less which is managed by buried in low land within premises of the existing WTP.</p> | <p>Management of reservoir specially to avoid excessive algal growth within the reservoir, done by Ilam Municipality as per specified methods.</p> | <p>Operation and maintenance along with minor repair works done by separate water supply section of Ilam municipality since 1998. Out of 93 staffs of the municipality, 35 are working in this section. O&M manual is not well prepared and practiced. Environmental monitoring being conducted by Ilam municipality as the entire responsibility of the existing system is handed over by Ilam Water Supply and Sanitation Division Office to the Ilam municipality in 1998 A.D.</p> |
| <p>It is located in the ward no. 7 of Ilam municipality. Its surroundings is moderately populated. It is surrounded by Bamboo forest. After demolition of these four existing RVTs, new RVT with 150 m³ capacity will be constructed.</p> | | <p>Turbidity and residual chlorine was within the limits of NDWQS. Monitoring is done by DWSS, Water quality section.</p> | | | |
| <p>Ilam View Tower and Shikharnagar RVT constructed by JICA is located in the same premises of these existing RVTs. It is well fenced by stone masonry wall and secured.</p> | | | | | |
| <p>The another existing RVT to be demolished is Gadhi Barrack (RVT A). Its existing capacity is 48 m³. According to the locals, it is said that it was constructed around 50-60 years back. It has steepy hill topography</p> | | | | | |