



# खानेपानी मन्त्रालय



पत्र संख्या:- ०६६/६६  
चलानी नं:- १४२

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फोन नं.: ४२११६९३  
फ्याक्स : ९७७-१-४२११४३३  
सिंहदरबार,  
काठमाडौं, नेपाल ।

मिति २०७६।०६।०२

सानासहरी खा. पा. आयोजना  
आयोजना व्यवस्थापन कार्यालय  
दर्ता नं.: ४६८  
मिति: ०६६/६/६

श्री खानेपानी तथा ढल व्यवस्थापन विभाग,  
पानीपोखरी, काठमाडौं ।

**विषय : प्रारम्भिक वातावरणीय परीक्षणको प्रतिवेदन(IEE) स्वीकृती सम्बन्धमा ।**

प्रस्तुत विषयमा तहां विभाग मार्फत स्वीकृतिका लागि मन्त्रालयमा प्राप्त भएको तेस्रो साना सहरी खानेपानी तथा सरसफाई आयोजना, पानीपोखरी काठमाण्डौं, प्रस्तावक रहेको ईलाम नगर सहरी खानेपानी तथा सरसफाई आयोजना (ईलाम)को परिमार्जित प्रारम्भिक वातावरणीय परीक्षण (IEE) प्रतिवेदन नेपाल सरकार (सचिवस्तर) को मिति २०७६।०६।०२ को निर्णयानुसार स्वीकृत भएको व्यहोरा निर्देशानुसार अनुरोध छ ।

**बोधार्थ :**

श्री तेस्रो साना सहरी खानेपानी तथा सरसफाई आयोजना,  
आयोजना व्यवस्थापन कार्यालय,  
पानीपोखरी, काठमाण्डौं ।

**संलग्न :**

स्वीकृत प्रारम्भिक वातावरणीय परीक्षण (IEE) प्रतिवेदन २ प्रति ।

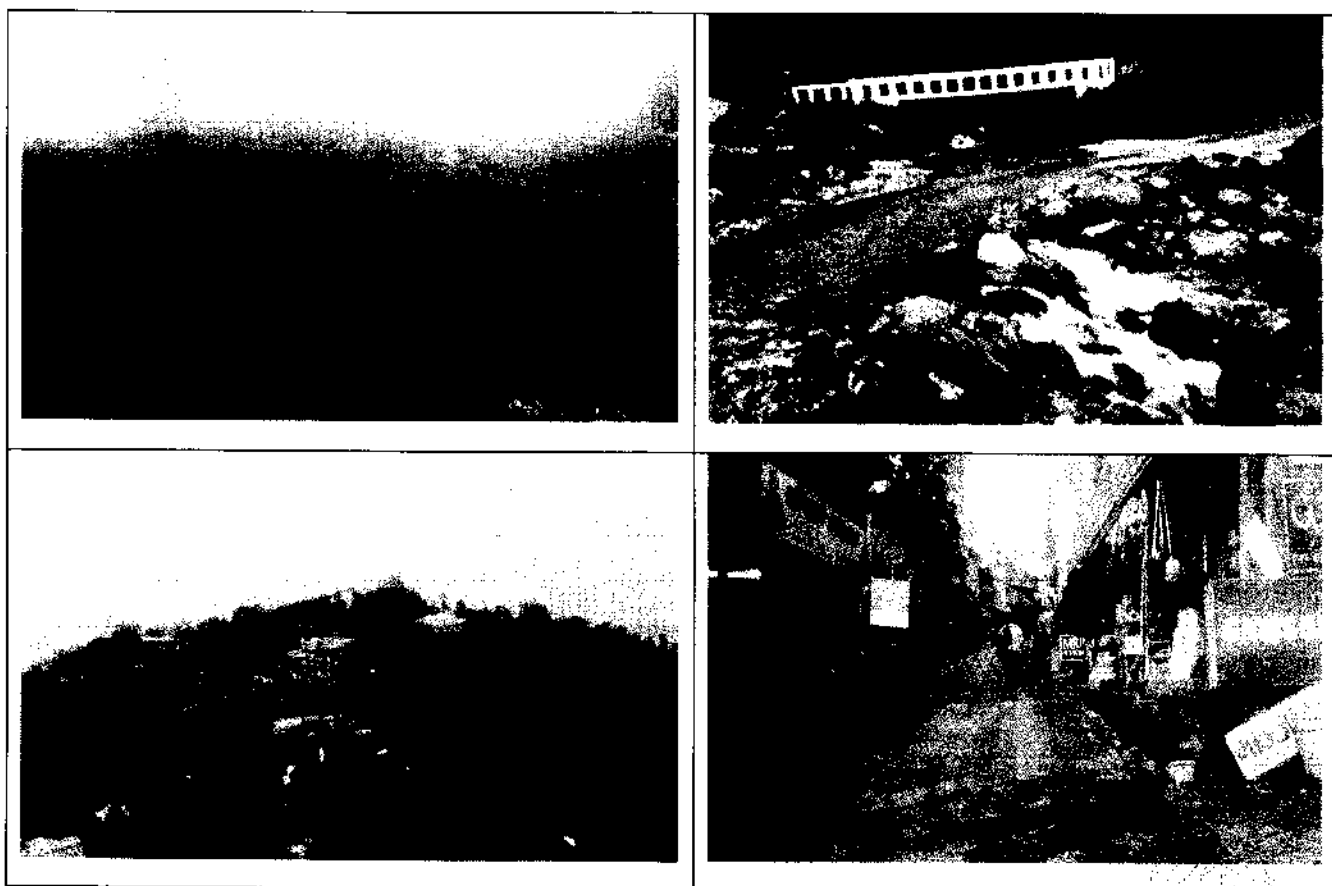
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कार्यक्षेत्र  
१६/६/६

(अञ्जना महर्जन)  
ईन्जिनियर



**Government of Nepal**  
**Ministry of Water Supply**  
**Department of Water Supply and Sewerage Management**  
**Urban Water Supply & Sanitation (Sector) Project**  
**Project Management Office**  
Panipokhari, Maharajgunj, Kathmandu

**Initial Environmental Examination (IEE)**  
**Of**  
**Ilam Water Supply and Sanitation Project**  
**Ilam, Nepal**



**AUGUST, 2019**

**SUBMITTED TO: Ministry of Water Supply, Singhadurbar, Kathmandu**

**SUBMITTED BY: Project Management Office, Urban Water Supply and Sanitation (Sector) Project, Department of Water Supply and Sewerage Management, Panipokhari, Kathmandu**

**Prepared by: TAEC Consult P. Ltd. - Integrated Consultants Nepal (P) Ltd. JV**

## ABBREVIATIONS

|              |                                                                                  |
|--------------|----------------------------------------------------------------------------------|
| 2ndSTWSSSP   | Second Small Towns' Water Supply and Sanitation Sector Project                   |
| A.D.         | Anno Domini                                                                      |
| ADB          | Asian Development Bank                                                           |
| AIFC         | Average Incremental Financial Cost                                               |
| AM           | Accountability Mechanism                                                         |
| AP           | Affected Person                                                                  |
| ATP          | Ability To Pay                                                                   |
| BDS          | Bulk Distribution System                                                         |
| BoQ          | Bill of Quantities                                                               |
| B.S.         | Bikram Sambat                                                                    |
| BWF          | Barbed Wire Fencing                                                              |
| CAPP         | Community and Public Participation                                               |
| C-EMP        | Contractor's Environmental Management Plan                                       |
| CFUG         | Community Forest User's Group                                                    |
| CITES        | Convention on International Trade in Endangered Species of Wild<br>Fauna & Flora |
| CLBW         | Chain Link Boundary Wall                                                         |
| Coliform P/A | Coliform Presence/Absence                                                        |
| CSA          | Concerned Sector Agency                                                          |
| DCC          | District Coordination Committee                                                  |
| DI           | Ductile Iron                                                                     |
| DMA          | District Metered Area                                                            |
| DPH          | Dosing Pump House                                                                |
| DRTAC        | Design Review and Technical Audit Consultant                                     |
| DS           | Distribution System                                                              |
| DSMC         | Design, Supervision and Management Consultant                                    |
| DWSSM        | Department of Water Supply and Sewerage Management                               |
| EARF         | Environmental Assessment and Review Framework                                    |
| EIA          | Environmental Impact Assessment                                                  |
| EIRR         | Economic Internal Rate of Return                                                 |
| EMP          | Environmental Management Plan                                                    |
| EMR          | Environmental Monitoring Report                                                  |
| ENPHO        | Environment and Public Health Organization                                       |
| EO           | Environmental Officer                                                            |
| EOCC         | Economic Opportunity Cost of Capital                                             |
| EPA          | Environment Protection Act                                                       |

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|          |                                                                 |
|----------|-----------------------------------------------------------------|
| EPR      | Environment Protection Rules                                    |
| ES       | Environmental Specialist                                        |
| ESA      | Environmental Safeguard Assistant                               |
| ESE      | Environmental Safeguard Expert                                  |
| FEDWASUN | Federation of Water Supply and Sanitation Users Committee Nepal |
| FGD      | Focus Group Discussion                                          |
| FIRR     | Financial Internal Rate of Return                               |
| FRP      | Ferro Reinforced Plastic                                        |
| GH       | Guard House                                                     |
| GI       | Galvanized Iron                                                 |
| GoN      | Government of Nepal                                             |
| GRM      | Grievance Redress Mechanism                                     |
| HDPE     | High Density Polyethylene                                       |
| HHs      | Households                                                      |
| HRF      | Horizontal Roughening Filter                                    |
| IBAT     | Integrated Biodiversity Assessment Tool                         |
| ICESCR   | International Covenant on Economic, Social & Cultural Rights    |
| ICG      | Implementation Core Group                                       |
| IP       | Indigenous People                                               |
| IUCN     | International Union for Conservation of Nature                  |
| IEE      | Initial Environmental Examination                               |
| JICA     | Japan International Cooperation Agency                          |
| JV       | Joint Venture                                                   |
| LGs      | Local Groups                                                    |
| Ltd.     | Limited                                                         |
| MoFE     | Ministry of Forest and Environment                              |
| MoWS     | Ministry of Water Supply                                        |
| MWSS     | Manufacturer Waste Scrap Shingles                               |
| NAAQS    | National Ambient Air Quality Standards                          |
| NCDC     | Namsaling Community Development Centre                          |
| ND       | Nominal Diameter                                                |
| ND       | Not Detected (In Test Reports)                                  |
| NDWQS    | National Drinking Water Quality Standard                        |
| NEPAP    | National Environment Policy & Action Plan                       |
| NGO      | Non Governmental Organization                                   |
| NRs.     | Nepalese Rupees                                                 |
| NRCS     | Nepal Red Cross Society                                         |
| NTFP     | Non Timber Forest Products                                      |

|          |                                                                  |
|----------|------------------------------------------------------------------|
| NVMES    | Nepal Vehicles Mass Emission Standards                           |
| NWSC     | Nepal Water Supply & Sewerage Corporation                        |
| OD       | Outer Diameter                                                   |
| ODF      | Open Defecation Free                                             |
| O&M      | Operation and Maintenance                                        |
| PAF      | Project Affected Families                                        |
| PE       | Polyethylene                                                     |
| PID      | Project Information Datasheet                                    |
| PMO      | Project Management Office                                        |
| PMQAC    | Project Management and Quality Assurance Consultants             |
| PN       | Nominal Pressure Rating                                          |
| PPHA     | Population Per Hectare                                           |
| PPTA     | Project Preparation Technical Appraisal                          |
| PTW      | Permit To Work                                                   |
| PSC      | Project Steering Committee                                       |
| RCC      | Reinforced Cement Concrete                                       |
| RDSMC    | Regional Design Supervision Management Consultant                |
| REA      | Rapid Environmental Assessment                                   |
| RL       | Relative Level                                                   |
| ROW      | Right of Way                                                     |
| RPMO     | Regional Project Management Office                               |
| RVT      | Reservoir Tank                                                   |
| SB       | Sedimentation Basin/Settling Basin                               |
| SDG      | Sustainable Development Goal                                     |
| SEAM-N   | Strengthening of Environmental Administration & Management-Nepal |
| SPS      | Safeguard Policy Statement                                       |
| SS       | Site Specific                                                    |
| SSF      | Slow Sand Filter                                                 |
| SSO      | Social Safeguard Officer                                         |
| STWSSSP  | Small Towns' Water Supply and Sanitation Sector Project          |
| TDF      | Town Development Fund                                            |
| TNTC     | Too numerous To Count                                            |
| ToR      | Terms of Reference                                               |
| TSTWSSSP | Third Small Town Water Supply & Sanitation Sector Project        |
| USD      | United States Dollar                                             |
| UWSSSP   | Urban Water Supply and Sanitation (Sector) Project               |
| VDC      | Village Development Committee                                    |
| WHO      | World Health Organization                                        |

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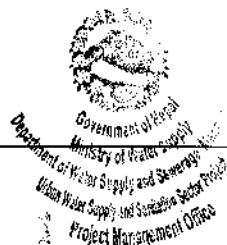
|       |                                               |
|-------|-----------------------------------------------|
| WN    | Ward Number                                   |
| WOV   | Wash Out Valves                               |
| WSP   | Water Safety Plan                             |
| WSSDO | Water Supply and Sanitation Divisional Office |
| WTP   | Water Treatment Plant                         |
| WUA   | Water Users' Association                      |
| WUSC  | Water Users' and Sanitation Committee         |



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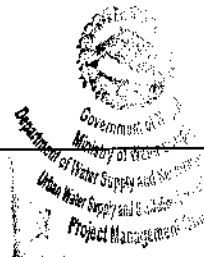


**WEIGHTS AND MEASURES**

|                |                                |
|----------------|--------------------------------|
| amsl           | Above mean sea level           |
| dBa            | decibel audible                |
| ha             | hectare/s                      |
| Kg/sq.cm       | Kilogram per square centimeter |
| km             | kilometer/s                    |
| Kph            | kilometer/s per hour           |
| m              | meter/s                        |
| Kph            | kilometer/s per hour           |
| lps            | liter per second               |
| m              | meter/s                        |
| m <sup>3</sup> | cubic meter/s                  |
| mg/l           | milligram/s per liter          |
| mm             | millimeter/s                   |
| NTU            | Nephelometric Turbidity Unit   |
| PPHA           | Population Per Hectare         |



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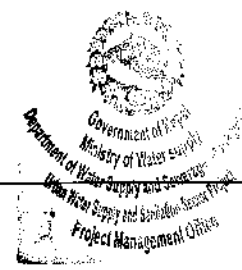
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*[Signature]*

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## EXECUTIVE SUMMARY

### Introduction

1. Ilam town project is one of the projects proposed under UWSSSP which is currently being prepared to support further GoN's continuing efforts to provide water supply and sanitation services to selected urban municipalities of Nepal. In support of GoN's endeavor, the Asian Development Bank (ADB) funded this Urban Water Supply and Sanitation Sector Project (UWSSSP).
2. During field study, it has been identified that the existing water supply system is said to be about 82 years old. Despite having been rehabilitated and expanded four times, the system is still not able to meet the current water demand. The quality of sand in SSF of the existing WTP is said to be poor which results in ineffective operation of WTP. The study also shows that the existing disinfection unit is also not in operation. It is observed that the existing distribution pipelines are very old and unable to supply water in sufficient quantity in many areas. This compelled people to take direct connections with the service reservoir. As a result, numerous distribution mains entangled with each other can be observed to be laid all along the project town.
3. The existing system has been serving only 3 wards of the project town that includes WN 6, 8 & 9 which belongs to 6 wards of the former Ilam municipality. Other wards have been using tap water through locally managed sources. However, some of the wards, located at the foothill of the project town, are deprived of tap water, and these areas are generally dependent on spouts and water from the river. The study shows that the existing system is supplying water only for 1.5 hours a day on an alternate day. Moreover, the frequent breakdown of system has made the supply system unreliable. The proposed project expects to improve the existing water supply condition of the project town through provision of effective WTP, well managed distribution mains, continuous supply service and expanded service area.
4. ADB and GoN require all projects to undergo environmental assessments. All projects funded by ADB must comply with the Safeguard Policy Statement (SPS) 2009 which will ensure the following mentioned points:
  - The projects are environmentally sound,
  - The projects are designed to operate in compliance with applicable regulatory requirements,
  - These projects are not likely to cause any significant environmental, health, or safety hazards.

5. According to ADB's REA Checklist, the proposed project falls under 'Category B' that requires IEE study only. On the GoN side, the statutory requirement that has to be adhered to is the Environment Protection Act (1997), and Environment Protection Rules (1997) with latest amendments (2017). Based on EPR Schedule 1, the Project falls within the threshold of activities under (H) drinking water sector that indicates that the project requires IEE only. This IEE fulfills the policy requirements of both ADB and GoN.
6. The proposed project will extend the distribution system to new areas of Ilam municipality (complete areas of wards 6 & 7 and partial areas of wards 8 & 9) which are not covered by the existing system. These areas are the core areas of Ilam municipality where the demand of water is very high. Along with the proposal of construction of new components, the proposed project will involve rehabilitation works of the existing system through rehabilitation of Slow Sand Filter, Water proofing of existing WTP and Construction of new RVT by demolishing 4 existing service reservoirs at Shikharnagar. Hence, the proposed project is an extension of the existing system. This Project has been conceptualized as a totally gravity surface water system. The overall concept has been developed with distribution system comprising of Bulk Distribution System (BDS) and Distribution System (DS). The entire distribution network is to be supplied from multiple (ten) reservoir system. All the water treatment plants will act as main distributors. The total supplies of the sub-systems have been divided in to these ten reservoirs in order to manage RVT wise demand

#### **Description of the Project**

7. Two new sources have been proposed for this project that includes Rate Khola and Mewa Khola. Along with this, two existing sources viz., Gitang Khola and Bhandi Khola will be used for this project. Hence, altogether, four intakes will be used for the proposed project. Similarly, the proposed project will also have one water treatment plant comprising 2 nos. of new sedimentation tanks in corresponding routes of Rate & Mewa Khola, 8 nos. of new HRF near existing WTP site and one rehabilitated existing SSF. Although the water quality test results as given in Annex 6 shows that the quality of Geetang Khola and Bhadi Khola is almost same, the treatment provision has been proposed for Geetang Khola only because our study shows that Bhandi Khola is well protected spring source and does not require any treatment. Then, there will be about ten service reservoirs that include six new and four existing RVTs, in this project. The cumulative capacity for these reservoirs will be about 1392.50 cum. The main water supply components of the proposed project include Intakes, Transmission Mains, Water Treatment Plant, Service Reservoirs, Bulk Distribution

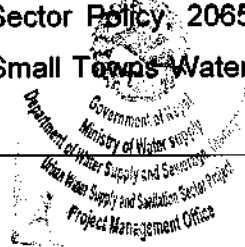
Mains, Distribution Mains, River Crossings, House Connections, Guard Quarter, Boundary Wall and Appurtenances (Valves, Chambers, Flow Meters & Fire Hydrant). This project also covers construction requirements like Land Requirement, Energy Requirement, Human Resource Requirement, Worker's Camp, and Stockpiling Site etc. The proposed project will also have sanitation components that includes three public toilets at Dhobi Dhara, Tundikhel and Adarsha Krishi Bazaar areas.

### **Methodology**

8. The basic methodology for the preparation of IEE as per EPR includes **Literature Review** to collect information on the project area and **Field Study** to collect baseline information on physical, cultural, chemical, biological, and social conditions of the core and surroundings areas of the project town. This is then followed by a 15-days **Public Notice Publication** in any national daily newspaper to seek opinions from the stakeholders. After this, **Public Consultation** has been carried out to acknowledge any kind of suggestions from the interested stakeholders regarding public notice. Along with this, **Impact Identification, Prediction & Evaluation** is carried out through simple checklist & questionnaire method and through professional judgement to determine adversity of the anticipated impacts. The study has followed the procedures outlined in the approved ToR and has covered the issues delineated therein.

### **Policy, Legal and Administrative Framework**

9. The IEE study requires study of the concerned Policy, Legal & Administrative Framework to analyze their compliance with the project construction activities. The major environmental act, rules, plan, policies, guidelines that are relevant for IEE study of this project includes;
  - a) **Major Law, Acts & Rules:** i) Constitution of Nepal; ii) Environmental Protection Act (EPA), 2053 B.S. (1997 A.D.); iii) Environmental Protection Rules (EPR), 1997 AD, and its amendments in 2017 A.D.
  - b) **Plans, Policies & Strategies:** i) National Environmental Policy & Action Plan (NEPAP), 2050 B.S. (1993 A.D.); ii) Water Resources Strategy, 2059 B.S. (2002 A.D.); iii) Rural Water Supply and Sanitation National Policy and Rural Water Supply and Sanitation National Strategy 2060 B.S. (2004 A.D.); iv) Rural Water Supply and Sanitation Sectoral Strategic Action Plan; v) National Water Plan- Nepal 2062 B.S. (2005 B.S.); vi) National Urban Policy, 2063 B.S. (2007 A.D.); vii) National Urban Water Supply & Sanitation Sector Policy, 2065 B.S. (2009 A.D.); viii) Updated 15-yr Development Plan for Small Towns Water Supply and



Sanitation Sector, 2066 B.S. (2009 A.D. and Amendments in 2015 A.D.); ix) National Water Supply & Sanitation Policy (Draft) ,2071 B.S. (2014 A.D.); x) National Forest Policy, 2075 B.S. (2019 A.D.); xi) Land Use Policy, 2072 B.S. (2015 A.D.) and xii) National Urban Development Strategy, 2074 B.S. (2017 A.D.)

**c) Laws & Acts:** i) Essential Goods Protection Act, 2012 B.S. (1955 A.D.); ii) Aquatic Animal Protection Act, 2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.)); iii) Town Development Act , 2045 B.S. (1988 A.D.); iv) Water Resource Act,2049 B.S. (1992 A.D.); v) Forest Act, 2049 B.S. (1993 A.D.) with amendments 2055 B.S. (1999 AD.); vi) Land Acquisition Act,2049 B.S. (1993 A.D.); vii) Child Labor Prohibition and Regulation Act, 2056 B.S. (2001 A.D.); viii) Water Supply Management Board Act, 2063 B.S. (2006 A.D.); ix) Solid Waste Management Act, 2068 B.S. (2011 A.D.); x) Labour Act, 2074 B.S. (2017 A.D.); xi) Local Government Operation Act, 2074 B.S. (2017 A.D.)

**d) Rules & Regulations:** i) Solid Waste (Management & Resource Mobilization) Rules, 2044 B.S. (1987 A.D.) & Amendments 2049 B.S. (1992 A.D.); ii) Water Resource Regulations, 2050 B.S. (1993 A.D.); iii) Drinking Water Regulations, 2055 B.S. (1998 A.D.); iv) Solid Waste Management Rules, 2070 B.S. (2013 A.D.); iv) Labor Rules, 2075 B.S. (2018 A.D.)

**e) Guidelines & Manuals:** i) National EIA Guidelines, 2049 B.S. (1993 A.D.); ii) WHO Air Quality Guidelines, Global Update, 2061 B.S. (2005 A.D.); iii) WHO Guidelines for Drinking Water Quality, Fourth Edition 2073 B.S. (2017 A.D.); iv) National Noise Standard Guidelines, 2068 B.S. (2012 A.D.); v) Guidelines for Community Noise by WHO, 2055 B.S. (1999 A.D.) and vi) "Working procedure for the use of national forest for national priority projects, 2074"

### **Existing Environment**

10. This IEE study requires information on the existing environment of the project town to identify the susceptibility of the environmental aspects of the project town towards the anticipated environmental impacts of the proposed project. Regarding this, the secondary information of the existing environment was collected through literature review during desk study. However, the secondary information is not sufficient for IEE study. Hence, the field study was carried out to collect primary information on the existing environmental aspects.
11. Regarding this, details on various physical environmental aspects like Landforms & Topography, Land Use Pattern, Geology & Soil, Water Resources, Climate, Air Quality, Acoustic Environment, Landslide Susceptibility etc and biological features like Flora, Fauna, Protected Areas & Community Forest Areas were collected

through simple checklist, REA checklist, professional judgement and interaction with the locals & the concerned bodies during field study. No existence of protected areas as well as community forest areas within the project area was observed during the field study.

12. Similarly, details on water quality of the water sources to be used for the proposed project were collected through sampling process followed by water quality tests on approved laboratory. The test result shows that the water samples taken from four sources viz; Gitang Khola, Bhandi Khola, Rate Khola and Mewa Khola have all the required parameters within the permitted value of NDWQS.
13. During field study, details on the socio-economic environment that includes Demographic Features, Caste/Ethnic Groups, Economic Features, Education & Skills and Community Infrastructures were collected through simple questionnaire method followed by household survey and interaction with the locals. Regarding this, Willingness to Pay for Monthly Tariff, Willingness for Up-front Cash Contribution and Affordability has also been assessed. As per the sampled household survey, 100% of 140 sampled HHs and 98.03% of total 2798 HHs expressed willingness to pay for monthly water tariff and to contribute for up-front cash contribution respectively. This indicates their demand for the proposed project to get rid of their acute water shortage problem. The survey also shows that 7.7% (215) of 2798 HHs fall under poor category and only 10.5% (293) of 2798 HHs expend less than Rs. 7,500 per month. Hence, this indicates the affordability of the community in terms of monthly income level and the expenditure level.

#### **Analysis of Alternatives**

14. Analysis on the alternatives of the proposed project is another important process of IEE study that will help to assess the feasibility of the project in regard to technical, environmental & social aspects. Primarily, this involves two alternatives that includes "Without Project" or "Do-nothing" Alternative and "With Project" Alternative. The limitation of "Without Project" Alternatives regarding continuous water supply system, treatment system and susceptibility to water borne diseases leads to opt for "With Project" Alternative. With Project Alternative has been analyzed by envisaging the likely benefits of the proposed project. The analysis shows that the proposed project is designed to provide convenient access to reliable, adequate, safe and potable water supply to 21,433 populations as per base year 2019 A.D. There is requirement of about 150 sqm area of Gumba Danda Community Forest for the construction of RVT1 and small guard house in this project. During the "With Project" Alternative analysis, "With No Forest" Alternative has also been studied to determine whether

the use of this community forest area could be avoided for the construction of those project components or not. This study shows that there are no other possible options which do not include Community Forest area.

15. This "With Project" Alternative analysis shows that three alternatives have been proposed for the design of the proposed project. All these three alternatives belong to gravity systems with similar service areas and structures from WTP to distribution network. The analysis shows that all of these three alternatives are technically, environmentally and socially feasible. The main difference between these three alternatives is in use of different sources with different transmission pipelines. This analysis also involves assessment of the most cost-effective, reliable and efficient system that can serve the design population. This analysis also shows that the capital cost of the alternative II is lower than other two alternatives. Hence, Alternative II has been selected as the best alternative for the project which involves two existing sources (16 lps from Gitang Khola and 4 lps from Bhandi Khola) and two new sources (10 lps from Rate Khola and 10 lps from Mewa Khola).

#### **Anticipated Environmental Impacts**

16. The analysis on the information collected during field study helps to identify and predict the likely environmental impacts that may result from the proposed project. These predicted impacts are then evaluated using Scoring matrix as per National EIA Guidelines, 1993 to determine the nature, extent and magnitude. This evaluation will further help to propose the appropriate mitigation measure for each impact.
17. The anticipated environmental impacts have been mainly categorized into two viz., Beneficial Impacts and Adverse Impacts on the basis of its negative and positive significance. This has been further categorized into four impacts that includes i) Impact on Physical Environment, ii) Impact on Biological Environment, iii) Impact on Chemical Environment and iv) Impact on Socio-economic Environment, based upon the effects on the existing environment. These impacts has been sub divided into three categories based upon the project phase that includes i) Design Phase, ii) Construction Phase and iii) Operation Phase.
18. Here, Beneficial Impacts includes Employment Generation, Skill Enhancement, Local Trade & Business Opportunities, Improved Health & Hygiene, Increased Economic Opportunity and Social Empowerment. Similarly, Adverse Impacts includes Soil Erosion, Noise Pollution, Impacts on Air Quality, Surface Water Quality, Generation of Solid Waste & Waste water from the construction site & worker's camp, Accidental Leakage or Spillage of Stored Fuel/Chemicals, Land Use Pattern, Disruption to Natural Drainage, Haphazard Disposal of Dismantled Debris, Impacts on Water

Bodies, Impacts on Flora & Fauna, Impact on Aquatic Life, Forest fire, Forest Encroachment, Impact on Water Quality of nearby rivers, Impact of Quality of water stored in the reservoir, Structural Instability, Workers & Community Health & Safety Hazards, and Damage to the existing Utilities, Traffic Congestion, Disruption to Local Vendor's Business, Occupational Health & Safety Hazards, Delivery of Unsafe Water, Impact of Sustainability of Works etc.

### **Mitigation & Augmentation Measures**

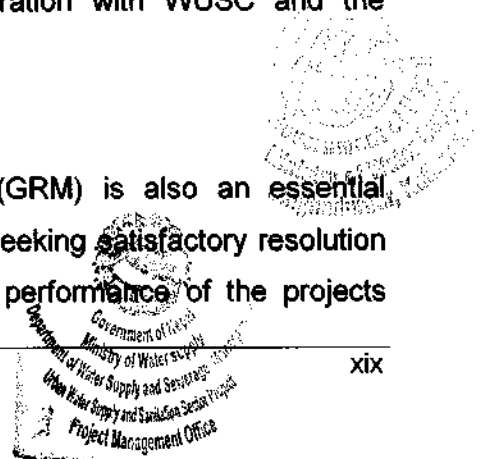
19. The mitigation & augmentation measures for each & every adverse impacts mentioned above have been proposed. These measures primarily includes Slope Protection Measures, Air Quality Monitoring, Noise Quality Monitoring, Waste Management, Prompt Backfilling, Handling of fuel & chemicals, Awareness regarding Workers & Community Health & Safety Hazards, Monitoring of Water Treatment System, Proper Handling of Chlorine etc. This has been described in detail in Chapter 8. If these proposed mitigation measures are effectively implemented, no such significant environmental problems have to be encountered during the construction & operation period of the proposed project. Likewise, various suitable augmentation measures have also been proposed to to maximize the anticipated beneficial impacts.

### **Information Disclosure, Consultation & Participation**

20. Stakeholder Consultation and Community Participation is an essential process in project preparation. It is the process of engaging stakeholders and affected people. This process involves Key Informant interviews, On-site discussions with WUSC, and Random Field Interviews of stakeholders. Prior to the stakeholder's consultation, stakeholder analysis and mapping of stakeholders were carried out to identify the potential stakeholders and their roles towards the implementation of the project. The potential stakeholders were then involved in consultation to disseminate information related to the project, to collect their views & suggestions and to prioritize their concerns regarding the project. This will continue throughout the implementation of the projects and operation period. To facilitate the stakeholder consultation, PMO & ICG will maintain good communication and collaboration with WUSC and the Municipality.

### **Grievance Redress Mechanism**

21. The Project-specific grievance redress mechanism (GRM) is also an essential process of the IEE study which is meant for persons seeking satisfactory resolution to their complaints on the social and environmental performance of the projects



under UWSSSP. The mechanism, developed in consultation with key stakeholders, will ensure the following mentioned points;

- (i) the basic rights and interests of every person adversely affected by the social and environmental performance of a Project are protected; and
- (ii) their concerns are effectively and timely addressed

This GRM involves setting up the Grievance Redress Committee (GRC) at the municipality level. The GRC will comprise of the following mentioned members:

- (1) WUSC Secretary;
- (2) RPMO Engineer;
- (3) RPMO social /environmental (as relevant) officer,
- (4) Representative of affected persons,
- (5) RDSMC's safeguards specialist (social/environment as relevant),
- (6) a representative of reputable and relevant CBO/SHG/organization working in the project area as invitee, and
- (7) Contractor's representative

#### **Environmental Management Plan**

22. Preparation and Implementation of the environmental management plan (EMP) is another essential process of the IEE study. The main purpose of EMP is to ensure that the activities are undertaken in a responsible and non-detrimental manner. Similarly, the other objectives of EMP are as follows:

- providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site;
- guiding and controlling the implementation of findings and recommendations of the environmental assignment conducted for the project;
- detailing specific actions deemed necessary to assist in mitigating the environmental impacts of the project and in enhancing beneficial impacts; and
- ensuring that safety recommendations are complied with.

23. The total estimated local level monitoring and mitigation cost for the project is NRs. 1,500,000.00.

#### **Monitoring & Reporting**

24. PMO & RPMO will be responsible for environmental monitoring & reporting. RPMO will monitor and measure the progress of EMP implementation. RPMO will submit a monthly monitoring and implementation reports to PMO, who will take follow-up

actions, if necessary. PMO will submit semi-annual monitoring reports to ADB. ADB will review project performance against the MoWS's commitments as agreed in the legal documents. ADB will monitor projects on an ongoing basis until a project completion report is issued. Along with this, Ministry of Water Supply (MoWS) as well as Ministry of Forests & Environment (MoFE) under Government of Nepal will also undertake monitoring process through random field visits to review the project performance.

### **Conclusion**

25. In conclusion, the IEE study shows that the proposed project is not an environmentally critical undertaking. The proposed project, its components, are not within or adjacent to environmentally sensitive areas. The few adverse impacts of high magnitude during construction will be temporary and short-term (i.e., most likely to occur only during peak construction periods). The proposed project will bring about the following mentioned benefits:
- (i) Access to reliable supply of safe and potable water;
  - (ii) Promotion of good hygiene and sanitation practices and reduced health and safety risks;
  - (iii) Liberation from the hardship for continuous drinking water supply for years and
  - (iv) Enhanced community health, improved quality of life and safe communities as outcomes.
26. Hence, there are no significant negative impacts of the proposed project, and the classification of the project as Category "B" is confirmed as per ADB and as Schedule -1 is confirmed as per Environment Protection Rules, 2054 (1997) and 2017 (Latest Amendments). No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) and Environment Protection Rules, 2054 (1997) of Nepal.

  
Engineer

## कार्यकारी सारांश

### परिचय

१. यस इलाम खानेपानी आपूर्ति तथा सरसफाई आयोजना, छनौट गरिएका नेपालका शहरी नगरपालिकाहरूमा खानेपानी आपूर्ति तथा सरसफाई सेवा वितरणमा सुधार ल्याउने नेपाल सरकारको निरन्तर थप प्रयासलाई सहायता गर्ने हेतुले शुरु गरिएको शहरी खानेपानी तथा सरसफाई आयोजना अर्न्तगत प्रस्ताव गरिएको परियोजना मध्ये एक हो । नेपाल सरकारको यही प्रयासलाई समर्थन गर्दै एसियाली विकास बैंकले शहरी खानेपानी तथा सरसफाई आयोजनाका निम्ति लगानी गरेको छ ।
२. स्थलगत अध्ययनको क्रममा यस रुपाकोट मझुवागढी नगरपालिकामा सञ्चालन भइरहेको वर्तमान खानेपानी आपूर्ति प्रणाली लगभग ८२ वर्ष पुरानो प्रणाली रहेको पहिचान गरिएको छ । चार पटकसम्म गरिएको पुनर्स्थापना एवं विस्तार बावजूद यस वर्तमान प्रणालीले वर्तमान खानेपानीको मागलाई पूरा गर्न सकेको छैन । विद्यमान WTP को SSF को बालुवाको गुणस्तर खराब रहेको भनिएको छ जसको परिणामस्वरूप WTP को सञ्चालनमा शून्यता देखिएको छ । विद्यमान डिस्ट्रिक्टक्सन यूनिट पनि सञ्चालनमा नआएको अध्ययनले देखाएको छ । विद्यमान वितरण पाइपलाइनहरू पुरानो भएको देखिनुका साथै यसले अधिकांश क्षेत्रहरूमा पर्याप्त मात्रामा पानी आपूर्ति गर्न असक्षम देखिएको छ । यसले त्यहाँका बासिन्दाहरूलाई पानी टैंकीबाट प्रत्यक्ष जडान गर्न बाध्य बनाएको छ । परिणामस्वरूप आयोजना शहरभरी अनगिन्ती एकअर्का सँग अल्झिएको वितरण पाइपलाइनहरू विछ्याइएको देख्न सकिन्छ ।
३. विद्यमान प्रणालीले वडा नं ६, ८ र ९ गरी आयोजना शहरका तीन वडाहरूमा सेवा दिदै आएको छ जुन पूर्व इलाम नगरपालिकाको ६ वडाहरू अर्न्तगत पर्दछ । अन्य वडाहरूले स्थानीय रूपमा व्यवस्थित स्रोतहरू मार्फत धाराको पानी प्रयोग गर्दै आएका छन् । तथापि, आयोजना शहरको तल्लो पहाडी भागमा अवस्थित केही वडाहरू धाराको पानी आपूर्तिबाट बञ्चित छन् भने यी क्षेत्रहरू सामान्यतया दुईधाराहरू र खोलाको पानीमा निर्भर छन् । विद्यमान प्रणालीले एकदिन विराएर दिनको केवल डेढ घण्टा लागि मात्र पानी आपूर्ति गर्दै आएको अध्ययनले देखाएको छ । साथै, बारम्बार विग्रने गरेको प्रणालीले आपूर्ति सेवालाई अविश्वसनीय बनाएको छ । प्रभावकारी WTP, व्यवस्थित वितरण पाइपलाइनहरू, निरन्तर आपूर्ति सेवा र विस्तारित सेवा क्षेत्रहरूको प्रावधान मार्फत प्रस्तावित आयोजनाले विद्यमान खानेपानी आपूर्ति प्रणालीको अवस्था सुधार गर्ने अपेक्षा गर्दछ ।
४. एसियाली विकास बैंक तथा नेपाल सरकारको नीति अनुसार सबै परियोजनाहरूको वातावरणीय मूल्यांकन गर्न आवश्यक छ । एसियाली विकास बैंकद्वारा लगानी गरिएको आयोजनाहरूले सन् २००९ मा लागू गरिएको सुरक्षा नीति विवरण (SPS) को अनुपालन गरेको हुनुपर्छ जसले निम्न उल्लेखित बुँदाहरूको सुनिश्चितता तय गर्दछ :

- यी आयोजनाहरू वातावरणीय पक्षको हिसाबले राम्रो व्यवस्थामा रहेको छ ।

- यी आयोजनाहरूको सम्बन्धित नियामक आवश्यकताहरूको अनुपालन गर्दै सञ्चालन गर्नको लागि डिजाइन गरिएको छ ।
  - यी आयोजनाहरूले सम्भवतः कुनै उल्लेखनीय वातावरण, स्वास्थ्य वा सुरक्षा सम्बन्धि खतराहरू निम्त्याउने छैन ।
५. एसियाली विकास बैंकको REA चेकलिस्ट अनुसार प्रस्तावित आयोजना, प्रारम्भिक वातावरणीय परीक्षण मात्र आवश्यक पर्ने Category 'B' अन्तर्गत पर्दछ । नेपाल सरकारको वैधानिक आवश्यकता अनुसार प्रस्तावित आयोजनाले वातावरण संरक्षण ऐन, २०५३, वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको पालना गरेको हुनुपर्छ । प्रस्तावित आयोजना, वातावरण संरक्षण नियमावलीको अनुसूची १ को प्रारम्भिक वातावरणीय परीक्षण मात्र आवश्यक पर्ने भनेर उल्लेख गरिएको (ऐ) खानेपानी क्षेत्र अन्तर्गत पर्दछ । तसर्थ, प्रस्तावित आयोजनाले एसियाली विकास बैंक तथा नेपाल सरकार दुवैका नीति आवश्यकताहरू पूर्ति गर्दछ ।
६. प्रस्तावित आयोजनाले विद्यमान प्रणालीको दायरा भित्र समावेश नभएका इलाम नगरपालिकाको नयाँ क्षेत्रहरू (वडा नं ६ र ७ का सम्पूर्ण क्षेत्रहरू तथा वडा नं ८ र ९ का आंशिक क्षेत्रहरू)मा वितरण प्रणाली विस्तार गर्नेछ । यी क्षेत्रहरू इलाम नगरपालिकाको मुख्य क्षेत्रहरू हुन् जहाँ पानीको माग धेरै उच्च रहेको छ । नयाँ संरचनाहरूको निर्माणको प्रस्तावको साथै विद्यमान SSF को पुर्नस्थापना, विद्यमान WTP को वाटरप्रूफिंग र शिखरनगरमा अवस्थित ४ विद्यमान पानी टैंकीहरू नष्ट गरी नयाँ पानी टैंकीको निर्माण मार्फत प्रस्तावित आयोजनाले विद्यमान प्रणालीको पुर्नस्थापनाका कार्यहरू पनि समावेश गर्नेछ । तसर्थ, प्रस्तावित आयोजना विद्यमान खानेपानी प्रणालीको विस्तारित रूप हो । प्रस्तावित आयोजना पूर्णरूपमा ग्रेभिटि प्रणालीको रूपमा परिकल्पना गरिएको छ । यस आयोजनाको वितरण प्रणाली अन्तर्गत थोक वितरण प्रणाली (BDS) र घरायसी वितरण प्रणाली (DS) समावेश छन् । यस आयोजनाको सम्पूर्ण वितरण सञ्जालमा दशवटा रिजर्भोयर (पानी टैंकी) प्रणालीबाट खानेपानी आपूर्ति गर्दछ । यस आयोजनाका सबै पानी प्रशोधन केन्द्रहरूले मुख्य वितरणको भूमिका निर्वाह गर्दछ । प्रत्येक रिजर्भोयर (पानी टैंकी)को मागको व्यवस्थापन गर्नको निम्ति प्रत्येक उप प्रणालीको कुल आपूर्तिलाई यी दशवटा रिजर्भोयरहरूमा विभाजित गरिएको छ ।

#### आयोजनाको विवरण

७. यस आयोजनाको लागि राते खोला र मेवा खोला गरी दुई नयाँ स्रोत प्रस्ताव गरिएको छ । यसका साथै वर्तमान प्रणालीमा प्रयोग भइरहेको दुई स्रोतहरू गिताङ्ग खोला र भाँडी खोला पनि प्रस्तावित आयोजनामा प्रयोग हुनेछन् । तसर्थ, यस प्रस्तावित आयोजनामा जम्मा चारवटा इन्टेकहरू प्रयोग हुनेछन् । त्यस्तैगरी, प्रस्तावित आयोजनामा एउटा पानी प्रशोधन केन्द्र रहनेछन् जसअन्तर्गत राते खोला र मेवा खोलाका मार्गमा पर्ने दुईवटा नयाँ सेडिमेन्टेसन टैंकीहरू, विद्यमान WTP निर आठवटा HRF र एउटा पुर्नस्थापित विद्यमान स्लो स्यान्ड फिल्टर समावेश छन् । एनेक्स ६ मा दिइएको पानी गुणस्तर परीक्षणको परिणाम अनुसार गिताङ्ग खोला र भाँडी खोलाको पानीको गुणस्तर लगभग एउटा पुर्नस्थापित प्रशोधनको प्रावधान

केवल गिताङ्ग खोलाको लागि मात्रै प्रस्ताव गरिएको छ किनभने भाँडी खोला सुरक्षित मूल स्रोतको रूपमा रहेको र यस स्रोतलाई कुनै प्रशोधनको आवश्यकता नभएको हाम्रो अध्ययनले देखाएको छ । यसपछि, यस आयोजनामा ६ वटा नयाँ र चारवटा विद्यमान पानी टैकीहरु गरी लगभग दशवटा पानी टैकीहरु रहनेछन् । यी रिजरभोयरहरुको समग्र क्षमता लगभग १३९२.५० घ.मि. हुनेछन् । यस आयोजनाका मुख्य खानेपानी संरचनाहरुको रूपमा इन्टेक, ट्रान्समिसन पाइपहरु, पानी प्रशोधन केन्द्र, पानी टैकी, वितरण पाइपहरु, रिभर कसिङ्ग, निजी धारा, पाले घर, सिमाना पर्खाल, पूरक संरचनाहरु ( भल्भहरु, चेम्बरहरु, फ्लो मिटर र फायर हाइड्रेन्ट) र तीनवटा सार्वजनिक शौचालयहरु जस्ता संरचनाहरु समावेश छन् । त्यस्तैगरी, यस आयोजनामा जमिन आवश्यकता, उर्जा आवश्यकता, मानव संसाधन आवश्यकता, श्रम शिविर, निर्माण सामग्री सञ्चय क्षेत्र आदि जस्ता निर्माणाधीन आवश्यकताहरु पनि समावेश छन् । यस आयोजनाका लागि प्रस्ताव गरिएको सरसफाई सम्बन्धि संरचना अर्न्तगत धोबी धारा, टुँडिखेल र आर्दश कृषि बजार गरी तीन क्षेत्रहरुमा एक एक वटा सार्वजनिक शौचालयहरु समावेश छन् ।

### पद्धति

८. वातावरण संरक्षण नियमावली अनुसार यस प्रारम्भिक वातावरणीय परीक्षणका आधारभूत पद्धतिमा आयोजनास्थलबारे जानकारी हासिल प्राप्त गर्न लेख-रचनाहरुको समीक्षा र आयोजनास्थलको प्रत्यक्ष र अप्रत्यक्ष प्रभावकारी क्षेत्रहरुको भौतिक, साँस्कृतिक, रासायनिक, जैविक र सामाजिक अवस्थाहरुबारे आधारभूत जानकारी एकत्रित गर्न स्थलगत अध्ययन समावेश छन् । यस कार्यविधिमा सरोकारवालाबाट सल्लाह सुझाव प्राप्त गर्न कुनै पनि राष्ट्रिय अखबार दैनिकमा पन्ध्र दिने सार्वजनिक सूचना प्रकाशन पनि समावेश छन् । त्यसपछि, इच्छुक सरोकारवालाबाट सुझाव एकत्रित गर्न सार्वजनिक परामर्श गरिएको छ । यसका साथै प्रत्याशित प्रभावहरुको प्रतिकूलता निर्धारण गर्नको लागि साधारण चेकलिस्ट प्रक्रियामार्फत प्रभावहरुको पहिचान, पुर्वांनुमान र मूल्यांकन गरिएको छ । यस प्रारम्भिकवातावरणीय परीक्षणले अनुमोदित सन्दर्भका सर्तहरु (ToR) मा उल्लिखित प्रक्रियाहरुको पालना गरेको छ ।

### नीति, कानूनी र प्रशासनिक रुपरेखा

९. प्रारम्भिक वातावरणीय अध्ययनको अवधिमा प्रस्तावित आयोजना निर्माणका गतिविधिहरुले सम्बन्धित नीति तथा कानूनको अनुपालना गरेको छ कि छैन भनेर मूल्यांकन गर्नका निम्ति ती सम्बन्धित नीति, कानूनी र प्रशासनिक रुपरेखाको अध्ययनको आवश्यकता पर्दछ । यस आयोजनाको प्रारम्भिक वातावरणीय परीक्षणसँग सम्बन्धित मुख्य वातावरणीय ऐन, नियमहरु, योजना, नीतिहरु, दिशानिर्देशहरु निम्न उल्लिखित छन् :

क) प्रमुख कानून, ऐन तथा नियमहरु: i) नेपालको संविधान; ii) वातावरणीय संरक्षण ऐन, वि.सं २०५३ (ई.स. १९९७); iii) वातावरणीय संरक्षण नियमावली वि.सं २०५४ (ई.स. १९९७) र पाचौँ संशोधन वि.सं २०७३ (ई.स. १९९७)



ख) योजना, नीति तथा रणनीतिहरू : i) राष्ट्रिय वातावरणीय नीति तथा कार्य योजना, वि.सं २०५० (ई.स. १९९३); ii) जलस्रोत रणनीति, वि.सं २०५९ (ई.स. २००२); iii) ग्रामीण खानेपानी तथा सरसफाई नीति, तथा ग्रामीण खानेपानी तथा सरसफाई रणनीति, वि.सं २०६० (ई.स. २००४); iv) ग्रामीण खानेपानी तथा सरसफाई क्षेत्रीय रणनीतिक नीति, वि.सं २०६० (ई.स. २००४); v) राष्ट्रिय जल योजना, वि.सं २०६२ (ई.स. २००५); vi) राष्ट्रिय शहरी नीति, वि.सं २०६३ (ई.स. २००७) ; vii) राष्ट्रिय शहरी खानेपानी तथा सरसफाई क्षेत्रगत नीति, वि.सं २०६५ (ई.स. २००९); viii) साना शहर खानेपानी तथा सरसफाई क्षेत्रका लागि परिमार्जित पन्ध्र वर्षे विकास योजना, वि.सं २०६६ (ई.स. २००९ तथा २०१५ मा गरिएको संशोधन ); ix) राष्ट्रिय खानेपानी आपूर्ति तथा सरसफाई नीति (डाफ्ट), वि.सं २०७१ (ई.स. २०१४); x) राष्ट्रिय वन नीति, वि.सं २०७५ (ई.स. २०१९); xi) भु-उपयोग नीति, वि.सं २०७२ (ई.स. २०१५)

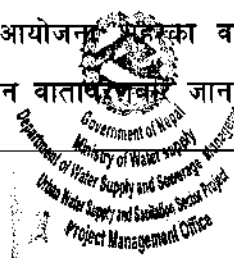
ग) कानून तथा ऐनहरू : i) आवश्यक वस्तु संरक्षण ऐन, वि.सं २०१२ (ई.स. १९५५); ii) जलचर संरक्षण ऐन, वि.सं २०१७ (ई.स. १९६१) तथा संशोधन वि.सं २०५५ (ई.स. १९९७); iii) शहरी विकास ऐन, वि.सं २०४५ (ई.स. १९९८); iv) जल स्रोत ऐन, वि.सं २०४९ (ई.स. १९९२); v) वन ऐन, वि.सं २०४९ (ई.स. १९९३); vi) भू-अतिक्रमण ऐन, वि.सं २०४९ (ई.स. १९९३); vii) बालश्रम निषेध तथा विनियमन ऐन, वि.सं २०५६ (ई.स. २००१); viii) खानेपानी व्यवस्थापन बोर्ड ऐन, वि.सं २०६३ (ई.स. २००६); ix) फोहोर मैला व्यवस्थापन ऐन, वि.सं २०६८ (ई.स. २०११); x) श्रम ऐन, वि.सं २०७४ (ई.स. २०१७) ; xi) स्थानिय सरकार सञ्चालन ऐन, वि.सं २०७४ (ई.स. २०१७)

घ) नियम तथा नियमावलीहरू : i) फोहोर मैला (व्यवस्थापन तथा स्रोत परिचालन) नियम, वि.सं २०४४ (ई.स. १९८७) तथा संशोधन वि.सं २०४९ (ई.स. १९९२); ii) जलस्रोत नियमावली, वि.सं २०५० (ई.स. १९९३); iii) खानेपानी नियमावली, वि.सं २०५५ (ई.स. १९९८); iv) फोहोरमैला व्यवस्थापन नियमावली, वि.सं २०७० (ई.स. २०१३); v) श्रम नियमावली, वि.सं २०७५ (ई.स. २०१८)

ङ) निर्देशिका तथा पुस्तिका : i) राष्ट्रिय वातावरणीय प्रभाव मूल्यांकन दिशानिर्देश, वि.सं २०४९ (ई.स. १९९३); ii) विश्व स्वास्थ्य संस्थाको वायु गुणस्तर दिशानिर्देश , वि.सं २०६१ (ई.स. २००५); iii) खानेपानी गुणस्तरका लागि विश्व स्वास्थ्य संस्थाको दिशानिर्देश, चौथो संस्करण, वि.सं २०७३ (ई.स. २०१७); iv) राष्ट्रिय ध्वनि मानक दिशानिर्देश, वि.सं २०६८ (ई.स. २०१२); v) सामुदायिक ध्वनिका लागि विश्व स्वास्थ्य संस्थाको दिशानिर्देश , वि.सं २०५५ (ई.स. १९९९) र vi) “राष्ट्रिय प्राथमिकता प्राप्त योजनाको लागि राष्ट्रिय वन क्षेत्र प्रयोग गर्ने सम्बन्धी कार्यविधि-२०७४”

### वर्तमान वातावरण

१०. प्रस्तावित आयोजनाका पूर्वानुमानित वातावरणीय प्रभावहरूप्रति यस आयोजनाका वातावरणीय पक्षहरूको संवेदनशीलताको पहिचान गर्न यस आयोजना शहरको वर्तमान वातावरणीय जानकारी लिन



आवश्यक पर्दछ । यसै सन्दर्भमा, डेस्क अध्ययनको क्रममा साहित्य समीक्षाको माध्यममार्फत वर्तमान वातावरणको द्वितीयक जानकारी प्राप्त गरिएको छ । यद्यपि, प्रारम्भिक वातावरणीय परीक्षणका लागि यी माध्यमिक तहको जानकारी पर्याप्त भन्ने छैन । तसर्थ, वर्तमान वातावरणीय अवस्थाबारे प्राथमिक जानकारी एकत्रित गर्न स्थलगत अध्ययन गरियो ।

११. यसै सन्दर्भमा स्थलगत अध्ययनको समयमा क) भौतिक वातावरणीय पक्ष अन्तर्गत स्थलाकृति, भूमि जमिन प्रयोगको वर्गीकरण, भूविज्ञान, जलस्रोतहरु, जलवायु, वायुको गुणस्तर, ध्वनिक वातावरण, भुक्षय संवेदनशीलता; ख) जैविक वातावरण अन्तर्गत वनस्पति, वन्यजन्तु संरक्षित क्षेत्र, सामुदायिक वन क्षेत्र; जस्ता बारे आवश्यक विवरणहरु साधारण चेकलिस्ट, REA चेकलिस्ट, विशेषज्ञ निर्णय तथा स्थानिय एवं सम्बन्धित निकाय सँगको अन्तर्क्रिया मार्फत संकलन गरियो । आयोजना क्षेत्रभित्र कुनै पनि संरक्षित क्षेत्र तथा सामुदायिक वन क्षेत्रहरु अवस्थित नरहेको स्थलगत अध्ययनको क्रममा देखिएको छ ।
१२. त्यस्तैगरी, प्रस्तावित आयोजनामा प्रयोग हुने जलस्रोतहरुको पानीको गुणस्तरबारे विवरण संकलन गर्न पानीको नमुना संकलन गरी स्वीकृति प्राप्त प्रयोगशालामा परीक्षण गरियो । यस परीक्षणले गिताङ्ग खोला, भाँडी खोला, राते खोला र मेवा खोला बाट संकलित पानीको नमुनामा सबै आवश्यक प्यारामिटरहरु राष्ट्रिय खानेपानी गुणस्तरको मापदण्ड भित्र रहेको देखाएको छ ।
१३. स्थलगत अध्ययनको क्रममा, सामाजिक आर्थिक वातावरण अन्तर्गत जनसांख्यिक विशेषताहरु, जाति/जातिय समूह, आर्थिक विशेषताहरु, शिक्षा तथा सीप, सामुदायिक पूर्वाधारहरु इत्यादि सम्बन्धि विवरणहरु साधारण प्रश्नावली प्रक्रिया हुँदै घरधुरी सर्वेक्षण र स्थानिय सँगको अन्तर्क्रिया मार्फत संकलन गरियो । यसै सन्दर्भमा पानीको मासिक महसुल तिर्ने सम्बन्धि तत्परता, अग्रिम नगद योगदानका लागि तत्परता र तिर्ने सक्ने क्षमता बारे पनि मूल्यांकन गरियो । नमुना घरधुरी सर्वेक्षण अनुसार १४० नमुना घरधुरी मध्ये १००% ले नै र २७९८ घरधुरी मध्ये ९८.०३% ले कमशः पानीको मासिक पानीमहसुल तिर्ने सम्बन्धि र अग्रिम नगद योगदान सम्बन्धि इच्छुकता व्यक्त गरेका छन् । यसले यस आयोजना शहरका बासिन्दाहरुको विद्यमान पानीको गंभीर समस्याबाट छुटकारा पाउन प्रस्तावित आयोजनाको चाहनालाई संकेत गर्दछ । त्यस्तैगरी, सर्वेक्षणले २७९८ घरधुरी मध्ये ७.७% (२१५) घरधुरीहरु विपन्न वर्ग अन्तर्गत रहेको देखाएको छ भने १०.५०% (२९३) घरधुरीले प्रति महिना रु.७,५००.०० भन्दा कम खर्चिने गरेको देखाएको छ । तसर्थ, यसले मासिक आय र व्यय स्तरको आधारमा प्रस्तावित आयोजनाको लागि समुदायको सामर्थ्यताको संकेत गर्दछ ।

### वैकल्पिक विश्लेषण

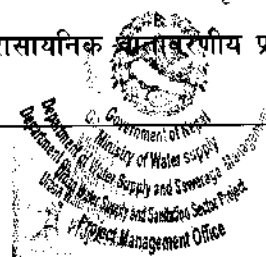
१४. प्रस्तावित आयोजनाको वैकल्पिक विश्लेषण, यस प्रारम्भिक वातावरणीय परीक्षणको अर्को मुख्य प्रक्रिया हो जसले प्राविधिक, वातावरणीय तथा सामाजिक पक्षहरुको सन्दर्भमा यस आयोजनाको सम्भाव्यताको परीक्षण गर्न मद्दत पुर्याउँछ । मुख्यतय, यस प्रक्रिया अन्तर्गत “आयोजना विना” विकल्प र “आयोजना सहित” विकल्प जस्ता दुई विकल्पहरु समावेश गरिएका छन् । निरन्तर खानेपानी प्रणाली, प्रशोधन प्रणाली तथा पानीजन्य रोगप्रतिको संवेदनशीलताको सन्दर्भमा “आयोजना विना” विकल्पको सीमितताले

“आयोजना सहित” विकल्पको छनौट तर्फ उन्मुख गराएको छ । प्रस्तावित आयोजनाका सम्भावित फाइदाहरूको मनन मार्फत “आयोजना सहित” विकल्पको विश्लेषण गरिएको छ । आधार वर्ष २०१९ को अनुसार २१,४३३ जनसंख्यामा विश्वसनीय, पर्याप्त, सुरक्षित र पिउन योग्य खानेपानीको सुविधाजनक पहुँच प्रदान गर्न प्रस्तावित आयोजना डिजाइन गरिएको यस वैकल्पिक विश्लेषणले देखाएको छ । यस आयोजनामा RVT १ र सानो पाले घरको निर्माणको लागि गुम्बा डाँडा सामुदायिक वनको १५० वर्ग मिटर जति क्षेत्रफलको आवश्यक पर्दछ । यस “आयोजना सहित” विकल्पको विश्लेषणको अवधिमा आयोजनाका यी संरचनाहरूको निर्माणका लागि यो सामुदायिक वन क्षेत्रको प्रयोगलाई परहेज गर्न सकिन्छ कि सकिदैन भनेर निर्धारण गर्नका लागि “विना वनको” विकल्पको बारे पनि अध्ययन गरियो। सामुदायिक वन क्षेत्र समावेश नभएको अन्य सम्भावित विकल्पहरू नभएको यस अध्ययनले देखाएको छ।

१५. प्रस्तावित आयोजनाको डिजाइनको लागि तीनवटा विकल्पहरू प्रस्ताव गरिएको यस “आयोजना सहित” विकल्पको विश्लेषणले देखाएको छ । समान सेवा क्षेत्रहरू र WTP देखि वितरण सञ्जाल सम्म समान संरचनाहरूका साथै यी तीन विकल्पहरू ग्रेभिटी प्रणाली सँग सम्बन्धित हुन् । यी सबै तीन विकल्पहरू प्राविधिक, वातावरणीय एवं सामाजिक रूपमा सम्भाव्य रहेको यस वैकल्पिक विश्लेषणले देखाएको छ । भिन्ना भिन्नै ट्रान्समिसन पाइपलाइन सहित भिन्ना भिन्नै स्रोतहरूको प्रयोग नै यी तीन विकल्पहरू बीचको प्रमुख भिन्नता हो । यस “आयोजना सहित” वैकल्पिक विश्लेषण अन्तर्गत डिजाइन जनसंख्यालाई सेवा प्रदान गर्न सक्ने सबैभन्दा लागत प्रभावकारी, विश्वसनीय र प्रभावकारी प्रणालीको मुल्यांकन समावेश छन् । यस विश्लेषणले विकल्प २ को पूँजीगत लागत अन्य दुई विकल्पहरू भन्दा कम रहेको देखाएको छ। तसर्थ, यस आयोजनाको लागि सर्वोत्तम विकल्पको रूपमा विकल्प २ लाई छनौट गरिएको छ जस अन्तर्गत दुई विद्यमान स्रोतहरू ( गिताङ्ग खोलाबाट १६ लिटर प्रति सेकेण्ड र भाँडी खोलाबाट ४ लिटर प्रति सेकेण्ड) र दुई नयाँ स्रोतहरू ( राते खोलाबाट १० लिटर प्रति सेकेण्ड र मेवा खोलाबाट १० लिटर प्रति सेकेण्ड) समावेश छन् ।

#### पूर्वानुमानित वातावरणीय प्रभावहरू

१६. स्थलगत अध्ययनको अवधिमा एकत्रित गरिएको जानकारीहरूको गरिएको विश्लेषणले प्रस्तावित आयोजनाको परिणामस्वरूप देखिने प्रत्याशित वातावरणीय प्रभावहरूको पहिचान तथा पूर्वानुमान गर्न मद्दत पुर्याउँछ । राष्ट्रिय वातावरणीय प्रभाव मुल्यांकन निर्देशिका, ई. सं. १९९३ अनुसार तय गरिएको स्कोरिङ म्याट्रिक्स प्रयोग गरी यी अनुमानित प्रभावहरूको प्रकृति, सीमा र परिमाण निर्धारण गर्न यी प्रभावहरूको मुल्यांकन गरियो । यो मुल्यांकनले प्रत्येक प्रभावका लागि उपयुक्त न्यूनिकरण विधि प्रस्ताव गर्न थप मद्दत गर्नेछ ।
१७. यी प्रत्याशित वातावरणीय प्रभावहरूलाई मुख्यतय यिनका नकरात्मक र सकारात्मक महत्वको आधारमा दुई भागमा वर्गीकृत गरिएको छ : क) लाभदायी प्रभाव र ख) प्रतिकूल प्रभाव । यी वर्गीकृत गरिएको प्रभावहरूलाई वर्तमान वातावरणमा पर्ने असरहरूको आधारमा थप चार प्रभावहरूमा वर्गीकृत गरिएको छ: क) भौतिक वातावरणीय प्रभाव ख) जैविक वातावरणीय प्रभाव ग) रासायनिक वातावरणीय प्रभाव र घ)



सामाजिक आर्थिक वातावरणीय प्रभाव । यी चार प्रभावहरूलाई आयोजनाको चरण अनुसार पुन तीन भागमा विभाजन गरिएको छ, जस अर्न्तगत क) डिजाइन चरण, ख) निर्माण चरण र ग) सञ्चालन चरण समावेश छन् ।

१८. यहाँ लाभदायिक प्रभावहरू अर्न्तगत रोजगार श्रृजना, क्षमता अभिवृद्धि, स्थानीय व्यापार तथा व्यापारिक अवसरहरू, सुधिएको स्वास्थ्य तथा सरसफाई, आर्थिक अवसरहरूमा वृद्धि, महिला सशक्तिकरण जस्ता प्रभावहरू समावेश छन् । त्यस्तैगरी, भूक्षय, ध्वनि प्रदुषण, वायुमा पर्ने प्रभाव, सतही पानीको गुणस्तरमा पर्ने प्रभाव, निर्माण क्षेत्र एवं श्रमिक शिविर बाट फोहोर मैला एवं फोहोर पानीको उत्पन्न, भण्डारण गरिएको ईन्धन/रसायनको आकस्मिक चुहावट, जमिन प्रयोगको वर्गीकरणमा पर्ने प्रभाव, प्राकृतिक ढल निकासमा अवरोध, भत्काइएका अवशेष बाट निस्किएका फोहोरको अनुचित ढँगबाट गरिएको विघटनको प्रभाव, खोला नालामा पर्ने प्रभाव, वनस्पति तथा वन्यजन्तुमा पर्ने प्रभाव, जलचरमा पर्ने प्रभाव, वन डढेलो, वन अतिक्रमण, नजिकैको नदीनालाको पानीको गुणस्तरमा पर्ने प्रभाव, रिजरभोयरमा भण्डारण गरिएको पानीको गुणस्तरमा पर्ने प्रभाव, संरचनात्मक अस्थिरता, सामुदायिक स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरू, हाल प्रदान भइरहेको सुविधाहरूमा हुनसक्ने क्षति, ट्राफिक जाम, स्थानिय विक्रेताको व्यवसायमा अवरोध, पेशागत स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरू, असुरक्षित खानेपानीको वितरण, आयोजनाका कार्यहरूको दिगोपनमा पर्ने प्रभाव इत्यादि जस्ता प्रभावहरू प्रतिकूल प्रभाव अर्न्तगत समावेश छन् ।

#### न्यूनिकरण तथा वृद्धि-विकासका उपायहरू

१९. माथि उल्लिखित प्रत्येक प्रत्याशित प्रतिकूल वातावरणीय प्रभावहरूको न्यूनिकरण तथा लाभदायिक प्रभावहरूको वृद्धि-विकासका उपायहरूको प्रस्ताव गरिएको छ । यी उपायहरू अर्न्तगत मुख्यतः भिरालो ठाउँहरूको सुरक्षाका उपायहरू, वायु गुणस्तर अनुगमन, ध्वनि गुणस्तर अनुगमन, फोहोर मैला व्यवस्थापन, शीघ्र माटो पुर्ने, इन्धन तथा रसायनको उचित व्यवस्थापन, श्रमिक तथा सामुदायिक स्वास्थ्य एवं सुरक्षा सम्बन्धि हुनसक्ने खतराहरू सम्बन्धि चेतनामूलक कार्यक्रमहरूको सञ्चालन, पानी प्रशोधन प्रणालीको अनुगमन, क्लोरिनको उचित व्यवस्थापन इत्यादि जस्ता उपायहरू समावेश छन् । यी उपायहरू अध्याय ८ मा विस्तारमा वर्णन गरिएको छ । यदि यी प्रस्तावित विधिहरू उचित ढंगले अपनाउने हो भने आयोजनाको निर्माण तथा सञ्चालन चरणमा कुनै उल्लेखनीय वातावरणीय समस्याहरूको सामना गर्नुपर्ने छैन । त्यस्तैगरी, प्रस्तावित आयोजनाका प्रत्याशित लाभदायिक प्रभावहरूलाई अबै माथि उकास्नको निम्ति विभिन्न उपयुक्त वृद्धि-विकासका उपायहरूको पनि प्रस्ताव गरिएको छ ।

#### सूचना प्रवाह, परामर्श तथा सहभागिता

२०. हितग्राहीहरु सँगको परामर्श तथा सामुदायिक सहभागिता यस आयोजनाको तयारीको क्रममा अपनाइने महत्वपूर्ण प्रक्रिया हो । यो सरोकारवाला तथा प्रभावित व्यक्तिहरुलाई संलग्न गराउने प्रक्रिया हो । यस प्रक्रियामा प्रमुख सूचनादातासँगको अर्न्तवार्ता, सम्बन्धित उपभोक्ता समितिसँगको स्थलगत छलफल तथा उपभोक्ताहरु सँग गरिने स्थलगत छलफल जस्ता प्रक्रियाहरु समावेश छन् । उपभोक्ताहरु सँगको परामर्श अघि सम्भावित उपभोक्ताहरु र आयोजना कार्यान्वयनप्रति यिनको भूमिकाको पहिचान गर्नको निम्ति उपभोक्ता विश्लेषण र म्यापिङ (चित्रण) गरिन्छ । यस पश्चात् आयोजना सम्बन्धि सूचना प्रवाह गर्न, उपभोक्ताहरुको सुझाव तथा सल्लाह संकलन गर्न र आयोजनाप्रति उनीहरुले देखाएका चासोका विषयहरुलाई जोड दिन यी सम्भावित उपभोक्ताहरुलाई परामर्शमा संलग्न गराइन्छ । उपभोक्ताहरु सँगको परामर्शका प्रक्रियाहरु यस आयोजनाको निर्माण तथा सञ्चालनको अवधिभरी जारी रहनेछ । उपभोक्ताहरुको संलग्नतालाई सहज बनाउन आयोजना व्यवस्थापन कार्यालय (PMO) तथा कार्यान्वयन केन्द्रिय समूह (ICG) ले सम्बन्धित उपभोक्ता समिति र नगरपालिकासँग राम्रो सञ्चार तथा सहकार्य कायम गर्नेछ ।

#### गुनासो सुनवाई संयन्त्र

२१. यस आयोजनाले निम्त्याएको अप्रत्याशित सामाजिक तथा वातावरणीय असरहरुप्रति भएका गुनासाहरुको समाधानको खोजी गरिरहेका सम्बन्धित व्यक्तिमा केन्द्रित रहेको यस आयोजनाको अर्को अत्यावश्यक प्रक्रियाको रूपमा गुनासो सुनवाई संयन्त्र (GRM) रहेको छ । यस संयन्त्र मुख्य हितग्राहीहरु सँग गरिएको परामर्शबाट विकास गरिएको हो जसले निम्न उल्लिखित बुँदाहरुको सुनिश्चितता जनाउनेछ :

➤ यस आयोजनाले निम्त्याएको प्रतिकूल सामाजिक तथा वातावरणीय प्रभावहरुबाट पीडित हरेक व्यक्तिको आधारभूत अधिकार र चासोको सुरक्षा

➤ ती व्यक्तिहरुको समस्यालाई समयमै प्रभावकारी ढङ्गले सम्बोधन गर्ने

यस संयन्त्र अन्तर्गत नगरपालिकाको स्तरमा गुनासो सुनवाई समितिको गठन समावेश छन् । यी गठन गरिएको समितिमा निम्न उल्लिखित सदस्यहरु समावेश गरिने छन् :

क) उपभोक्ता समितिको सचिव

ख) क्षेत्रिय आयोजना व्यवस्थापन कार्यालयको इन्जिनियर

ग) क्षेत्रिय आयोजना व्यवस्थापन कार्यालयको सामाजिक/वातावरण अधिकारी

घ) पीडित पक्षका तर्फबाट एक प्रतिनिधि

ङ) क्षेत्रिय डिजाइन, निरीक्षण र व्यवस्थापन परामर्शदाताकोबाट सुरक्षा विद (सामाजिक/वातावरणीय सम्बन्धित विशेषज्ञ)

च) अतिथिको रूपमा आयोजना क्षेत्रमा सक्रिय कुनै प्रतिष्ठित एवं प्रसांगिक समुदायमा आधारित संस्था(CBO)/स्वयं सहायता समुह (SHG) को एक प्रतिनिधि

छ) ठेकेदारको प्रतिनिधि

*[Signature]*



### वातावरणीय व्यवस्थापन योजना

२२. वातावरणीय व्यवस्थापन योजनाको तयारी तथा यसको कार्यान्वयन, प्रारम्भिक वातावरणीय परीक्षणको अर्को अत्यावश्यक प्रक्रिया हो । यस योजनाको मूल उद्देश्य भन्नु नै आयोजनाका गतिविधिहरू विना क्षति जिम्मेवार ढँगले भइरहेको सुनिश्चित गर्नु हो । त्यस्तैगरी, यस योजनाका अरु उद्देश्यहरू निम्न उल्लिखित छन् :
- क) स्थलगत वातावरणीय गतिविधिको निगरानीको लागि सक्षम बनाउन एक सक्रिय , सम्भाव्य र व्यावहारिक उपकरण प्रदान गर्नु;
  - ख) यस आयोजनाका लागि गरिएको वातावरणीय गतिविधिहरूका खोज तथा सिफारिशहरूको कार्यान्वयनलाई मार्गदर्शन र नियन्त्रण गर्ने ;
  - ग) यस आयोजनाको वातावरणीय प्रभावहरूको न्यूनिकरण गर्न सहयोग पुर्याउनका लागि आवश्यक देखिएका विशेष कार्यहरू विस्तार गर्ने तथा लाभदायिक प्रभावहरूको वृद्धि गर्ने, र
  - घ) सुरक्षा सम्बन्धि दिइएका सिफारिशहरूको अनुपालना गरिएको सुनिश्चित गर्ने ।
२३. यस आयोजनाका लागि तयार पारिएको स्थानिय स्तर निगरानी तथा प्रत्यासित प्रभावको न्यूनिकरणको कूल अनुमानित लागत रु.१,५००,०००.०० रहेको छ ।

### अनुगमन तथा रिपोर्टिङ

२४. यस आयोजनाको वातावरणीय गतिविधिको निगरानी र रिपोर्टिङका लागि आयोजना व्यवस्थापन कार्यालय (PMO) र क्षेत्रिय आयोजना व्यवस्थापन कार्यालय (RPMO) जिम्मेवार रहनेछ । RPMOले PMO समक्ष मासिक निगरानी र कार्यान्वयनको प्रतिवेदन पेश गर्नेछ भने तदनुसार PMO ले आवश्यक भएमा उचित कदम चाल्नेछ । यस पश्चात् PMO ले एसियाली विकास बैंक समक्ष अर्द्ध वार्षिक निगरानीको प्रतिवेदन पेश गर्नेछ । कानूनी कागजातमा सम्झौता भएअनुसार खानेपानी मन्त्रालयले गरेको प्रतिवद्धताको लेखाजोखा गर्न एसियाली विकास बैंकले आयोजनाको गतिविधिहरूको समीक्षा गरिनेछ । आयोजना सम्पन्न प्रतिवेदन जारी नभएसम्म एसियाली विकास बैंकले आयोजनाको निगरानी गर्नेछ । यसका साथै नेपाल सरकार अन्तर्गत रहेको खानेपानी मन्त्रालय एवं वन तथा वातावरण मन्त्रालयले आयोजना प्रदर्शनको समीक्षा गर्न, प्रसांगिक स्थलगत भ्रमणका माध्यमबाट अनुगमन कार्य पनि गर्नेछ ।

### निष्कर्ष

२५. निष्कर्षमा, प्रारम्भिक वातावरणीय परीक्षण अध्ययनले यस प्रस्तावित आयोजना वातावरणीय हिसाबले गम्भीर प्रकृतिको नभएको देखाएको छ । प्रस्तावित आयोजना र यसका संरचनाहरू वातावरणीय हिसाबले संवेदनशील क्षेत्रभित्र वा वरपर अवस्थित छैनन् । साथै, निर्माणको कममा सामना गर्नुपर्ने केही प्रतिकूल प्रभावहरू (सम्भावित अधिकतम निर्माण अवधिमा देखापर्ने) अस्थायी र छोटो अवधिका छन् । प्रस्तावित आयोजनाले निम्न उल्लिखित फाइदाहरू दिलाउने छन् :

- क) सुरक्षित र पिउन योग्य पानीको विश्वसनीय आपूर्तिमा पहुँच,

- ख) उचित सरसफाई र स्वच्छताको अभ्यासमा उन्नति र स्वास्थ्य एवं सुरक्षा जोखिममा कमी,
- ग) वर्षौंदेखि निरन्तर खानेपानी आपूर्तिकालागि भोग्नुपरेको कठिनाई बाट मुक्ति र
- घ) परिणामको स्वरूप परिस्कृत सामुदायिक स्वास्थ्य , सुधारिएको जीवन स्तर र सुरक्षित समुदाय

२६. तसर्थ, यस आयोजनाले कुनै उल्लेखनीय नकरात्मक प्रभावहरु ननिम्त्याएको र एसियाली विकास बैंकद्वारा गरिएको वर्गीकरण अनुसार प्रस्तावित आयोजना Category 'B' अन्तर्गत पर्ने र वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको अनुसूचि-१ लाई अनुपालन गरेको देखिएको छ । २००९ मा लागू गरिएको सुरक्षा नीति विवरण (SPS) तथा वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको अनुपालन गर्न कुनै विशेष अध्ययन वा वातावरणीय प्रभाव मूल्यांकन (EIA) को आवश्यकता नभएको यस प्रारम्भिक वातावरणीय परीक्षण अध्ययनले निष्कर्ष निकालेको छ ।

## 1. INTRODUCTION

### 1.1. Background

1. In 2000, the Government of Nepal (GoN) endorsed the 15-year Development Plan for Small towns Water Supply and Sanitation to improve health and economic and environmental living conditions of people in small towns in Nepal. The Plan adopts a community managed demand responsive approach, where the community is involved in all aspects of planning and implementation of its town's project. In support of GoN's endeavor, the Asian Development Bank (ADB) funded the Small Towns' Water Supply and Sanitation Sector Project (STWSSSP) in 2001-2008. Twenty-nine (29) small towns of about 570,000 people benefitted from the improved water supply and sanitation services delivered under the Project. The positive impacts of STWSSSP led GoN to embark on the Second Small Towns' Water Supply and Sanitation Sector Project (2ndSTWSSSP), also financed by ADB and which benefitted another twenty-one (21) small towns. Following these two projects, the Third Small Towns' Water Supply and Sanitation Sector Project (TSTWSSSP) has been implemented to support further GoN's continuing efforts to improve water supply and sanitation service delivery in small towns in Nepal. 26 small towns were benefitted by this TSTWSSSP. The Project follows the government's 15-year Development Plan, as updated in 2009, to develop the water and sanitation sector for small towns. Hence, ADB has supported the government in improving WSS services in 70 of the 176 small towns in Nepal through three earlier projects.
2. Subsequently, ADB and GoN are working together to provide water supply and sanitation services to selected urban municipalities of Nepal through Urban Water Supply Sanitation (Sector) Project (UWSSSP) in accordance with the updated 15-year Development Plan for Small Towns and the National Urban Development Strategy. The Project will support Nepal in expanding access to community managed water supply & sanitation in 20 project municipalities by drawing on experiences and lessons from three earlier projects funded by ADB. UWSSSP will be implemented over a five-year period (indicative implementation period is 2018 to 2023) and will be supported through ADB financing using a sector lending approach. This project has the following outputs: i) Improved Water Supply and Sanitation Infrastructure in Project Municipalities and ii) Strengthened Institutional and Community Capacities.

**1.2. Name and Address of the Individual Institution Preparing the Report**

**Name of the Proposal**

3. The Name of the Proposal is Ilam Water Supply and Sanitation Project

**Name and Address of the Proponent**

4. The Project proponent, Urban Water Supply and Sanitation (Sector) Project (UWSSP) of the Government of Nepal, Department of Water Supply and Sewerage Management (DWSSM), Ministry of Water Supply (MoWS), is responsible for the preparation of IEE Report.

**Name of Proponent**

Project Management Office

Urban Water Supply and Sanitation (Sector) Project

Department of Water Supply and Sewerage Management (Implementing Agency)

Ministry of Water Supply (Executive Agency)

Government of Nepal

**Address of the Proponent:**

Panipokhari, Kathmandu

Tel: 977 1 442388, 977 1 4412348

Fax: 977 1 4413280

E-mail: [info@stwsssp.gov.np](mailto:info@stwsssp.gov.np)

Website: [www.sstwsssp.gov.np](http://www.sstwsssp.gov.np)

**Consultant Preparing the Report**

TAEC Consultant P. Ltd. / Integrated Consultants Nepal Pvt. Ltd. JV

Shankhamul, Kathmandu

Tel: 977 1 5242846

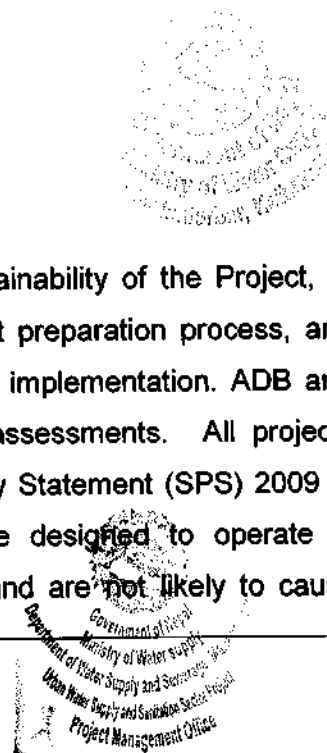
Fax: 977 1 5242553

E-mail: [taec@mos.com.np](mailto:taec@mos.com.np)

Website: [www.taecconsult.com.np](http://www.taecconsult.com.np)

**1.3. Purpose of IEE**

5. IEE was conducted to ensure the environmental sustainability of the Project, to integrate environmental considerations into the Project preparation process, and provide for environmental management during Project implementation. ADB and GoN require all projects to undergo environmental assessments. All projects funded by ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause



significant environmental, health, or safety hazards. The rapid environmental assessment using ADB's REA Checklist has indicated that the Project is a Category B undertaking, requiring IEE. On the GoN side, the statutory requirement that has to be adhered to is the Environment Protection Act (1997), and Environment Protection Rules (1997) and as amended in 1999, 2007 & 2016). Based on EPR Schedule 1, the Project is within the threshold of activities under the water supply and sanitation sector that will require IEE. This IEE fulfills the policy requirements of both ADB and GoN.

6. The IEE Report primarily: (i) provides information on the Project and its environmental requirements; (ii) provides the necessary baseline conditions of the physical, ecological, cultural and socio-economic environments and/or resources in and surrounding the Project's area of influence; (ii) identifies and assesses potential impacts arising from the implementation of the Project on these environments and/or resources; (iii) recommends measures to avoid, mitigate, and compensate for the adverse impacts; (iv) presents information on stakeholder consultations and participation during Project preparation (v) recommends a mechanism to address grievances on the environmental performance of the Project; and (vi) provides an environmental management plan. Relevant reports/documents, consultations with communities are included in the report, and reference to relevant government policies, laws and regulations and mainly the Terms of References (ToR) approved by MoWS.

#### **1.4. Need for the Project**

7. The existing water supply system is not able to meet even the current demand of Ilam municipality. The supply system is intermittent with about 1.5 hrs in a day. It is estimated that current water availability is only about 24 liters per day. However, considering the leakage & wastage, the actual availability may be much lower than this, which however was not measured.
8. According to five years periodic plan in 2010 prepared by Ilam Municipality, all wards have prioritized water supply as the topmost amenity to be provided for the Ilam municipality.
9. Being the district headquarters, the rental population of this project town constitutes more than half of the permanent population. Almost all district level government offices including security agencies are located in this service area. The city is quite popular among the domestic tourists. This indicates significant institutional &

- commercial demand of water. Shortage of water is a major constraint to further growth.
10. Regarding this, as per the detailed design of the proposed project, domestic consumption at ultimate demand i.e., 100 lpcd has been considered as the proposed project aims to provide safe & reliable water to each HH. This nodal demand also includes the institutional demand, commercial demand and wastage & leakage. Here, the institutional demand consists of water demand pertaining to institutions like schools & colleges. Similarly, the commercial demand consists of water demand pertaining to army barracks, police posts, hotels, lodges, factories, government and non-government offices. Hence, all the parts that includes Residential, Commercial, Institutional along with anticipated wastage & leakage issues within the service area has been covered under the scope of the proposed project.
11. The existing system has a design, construction, and operation & maintenance deficiencies and requires upgrading and rehabilitation to meet the growing demand. Considering the water demand and condition of existing system, there is a need for a project to upgrade the existing water supply situation in the service area to meet growing demand for private connections and to make drinking water available to the people of service area throughout the year.
- 1.5 Rationale of the Project**
12. The rationale of the project is based on the increasing demand of the reliable project, hardship of people for safe drinking water, willingness to pay, affordability, public health impacts, policy commitments and various other aspects. This all will be discussed in the following chapters.
13. The proposed water supply and sanitation project is needed to be studied from the environmental point of view as per EPA 1997 A.D. and EPR 1997 A.D., 2054 B.S. (Amendments 1999 A.D., 2007 A.D. & 2016 A.D.). The Proposed Water Supply and Sanitation Project is intended to serve drinking water in wards 6 & 7 (fully) and wards 8 & 9 (partially). The project is expected to benefit a base year population of about 39,860 populations (2019) & a design population of 28,172 (2039) by providing a reliable and adequate supply of safe & potable water, promotion of good hygiene and sanitation practices.
14. The proposed project shall use surface water sources. The Project will not involve the construction of any tunnels; relocation of people or households, settlement plan above the gravity source and construction of river training works. As the proposed

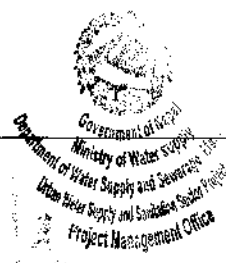
project falls within the definitions provided in Schedule 1-Clause H of EPR 1997 (Amendments 1999, 2007 & 2017) for drinking water sectors; only an IEE shall be necessary. The regulation stated in Schedule 1-Clause H shall only be applicable if the proposal does not fall under the category (A) through Clause H of Schedule 2.

15. The following given table gives the brief details on fulfillment of the criteria for the requirement of IEE as per Schedule 1-Clause H of Environmental Protection Regulations 1997 with latest amendments 2017, by the proposed project.

**Table 1: Criteria for Requirement of IEE for Drinking Water Supply Projects as per Schedule 1 (Clause H) of Environment Protection Regulation 1997 with Latest Amendments 2017**

| S.N. | Condition described in the Act and Regulations                                               | IEE Required as per the Regulation Schedule 1 (Clause H)        | Conditions in the Project                                                                                                                                                                                                |
|------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Supply of water in dry season from surface water with a safe yield of                        | Up to 1 cusec and utilizing up to 50% of the available quantity | Within the Limit (The proposed existing sources Bhandi Khola & Gitang Khola has safe yield of 5 & 16 lps while new sources Rate Khola & Mewa Khola have safe yield 13 to 15 lps which is within 1 cusec i.e., 28.32 lps) |
| 2    | Processing of Water Treatment                                                                | More than 25 liters per sec                                     | Within the limit (Total Capacity of all WTPs is 41 lps.)                                                                                                                                                                 |
| 3    | Connection of New Source to supply water to existing water supply system for a population of | 10,000 – 100,000                                                | About 21,433 populations (2019) & design populations of 30,325 populations (2039).                                                                                                                                       |

Source: EPR, 1997 (Latest Amendments) & DEDR, 2018



## 2 DESCRIPTION OF THE PROJECT

### 2.1 Location & Accessibility

16. The Project area of Ilam Water Supply and Sanitation Project lies in Ilam Municipality, Ilam District, a hilly district in the Province 1 of Eastern Nepal.
17. Geographically, the project area lies in the hilly region which is mostly known as Mahabharata Range at 26°54'00" N latitude and 83°56'25" E longitude with altitudes ranging from an elevation of 401m above mean sea level (amsl) at the riverbed to 1407m amsl at the top of Ilam hill. The main Ilam Bazaar lies at an altitude of 1228m amsl.
18. The term "Ilam" itself describes its topography as the word "Ilam" comprises two words derived from Limbu language – "I" (winding) and "Lam" (Way) which means winding way. The topography of Ilam is such that it has several winding paths crisscrossing on the way. The project town was declared as Ilam Municipality in 1958 A.D. During Panchayat system (1960 A.D.) Ilam municipality was renamed as Ilam Nagar Panchayat. It was again renamed as Ilam Municipality in 1990 after the abolition of Panchayat System. In 2015, with the new constitution of Nepal, new Ilam municipality was reformed by merging former neighbouring four VDCs i.e., Godak, Soyak, Barbote, part of Maipokhari, Sumbek, Puwamajhuwa, part of Sangrumba, part of Siddhithumka and Sakhejung VDCs with former Ilam Municipality.
19. This *figure 1* below shows that the project area belongs to Ilam Municipality of Ilam District of Province 1 of Nepal. The proposed project covers complete area of ward no.6 & 7 and partial area of ward number 8 & 9 of Ilam Municipality.

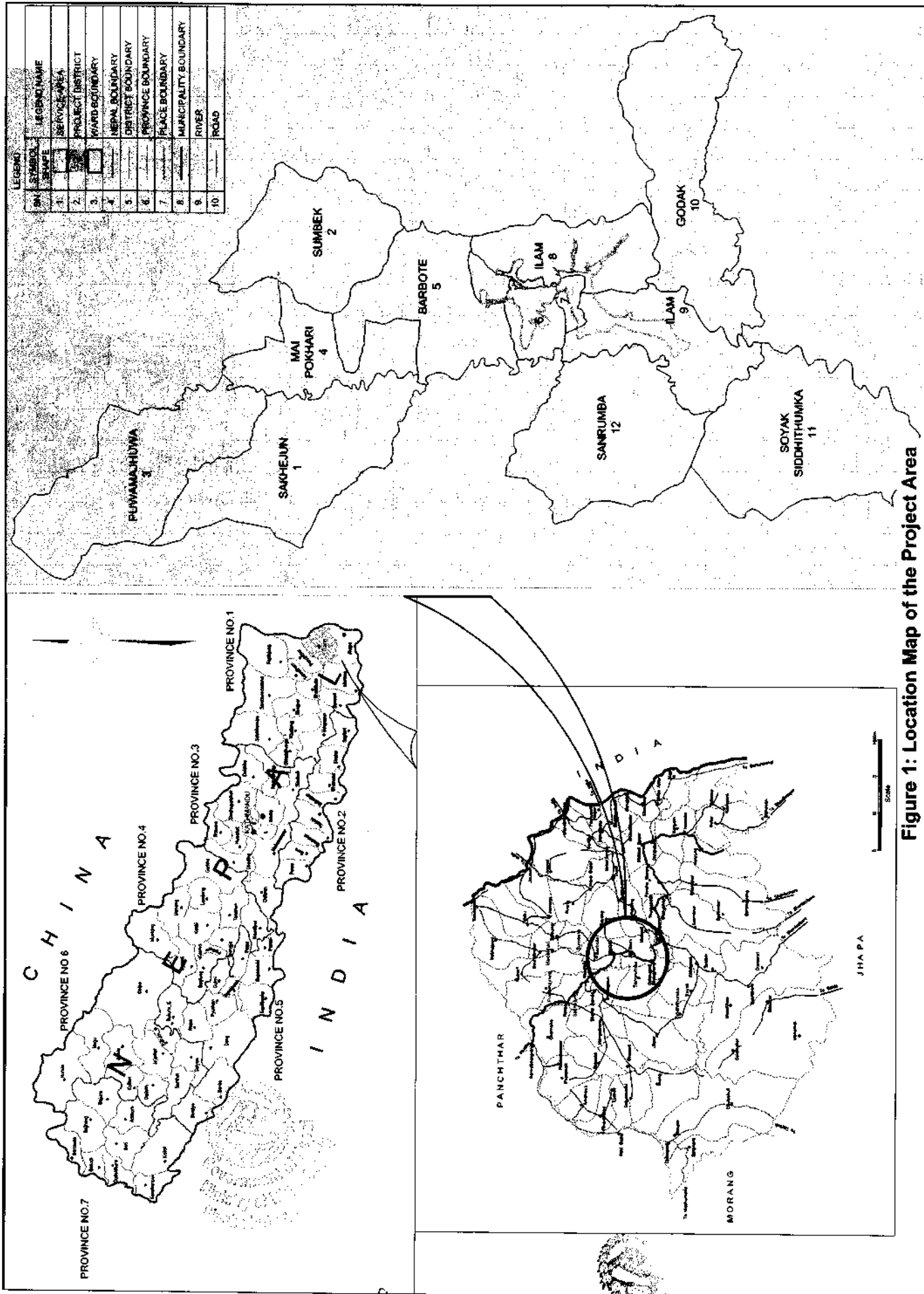


Figure 1: Location Map of the Project Area

*[Signature]*  
Engineer

Government of Nepal  
Ministry of Water Supply  
Department of Water Supply and Sewerage  
Ilam Water Supply and Sanitation Sub-project  
Project Management Office

20. The Table 2 given below gives the brief details on the reformed Ilam municipality;

Table 2: Ilam Municipality Ward Profile

| Present Ward Municipality | Former VDC/Municipality | Former Ward No. |
|---------------------------|-------------------------|-----------------|
| 1                         | Sakhejung VDC           | WN 1 to 9       |
| 2                         | Sumbek VDC              | WN 1 to 9       |
| 3                         | Puwamajhuwa VDC         | WN 1 to 9       |
| 4                         | Barbote VDC             | WN 4 & 5        |
|                           | Maipokhari VDC          | WN 1 to 3       |
| 5                         | Barbote VDC             | WN 1-3,6-9      |
| 6                         | Ilam Municipality       | WN 8 & 9        |
| 7                         | Ilam Municipality       | WN 1 & 2        |
| 8                         | Ilam Municipality       | WN 6 & 7        |
| 9                         | Ilam Municipality       | WN 3 to 5       |
| 10                        | Godek VDC               | WN 1 to 9       |
| 11                        | Soyak VDC               | WN 1 to 9       |
|                           | Siddhithumka VDC        | WN 7            |
| 12                        | Sangrumba               | WN 1 to 6       |

Source: Final District 1-75 Corrected Last For Rajpatra (www.mofald.gov.np)

21. The above given table also shows that the reformed Ilam municipality has been divided into 12 wards. The current wards 1 belongs to ward 1 to 9 of former Sakhejung VDC, ward 2 belongs to ward 1 to 9 of former Sumbek VDC, ward 3 belongs to ward 1 to 9 of former Puwamajhuwa VDC, ward 4 belongs to ward 4 & 5 of former Barbote VDC and ward 1 to 3 of former Maipokhari VDC, ward 5 belongs to ward 1 to 3 and 6 to 9 of former Barbote VDC, and ward 6,7,8 & 9 belong to wards 8 & 9, ward 1 & 2, ward 6 & 7 and ward 3 to 5 of former Ilam municipality. Similarly, ward 10 belongs to ward 1 to 9 of former Godek VDC, ward 11 belongs to ward 1 to 9 of former Soyak VDC and ward 7 of former Siddhithumka VDC and ward 12 belongs to ward 1 to 6 of former Sangrumba VDC.
22. The project town is situated along the Mechi Highway which is on the way to Phidim, Panchthar District. It is about 518 km far from Kathmandu (Kathmandu-Khurkot-Charali-Ilam) and 73 km north of Charali, Jhapa. The nearest operating airport is Bhadrapur, Jhapa which is about 90km far from the project town, where daily flights are available.
23. Since Ilam is located in the middle mountain region, its climate is essentially warm temperate or sub-tropical. The temperature ranges from 6° to 31.5° Celsius. The average annual rainfall is 1545mm. The huge difference in altitude influences the variation in climate within the municipality.

## 2.2 The Proposed Project

24. The proposed project is the extension of the existing water supply system. This Project has been conceptualized as a totally gravity surface water system.
25. The overall concept has been developed with distribution system comprising of Bulk Distribution System (BDS) and Distribution System (DS). In this concept, the whole service area will be divided in number of service area with dedicated storage reservoir for that particular service area. Therefore, the main system comprises of number of sub-system. The service area will be divided on the basis of elevation difference and proximity. At the same time, it will reduce pipe cost considerably, provides flexibility to operate the system, avoid excessive large number of break pressure tanks and follow principles of DMA.
26. The concept of BDS has been conceptualized in order to reduce inequality of pressure in HHs connection within the service area so that the household at high elevation and at tail end of the service area will get equal service level. Each service reservoir will have control mechanism with bulk meter so that it will support the principles of DMA.
27. The entire distribution network is to be supplied from multiple (ten) reservoir system. All the water treatment plants will act as main distributors. The total demand of 2019 and 2039 of every sub-system has been calculated and shown below.

**Table 3: Proposed Sub-system and demand**

| Sub-System               | Water Demand (lpd) |                  |                  |                  |                  |                  | Storage Volume (cum) |
|--------------------------|--------------------|------------------|------------------|------------------|------------------|------------------|----------------------|
|                          | 2017               | 2019             | 2024             | 2029             | 2034             | 2039             |                      |
| GumbaRVT                 | 98,797             | 102,659          | 112,999          | 124,394          | 136,954          | 150,798          | 50(N)                |
| GadiRVT-A                | 289,685            | 300,067          | 327,714          | 357,964          | 391,067          | 427,299          | 150(N)               |
| GadiRVT-B                | 173,685            | 180,814          | 199,950          | 221,117          | 244,534          | 270,438          | 120(UC)              |
| ShikhernagarNewRVT       | 341,740            | 353,055          | 383,034          | 415,598          | 450,974          | 489,409          | 150(N)               |
| ShikhernagarExt. JICARVT | 556,537            | 574,469          | 621,892          | 673,266          | 728,926          | 789,233          | 360(E)               |
| MilankendraExt. JICARVT  | 256,795            | 264,912          | 286,349          | 309,527          | 334,590          | 361,690          | 87.5(E)              |
| CampusAreaNew RVT        | 58,696             | 60,778           | 66,319           | 72,376           | 78,998           | 86,239           | 50(N)                |
| TundikhelExt. JICARVT    | 299,679            | 311,743          | 344,088          | 379,815          | 419,281          | 462,879          | 125(E)               |
| GolakharkaNewRVT         | 267,042            | 277,662          | 306,117          | 337,518          | 372,173          | 410,422          | 150(N)               |
| TilkiniNewRVT            | 276,403            | 285,037          | 307,823          | 332,431          | 359,005          | 387,704          | 150(N)               |
| <b>TOTAL</b>             | <b>2,619,056</b>   | <b>2,711,196</b> | <b>2,956,283</b> | <b>3,224,007</b> | <b>3,516,502</b> | <b>3,836,111</b> | <b>1392.5</b>        |

Source: DEDR, Ilam, 2018

28. All sub-systems can be operated independently. The ten distribution sub systems are also inter linked, at possible extent, and water from neighboring sub system

can be supplied to another adjacent sub system in case of maintenance and other unforeseen events. Appropriate Valve Chambers have been proposed to regulate this. This option considers integration of existing system. However, water audit provision has not been provided in this interconnection.

29. The schematic diagram of the proposed project is presented in the figures given below:

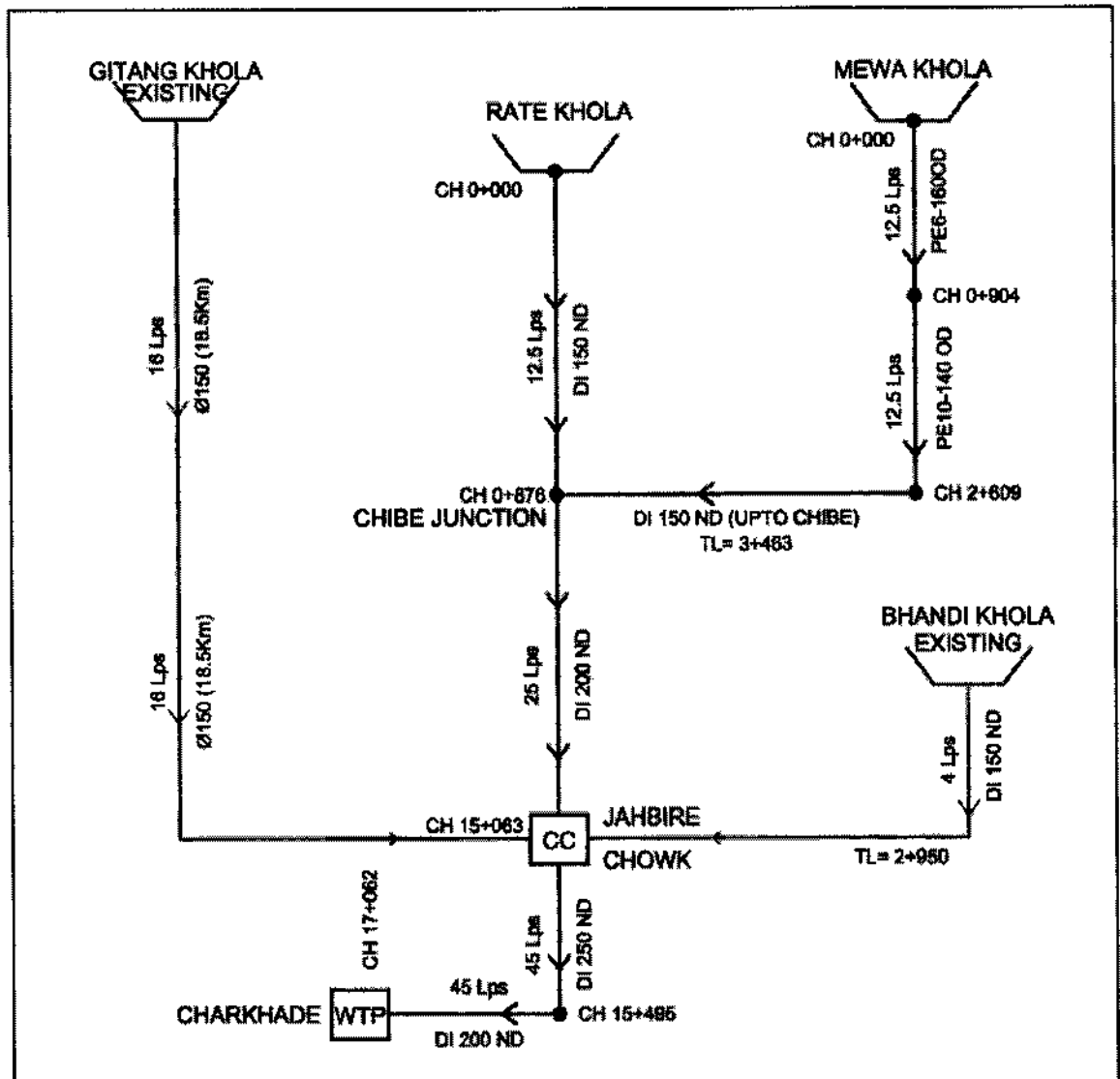


Figure 2: The Schematic Layout of Main Transmission of the Project

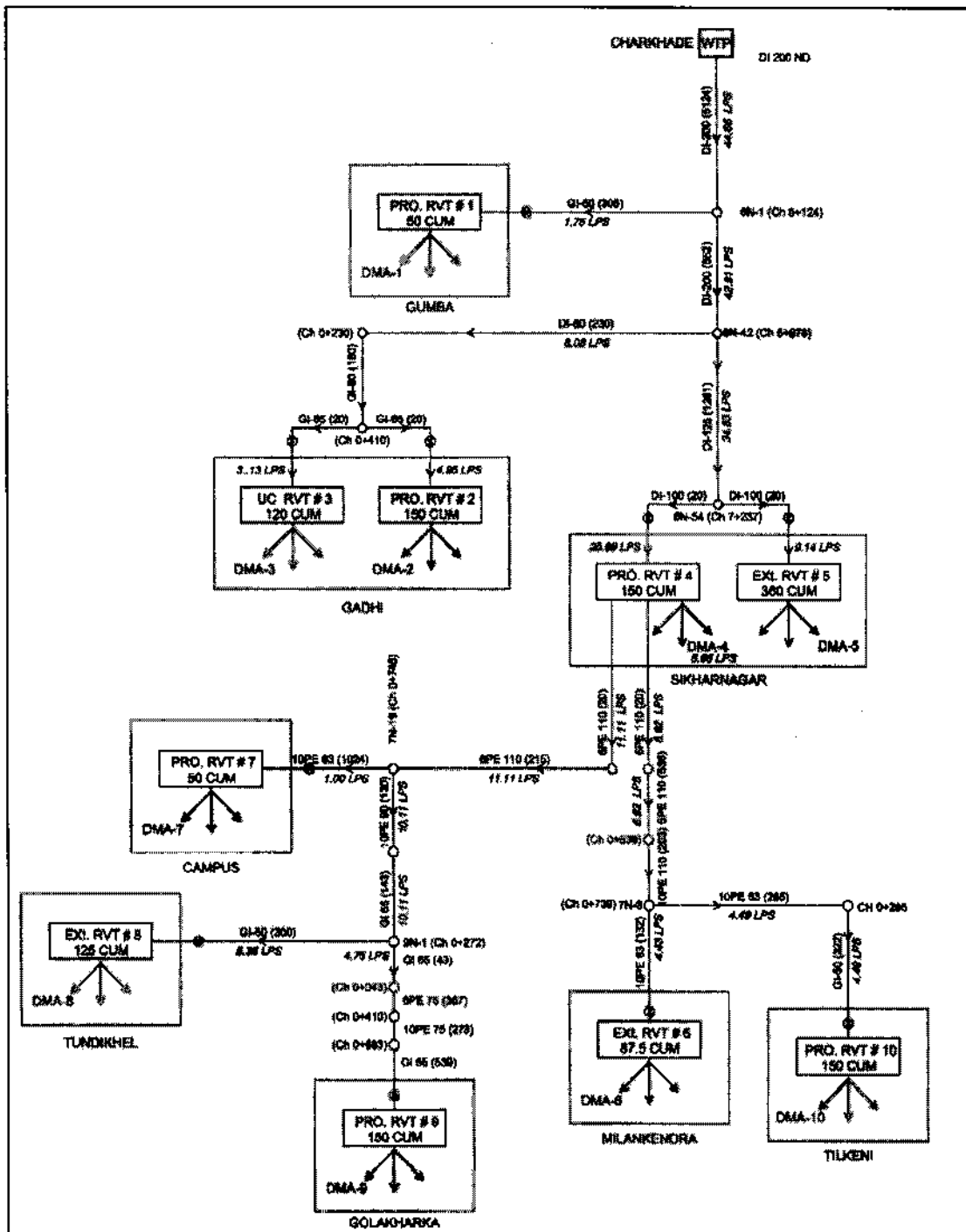


Figure 3: The Schematic Layout of Transmission & BDS Mains

30. Along with these water supply components, the proposed project also has provision of sanitation components under which 3 public toilets have been proposed through the consultation with the municipality officials.

### 2.3 Salient Features of the Project

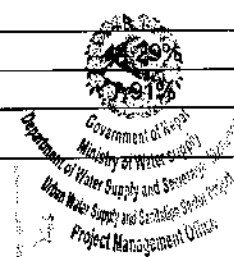
31. The salient features of the project is given in **Table 4** which is as follows:.

Table 4: Salient features of the project

| SN. | Items                                       | Description                                                                                                                                                                                                                                                     |
|-----|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Name of Project                             | Ilam Water Supply and Sanitation Project                                                                                                                                                                                                                        |
| 2   | Type                                        | Gravity                                                                                                                                                                                                                                                         |
| 3   | Study Level                                 | Detailed Engineering Design                                                                                                                                                                                                                                     |
| 4   | Location Area                               |                                                                                                                                                                                                                                                                 |
|     | Province                                    | 1                                                                                                                                                                                                                                                               |
|     | District                                    | Ilam                                                                                                                                                                                                                                                            |
|     | Municipality/Rural Municipality             | Ilam Municipality                                                                                                                                                                                                                                               |
|     | Ward                                        | Complete Area of wards 6 & 7<br>Partial Area of wards 8 & 9                                                                                                                                                                                                     |
| 5   | Available Facilities                        |                                                                                                                                                                                                                                                                 |
|     | Road                                        | Mechi Highway                                                                                                                                                                                                                                                   |
|     | Water Supply System                         | WUSCs                                                                                                                                                                                                                                                           |
|     | Electricity                                 | Available                                                                                                                                                                                                                                                       |
|     | Communication                               | Available                                                                                                                                                                                                                                                       |
|     | Health Services                             | Available                                                                                                                                                                                                                                                       |
|     | Banking Facilities                          | Available                                                                                                                                                                                                                                                       |
| 6   | Social Status                               |                                                                                                                                                                                                                                                                 |
|     | Present HHs Numbers (2017)                  | 2,798                                                                                                                                                                                                                                                           |
|     | Present Population (2017)                   | 20,704                                                                                                                                                                                                                                                          |
|     | Base Year Population (2019)                 | 21,433                                                                                                                                                                                                                                                          |
|     | Design Year Population (2039)               | 30,325                                                                                                                                                                                                                                                          |
|     | Average HH Size                             | 7.22                                                                                                                                                                                                                                                            |
|     | Weighted Growth Rate % (WGR)                | 1.75                                                                                                                                                                                                                                                            |
|     | Projected HHs in Design Year (based on WGR) | ~4100                                                                                                                                                                                                                                                           |
| 7   | Water Demand (MLD)                          |                                                                                                                                                                                                                                                                 |
|     | Base Year (2019)                            | 2.711                                                                                                                                                                                                                                                           |
|     | Design Year (2039)                          | 3.836                                                                                                                                                                                                                                                           |
| 8   | Source Characteristics                      |                                                                                                                                                                                                                                                                 |
|     | Source Name                                 | Existing Sources: Bhandi & Gitang Khola<br>Proposed Sources: Rate & Mewa Khola                                                                                                                                                                                  |
|     | Source Type                                 | Bhandi Khola: Spring<br>Gitang, Rate & Mewa Khola: Perennial Stream                                                                                                                                                                                             |
|     | Source Location                             | <b>Existing Sources:</b><br>Bhandi Khola : WN-2 of Ilam Municipality<br>Gitang Khola : WN-2 of Sandakpur Rural Municipality<br><b>Proposed Source:</b><br>Rate Khola : WN-2 of Sandakpur Rural Municipality<br>Mewa Khola: WN-2 of Sandakpur Rural Municipality |

| SN. | Items                                                                                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | Safe Yield & Measured Flow                                                                             | <b>Safe Yield:</b><br><b>Existing Sources:</b> Bhandi Khola-5lps & Gitang Khola:16lps<br><b>Proposed Sources:</b> Rate & Mewa Khola-More than 15 lps<br><b>Measured Flow:</b><br><b>Proposed Sources:</b> RateKhola-45.17lps & Mewa Khola-55.42lps (During April)                                                                                                                                                                                                                                                                                    |
|     | Proposed Tapped Discharge                                                                              | <b>Existing Sources:</b> Bhandi Khola-4lps & Gitang Khola:16lps<br><b>Proposed Sources:</b> Rate Khola-12.5lps & Mewa Khola-13.5lps                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 9   | Type of Structures/Components                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| a)  | Water Supply Components                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|     | Proposed Intakes                                                                                       | <b>Total : 4 Nos</b><br>2 nos of New Stream Intaks ;1 no.at each Rate & Mewa Khola<br>Rehabilitation of 2 nos of Existing Intakes; 1Existing Stream Intake at Gitang Khola and 1 Existing Spring Intake at Bhandi Khola                                                                                                                                                                                                                                                                                                                              |
|     | Water treatment plant                                                                                  | <b>Assuming water from Bhandi Khola does not require any primary treatment</b><br>Sedimentation Tanks-2 nos each with 12.5lps capacity<br>HRF: 8 nos (41 lps capacity in total)<br>SSF: 1 no. with some rehabilitation works<br>Disinfection Unit: 1 no.                                                                                                                                                                                                                                                                                             |
|     | Ground Reservoir(Number and Capacity in cum)                                                           | <b>Existing RVTs; 4 nos with total capacity 692.50 cum</b><br>1 no. at Gadhi Barrack -120cum<br>1 no. at Shikhamagar (JICA)-360cum<br>1no. at Milan Kendra (JICA)-87.5cum<br>1no. at Tundikhel (JICA)-125cum<br><b>Proposed RVTs; 6 nos with total capacity 700.00 cum</b><br>1 no. at Gumba Danda-50cum<br>1no. at Campus Danda-50cum<br>1 no. at Gadhi Barrack-150cum<br>1 no. at Shikhamagar-150cum (after Demolition of all existing4 RVTs)<br>1 no. at Golkharka-150cum<br>1 no. at Tilkini -150cum<br><b>Hence, Total Capacity: 1392.50cum</b> |
|     | Valve Chamber                                                                                          | Brick Masonry: 20nos.<br>RCC: 10 nos.<br>RRM: 10nos.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|     | Office(O1)/ Small Guard House (GH1)<br>Medium Guard House(GH2)/Dosing Pump House(DPH) & Chemical Store | O1- 1no. at Shikhamagar ( 2 storey)<br>GH1- 2 nos. at Gadhi RVT & Tilkini RVT (2 Rooms)<br>GH2- 3 nos. at two WTP locations & Golkharka RVT<br>DPH & Chemical Store- 1no.                                                                                                                                                                                                                                                                                                                                                                            |
|     | Household Connection                                                                                   | 2,866                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|     | Fire Hydrant                                                                                           | 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| SN. | Items                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | River/Stream Crossings                              | a) MS truss crossings: 3 nos.<br>• 2 nos. of 25m span at Rate & Sano Mai Khola<br>• 1 no. of 20m span at Soti Khola<br>b) Simple crossings with SP-4 type concrete saddle blocks: 10 nos. (For DI pipes)                                                                                                                                                                                                         |
|     | Transmission Mains                                  | 41.975km                                                                                                                                                                                                                                                                                                                                                                                                         |
|     | Bulk Distribution Mains                             | 18.130km                                                                                                                                                                                                                                                                                                                                                                                                         |
|     | Distribution Mains                                  | 109.822km                                                                                                                                                                                                                                                                                                                                                                                                        |
|     | Boundary Wall/Fencing                               | A) Barbed Wire Fencing at:<br>a) Proposed Intakes: 120.00m<br>b) Proposed Sedimentation Tank: 160.00m<br>c) RVT 2 & 3 at Gadhi Danda: 125.00m<br>d) RVT 6 at Milan Kendra: 48.00m<br>B) Galvanized Chain Link Fencing at:<br>a) RVT 1 at Gumba Danda: 154 m <sup>2</sup><br>b) RVT 7 at Campus Area: 100 m <sup>2</sup><br>c) RVT 9 at Golkharka: 154 m <sup>2</sup><br>d) RVT 10 at Tilkini: 140 m <sup>2</sup> |
|     | Internal Approach/Access Roads                      | Gravel Road; Length: 100m & Width: 5m<br>RCC Stretches; 100 m <sup>2</sup>                                                                                                                                                                                                                                                                                                                                       |
|     | Reinstatement/Resealing Works                       | Reinstatement of PCC/RCC Pavements: 2500 m <sup>2</sup><br>Resealing of Blacktopped Roads: 5000 m <sup>2</sup><br>Resealing of Gravel Roads: 10000 m <sup>2</sup>                                                                                                                                                                                                                                                |
|     | Rehabilitation Works                                | Existing SSF of 3 units                                                                                                                                                                                                                                                                                                                                                                                          |
|     | Demolition Works                                    | 4 nos. of Old Masonry RVTs at Shikhamagar                                                                                                                                                                                                                                                                                                                                                                        |
| b)  | Sanitation Components                               |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|     | Public Toilets                                      | 3 nos. (1 no. at 3 locations: Dhobi Dhara, Tundikhel and Adrasha Krishi Bazaar Areas)                                                                                                                                                                                                                                                                                                                            |
| 10  | Total Cost of WS Component (Inclusive of all) NRs.  | 836,800,292.80                                                                                                                                                                                                                                                                                                                                                                                                   |
| 11  | Cost Sharing Arrangement in WS Component            |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|     | GON Component (75%)                                 | 585,760,204.96                                                                                                                                                                                                                                                                                                                                                                                                   |
|     | TDF Loan (25%)                                      | 209,200,073.20                                                                                                                                                                                                                                                                                                                                                                                                   |
|     | WUSC's Contribution for upfront cash (5%)           | 41,840,014.64                                                                                                                                                                                                                                                                                                                                                                                                    |
| 12  | Tariff                                              |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|     | Upto 6cum/monthly (NRs)                             | 210                                                                                                                                                                                                                                                                                                                                                                                                              |
|     | 7 to 10cum/monthly (NRs)                            | 53                                                                                                                                                                                                                                                                                                                                                                                                               |
|     | 11 to 20cum/monthly (NRs)                           | 79                                                                                                                                                                                                                                                                                                                                                                                                               |
| 13  | Sanitation Cost (Inclusive of all) NRs. and Sharing | 11,108,223.00                                                                                                                                                                                                                                                                                                                                                                                                    |
|     | GON Contribution (85%)                              | 9,441,989.55                                                                                                                                                                                                                                                                                                                                                                                                     |
|     | Local Authority/Users' (15%)                        | 1,666,233.45                                                                                                                                                                                                                                                                                                                                                                                                     |
| 14  | Per Capita Cost for W/S component                   |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|     | Per Capita Cost (for base year pop.)                | 39,043.00                                                                                                                                                                                                                                                                                                                                                                                                        |
|     | Per Capita Cost (for design year pop.)              | 27,595.00                                                                                                                                                                                                                                                                                                                                                                                                        |
| 15  | Per Capita Cost for Sanitation component            |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|     | Per Capita Cost (for base year pop.)                | 518                                                                                                                                                                                                                                                                                                                                                                                                              |
|     | Per Capita Cost (for design year pop.)              | 366                                                                                                                                                                                                                                                                                                                                                                                                              |
| 16  | Total Cost of the Project (WATSAN)                  | 847,908,515.80                                                                                                                                                                                                                                                                                                                                                                                                   |
| 17  | Economic and Financial Indicators                   |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|     | Economic Rate of Return (EIRR)                      | 12.9%                                                                                                                                                                                                                                                                                                                                                                                                            |
|     | Financial Rate of Return (FIRR)                     | 19.1%                                                                                                                                                                                                                                                                                                                                                                                                            |



| SN. | Items        | Description                   |
|-----|--------------|-------------------------------|
| 18  | Environment  |                               |
|     | ADB Category | "B", Only IEE necessary       |
|     | IEE finding  | No significant adverse impact |

Source: DEDR, Ilam, 2018

## 2.4 Water Supply Project Components/Features

32. The major sub-components of the project with their characteristic features are described in the sections below:

### 2.4.1 Sources/Intakes

#### a) Sources

33. Altogether there are four sources viz., Gitang Khola, Bhadi Khola, Rate Khola & Mewa Khola that will be used for the proposed system. Among them, Gitang & Bhadi Khola are the sources that are being used for the existing water supply system.

34. All these sources are surface water types. The Bhadi Khola is a spring source, which is said to have decreased over the years. There are several leakages and spillovers of water in the existing intake at Bhadi Khola. The vegetation around the source is also not dense. A motorable road passes upstream of the site. All these issues confirm that the source is at risk and has to be protected from further depletion. This issue will be considered in this proposed project.

35. All other three sources that includes Gitang, Rate & Mewa Khola are perennial stream sources. The river has been widened at proposed intake sites. The river banks have been gradually eroded, and there is possibility of minor landslides and soil erosion. The existence of large stones around the sites indicates that the river tends to bring large stones and boulders during the rainy season. It demands source protection from flood and soil erosion. The source protection measures through Barbed Wire Fencing has been proposed in this project.

36. The proposed sources Rate & Mewa Khola is a tributary of Mai Khola, which eventually drain into Kankai Mai River. Both river originates from the Middle Mountain region which is also known as Mahabharat range. The highest altitude of the Rate Khola basin is 3,100m amsl near Chintapu Danda, and the highest altitude of the Mewa Khola basin is 3,488m amsl located near Tindobate (near Indo-Nepal border BP 9).

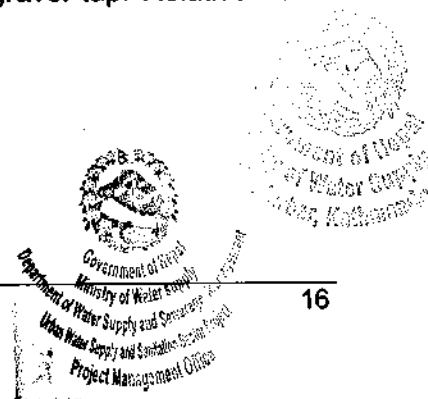
37. There are no hydrological stations in these rivers. Therefore, regional approach have been used to predict low flow. Hydrological analysis recommended by the

PDSP Manual (Planning and Design Strengthening Project, Design Manual published by Department of Irrigation) has been used to predict mean monthly flow and 80% reliable monthly flow. This rational method for the estimation or prediction of various discharges also referred as Medium Irrigation Project (MIP) Method.

38. It has been estimated that 80% reliable discharges in the Rate & Mewa Khola are 21 lps and 26 lps, respectively. Therefore, drawing water of about 13 to 15 lps at the sources is possible without any technical point of view.

**b) Intakes**

39. Two existing intakes belonging to two existing sources i.e., Gitang Khola & Bhandi Khola will be used for the proposed project after some minor rehabilitation works. Among these two intakes, there is one stream intake at Gitang Khola and one spring intake at Bhandi Khola. Similarly, two new intakes have been proposed for two proposed sources that includes Rate & Mewa Khola. Both proposed intakes are stream type intakes. At Rate Khola, simple weir intake has been proposed across the river. In case of Mewa Khola, a side intake has been proposed. Each source river have a safe yield of more than 15 lps.
40. Simple off-take type of intakes has been proposed in Rate Khola. Discharge of 12.5 lps has been proposed to abstract from this river. Relative Level (RL) of this intake is around 1875 amsl.
41. 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 20m 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 (RL) of this intake is around 1910m amsl.



#### 2.4.2 Transmission Mains

42. 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.
43. The main transmission line has been considered length between Intakes to 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.
44. The total length of existing transmission lines of Gitang and Bhadi Khola up collection chambers are 18.5 and 2.95 km, respectively. The proposed transmission Rate is about 17.1 km. 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.
45. 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.

#### 2.4.3 Thrust Blocks, Saddle Blocks and Thrust Beam

46. Thrust blocks have been proposed for DI pipes (transmission and distribution mains) from being moved by forces exerted within the pipes 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 have been designed for a pressure of 16 kg/sq cm for both transmission lines and distribution lines.
47. A large number of saddle blocks, thrust beams and anchor blocks are required in the transmission mains in All saddle block are proposed to be anchored with concrete at the center of each pipe to prevent movement.

#### 2.4.4 River/Stream Crossings

48. There are number of small river crossing in the proposed transmission system. There are major wide crossing along the transmission system at various rivers like 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 25m have been proposed for Rate and Sano Mai Khola whereas crossing span of 20m have been proposed for Soti Khola. These truss crossings are triangular comprising of tubular mild steel sections and braced by welded tubular sections to form composite light section which is economical than the traditional angle and channel sections.

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

#### 2.4.5 Water Treatment Plant

50. The existing water treatment at Charkhande consists of sedimentation tank (ST), horizontal roughening filter (HRF), slow sand filter (SSF) and disinfection unit. The design capacities of the existing water treatment units at Charkhande have been checked. There are some design inconsistencies between design discharges of different units. The design discharge of slow sand filter is about five to six times higher than that of ST and HRF. There is also problem with the filter media of the SSF. Hence, the existing SSF requires rehabilitation to be fit for the proposed project. However, some of other existing components like ST & HRF are functional and will be considered in this proposed project. There is also a disinfection unit, but it is not in operation.
51. The water quality test has also been carried out for each sources to ensure the requirement of water treatment plant. Accordingly, the water quality test reports (**Refer Annex 6**) of the existing for physical, chemical & biological parameters show that the sample from Geetang Khola & Bhandi Khola has 5 NTU turbidity value and has hardness value of 40 mg/L & 36 mg/L as  $\text{CaCO}_3$  respectively which falls below the prescribed NDWQS (Turbidity: 5-10 NTU and Hardness: 500 mg/L). Similarly, the test result also shows that both of the existing sources has minimal value of iron content that is less than 0.05 mg/L which is very less than the prescribed NDWQS i.e., (0.30-3)mg/L. Similarly, the test result of the proposed sources as given in **Annex 6** shows that the sample from Rate Khola & Mewa Khola has 5 NTU & 1 NTU turbidity value and hardness value of 46 mg/L & 12 mg/L respectively. These values are also less than the prescribed standard. The values observed for the iron content (Rate Khola-0.34 & Mewa Khola-0.23) are also acceptable as per the prescribed NDWQS. However, there is no surety that these sources' quality will remain same in the future as the project town is leading towards urbanization and the urbanization may intensify the risk of contamination in the proposed sources. Similarly, the on site bacteriological test carried out during field study shows that the proposed water sources are contaminated with bacteria which constrain the provision of water treatment plant for the proposed project.

Hence, along with the rehabilitation of the existing WTP, there is requirement of new WTP for the system to be served by the proposed sources.

52. The proposed water treatment plant consists of construction of two new sedimentation tanks along corresponding transmission routes of Rate and Mewa Khola, eight numbers of Horizontal roughing filters and repair of existing slow sand filters since SSF is good in size.
53. Plain sedimentation 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, etc. will settle through the force of gravity. This settling process will reduce the turbidity of water because lesser the presence of suspended solids, lesser will be the turbidity. In each settling tanks, the retention period is equal or more than 4 hours.
54. Each setting basin is rectangular basin with a longitudinal flow. Each setting 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  $0.8 \text{ m}^3/\text{m}^2/\text{hour}$ . The required area for the proposed tank is about  $150 \text{ m}^2$  in every location along transmission line of Rate and Mewa Khola
55. The horizontal roughing filter has been proposed near Charkhade (existing WTP). It is primarily used to separate water from fine solids that are only partly retained, or not at all, by sedimentation tanks. In addition to this, it partly improves bacteriological water quality. The roughening filter (HRF) has been designed for a flow capacity of  $3147.6 \text{ m}^3/\text{hour}$  (or 41 lps) considering the diverted additional four lps from Bhandi Khola does not require any treatment since it is from spring source. Four numbers of identical units have been proposed with a filtration rate of  $1.8 \text{ m}^3/\text{m}^2/\text{hour}$ . A unit consists of four chambers of 5 m wide and 1.7 m in depth. The overall size of each chamber is 5m x 8.8m. 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  $3500 \text{ m}^2$  in a location close to existing WTP area.
56. The rehabilitated existing SSF will enhance the removal of turbidity. This SSF improves water quality by removing water borne parasites, bacteria and suspended solids. This is also effective in removing oxidated precipitate of dissolved solids like iron.
57. Chlorination or disinfection unit is required for the removal of complex iron content and complete removal of bacteriological content. Hence, there is provision of

dosing system or chlorination/disinfection unit before distributing water to the RVTs.

58. 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 is recommended. This will effectively remove bacteriological content that are only partly removed by SSF.

#### 2.4.6 Service Reservoir

59. The existing system has been operated as multi reservoir (nine) system with RVTs of different sizes at six locations. The proposed system is designed on the basis of multi reservoir system. The design considers the use of existing RVTs to the extent possible. The following table shows that four operating RVTs with total volume of 692.5 m<sup>3</sup> will be used 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 700m<sup>3</sup> has been recommended. The details of capacities of each reservoir are mentioned below:

Table 5: Details of Service Reservoirs

| Location | Name                 | Existing Capacity | Size of RVTs (m <sup>3</sup> ) |                 |              | Remarks                                              |
|----------|----------------------|-------------------|--------------------------------|-----------------|--------------|------------------------------------------------------|
|          |                      |                   | Require                        | Use of Existing | New Proposed |                                                      |
| 1        | Gumba Danda          | 60                | 50                             |                 | 50           | Required relocation                                  |
| 2        | Gadhi Barrack (RVTA) | 48                | 150                            |                 | 150          | Non Operating                                        |
|          | Gadhi Barrack        |                   | 120                            | 120             |              | Under Construction                                   |
| 3        | Shikharnagar         | 165               | 150                            |                 | 150          | Demolition of all 4 old RVTs (made of stone masonry) |
|          | Shikharnagar         | Damaged           |                                |                 |              |                                                      |
|          | Shikharnagar         | 38                |                                |                 |              |                                                      |
|          | Shikharnagar         | 42                |                                |                 |              |                                                      |
|          | Shikharnagar (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          |                                                      |

Source: DEDR, Ilam, 2018

60. The cumulative capacity of all service reservoir provided in the proposed project is about 1,392.50 m<sup>3</sup>. A minimum of 50m<sup>3</sup> capacity has been provided for all reservoirs.

### 2.4.7 Bulk Distribution Mains

61. As the service area is very scattered and stretched in 15 to 20 km with high elevation difference within the service area (in the range of 1000 m), the proposed concept of Bulk Distribution has been proposed. This has been done to reduce inequality of pressure in HHs connection within the service area so that the household at high elevation and the tail end of the service area will get equal service level.
62. All of the storage reservoirs of the system will get required water from water treatment plants. The total cumulative length of BDS is about 18.130 km.

### 2.4.8 Distribution Mains

63. The distribution system comprises of a pipe network, which is looped in certain cases and branched in other. The network has been analyzed using EPAnet, a design analytical software tool. The entire system has been designed using Polyethylene (PE), Ductile Iron (DI) and Galvanized Iron (GI) pipes.
64. The minimum diameter of distribution pipe has been adopted as 50mm for the proper saddle arrangement at the household connection in distribution pipe. Two types of pipes have been used in the distribution network; Galvanized Iron (GI) pipes and PE pipes. However, uses of GI pipes have been limited. The total pipe lengths of various diameters are given in the table below. The total pipe length of the proposed distribution system works out to be 109.822 km. The details are briefly given below:

Table 6: Details of Pipes Used in Distribution System (in meters)

| A | PE Pipes           | Length of PN 6 Pipe (m) | Length of PN 10 Pipe (m) | Length of PN 16 Pipe (m) |
|---|--------------------|-------------------------|--------------------------|--------------------------|
|   | 50OD PEPipe        | 0                       | 27,318                   | 30,918                   |
|   | 63OD PEPipe        | 0                       | 25,127                   | 2,564                    |
|   | 75OD PEPipe        | 7,283                   | 4,398                    | 710                      |
|   | 90OD PEPipe        | 2,647                   | 1,843                    |                          |
|   | 110OD PEPipe       | 2,643                   | 985                      |                          |
|   | 125OD PEPipe       | 987                     | 646                      |                          |
|   | 140OD PEPipe       | 491                     | 387                      |                          |
|   | 160OD PEPipe       | 765                     | 0                        |                          |
|   | <b>Sub Total</b>   | <b>14,816</b>           | <b>60,704</b>            | <b>34,192</b>            |
| B | METALLIC PIPE      | Length of GI Pipe (m)   | Length of DI Pipe (m)    |                          |
|   | 100 ND             | 110                     |                          |                          |
|   | <b>Sub Total</b>   | <b>110</b>              |                          |                          |
|   | <b>GRAND TOTAL</b> |                         | <b>109,822</b>           |                          |

Source: DEDR, Ilam, 2018

#### 2.4.9 House Connection

65. Two types of house connections have been envisaged in the project. There is about 573 number of household 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 of the connection will be private.
66. The house connection shall comprise about 12 m pipe PE or GI Pipe (as per requirement) and water meter. The house connection pipe shall be PE-80 or 100, 20 mm OD diameter pipe rating PN-16. 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 PE saddle with the ferrule. Tapping from GI pipes has been proposed from PE saddle with ferrule.
67. 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.

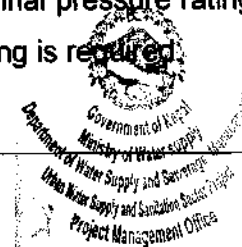
#### 2.4.10 Appurtenances

##### a) *Line or Sectional Valves*

68. 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*

69. Airvalves willbe installed at allhigh points ofthe pipeline,in sections which forma peakwith respect to the hydraulic gradientand on the downhillside ofline valves.
70. Air Valves shall be of the combined type with a larger and smaller venting orifice which permits passage of large volume of air for vacuum breaking and venting on starting up and closing 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 high pressure rating is required.



**c) Wash Out Valves**

71. Washout valves 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**

72. 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 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 flowmeter of Waltman type has been recommended to regulate flow.

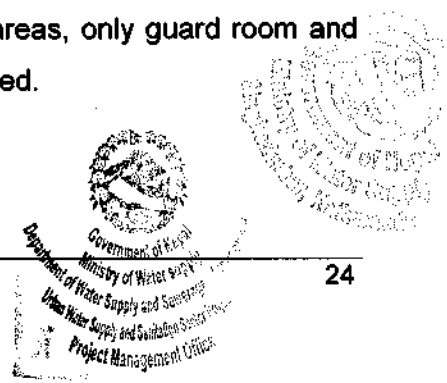
**e) Fire Hydrant**

73. 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 IS908 is recommended.

**f) Chambers**

74. **Control Valve Chambers:** Three type of Chambers have been proposed in the project to control or regulate the flow of the proposed water supply system. The chambers constructed by brick masonry wall and random rubble masonry have been provided in non-vehicular areas and rural area. In other vehicular carriageway and city area chambers constructed with RCC has been provided.
75. 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. 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 manholes in paths may be proposed of medium duty type.

76. In total, 20 nos. of Brick Valve Chambers, 10 nos. of RRM Valve Chambers and 10 nos. of RCC Valve Chambers have been proposed.
77. **Pressure Release Valve Chambers:** To protect the water supply system during an overpressure event, pressure valve chamber has been proposed. For this project, only one pressure release valve chamber for 100 mm diameter pipe has been proposed where there is possibility of occurrence of overpressure event.
78. **Distribution Chambers:** Similarly, to regulate the flow in the distribution system to supply water for house connections, distribution chamber has been proposed. 20 numbers of Prefabricated RCC Chamber and 10 nos. of Cast in Situ Brick chambers have been proposed for the project.
- g) Office Building, Guard House, Dosing House and Boundary Wall**
79. To safeguard storage tanks and RVT from vandalism as well as contamination, Chain-link boundary (CLBW) wall and barbed wire fencing (BWF) has been proposed. A galvanized chain link fencing over 450 mm high parapet wall has been proposed from aesthetic and economic consideration for boundary wall. Barbed wire with the concrete post has been proposed for fencing in a fringe area of town and rural area of the municipality.
80. A two-bay two-storeyed 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. A separate toilet block housed with a bath chamber and two toilet chambers have been proposed at its premises.
81. Three numbers of single storey Guard House (GH-3) are proposed at two WTP locations and Golkharka RVT area. Slightly ample space is required in this area since this area is far from the main bazaar. The Guard House building comprises of residence facilities for a guard in addition to rooms for tools of repair & maintenance.
82. Similarly, two numbers of small Guard Houses (GH-1) have been proposed at two reservoir locations, Gadhi and Tilkini. This Guard House comprises two rooms. As the locations are very close to settlement and bazaar areas, only guard room and room for tools of repair & maintenance has been proposed.



83. The Dosing Pump House or Chemical Dosing House (DPH) with two compartments has also been proposed. The one compartment is for housing dosing pump and other compartment is recommended for the chemical store.
84. As the system comprises of many RVTs and other structures to be protected and operated, different size of building structures and different type of boundary has been discussed with the WUSC and proposed in the project. The table below summarizes these in details.

**Table 7: Proposed Buildings and Boundary Type**

| Location            | Components               | Building | Septic Tank | Boundary Type          |
|---------------------|--------------------------|----------|-------------|------------------------|
| Settling Basin Area | Settling Basin           | G        | S+S         | Fencing by Barbed Wire |
| Additional WTP Area | H                        | G        | S+S         | Fencing by Barbed Wire |
| Existing SSF Area   | S                        | C        | Existing    | Existing               |
| Gumba Danda         | N-RVT                    |          |             | Fencing by Barbed Wire |
| Gadhi Danda         | E-RVT #2+N-RVT #3        | G        | S+S         | GI Chainlink with B/W  |
| Shikher Nagar       | N-RVT #4+E-RVT (JICA)#5  | OFF-1    | Existing    | Existing               |
| Milankendra         | E-RVT (JICA)#6           |          |             | Fencing by Barbed Wire |
| Campus Area         | N-                       |          |             | GI Chainlink with B/W  |
| Tundikhel           | E-RVT (JICA)#8           |          |             | Fencing by Barbed Wire |
| Golakharka          | N-                       | G        |             | GI Chainlink with B/W  |
| Tilkini             | N-RVT                    | G        |             | GI Chainlink with B/W  |
| Various Locations   | Intakes, IC, CC and BPTs |          |             | Fencing by Barbed Wire |

Source: DEDR Ilam, 2018

#### 2.4.11 Internal Access Roads

85. There is also provision of Internal Access Roads which has been included under Road Development & Re-sealing of Roads. This involves construction of Approach Road of Gravel of total length 100m with 5m width. Similarly, this also involves construction of RCC Access road of 100 m<sup>2</sup>.

#### 2.4.12 Miscellaneous Works

86. There is also provision of miscellaneous works for this proposed project that includes Construction of RRM Wall, Gabion Wall, Surface Drain, Footpath, Hume Pipe, Landscaping & Plantation etc. for River Protection Works, Site Development Works, Drainage for the protection of Intakes, WTPs, RVTs, Guard House and Distribution system.

#### 2.4.13 DMA Establishment

87. One increasingly common principle of managing a large water network is to sub-divide it into a number of areas, typically of between 500 and 3000 connections, each established area having a defined and permanent geographical and/or hydraulic boundary. Such an area is known as a District Management Area or, more commonly, a 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 on 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.
88. 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, the rate of flow of individual bursts and the rate of the annual burst frequency. In order to manage NRW in the proposed system, the total system has been divided into 10 DMAs according to the serving reservoir.
89. The figure given below gives brief details on the DMAs of the proposed project:

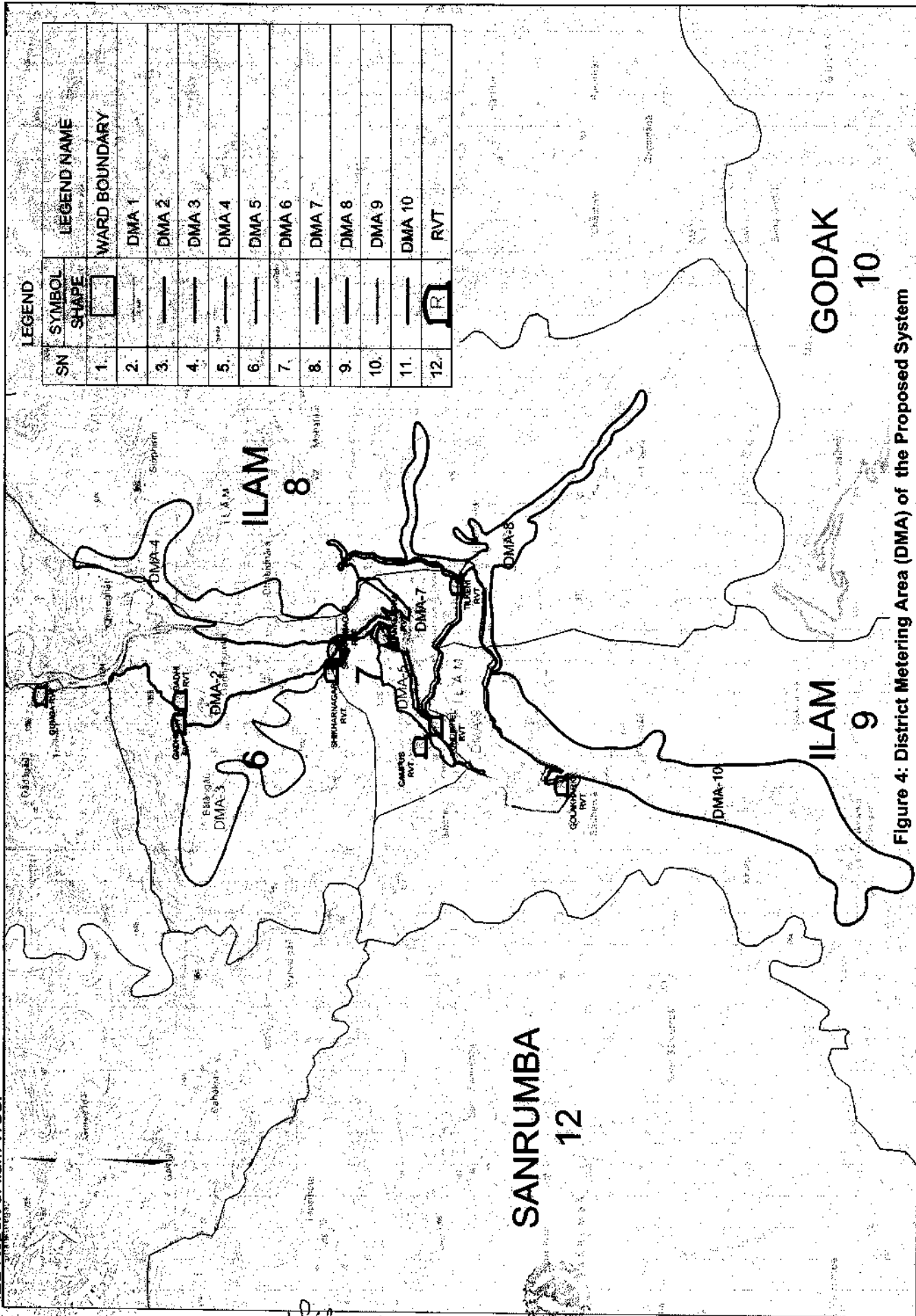


Figure 4: District Metering Area (DMA) of the Proposed System

#### 2.4.14 Construction Planning

90. It provides the basis for the fulfillment of the requirement during construction period of the proposed project. It involves the following described requirement of the project;

a) **Land Requirement for the project area**

91. The land requirement and the ownership details of the land required for the following mentioned project components are given below:

92. As per Table 8 given below, it has been identified that only 150 sqm of Gumba Danda Community Forest Area is required for the construction of RVT 1 and small guard house. As per Section 68 (1) of Forest Act 2049 (1993), it states that " Not withstanding anything contained in this Act, in case there is no alternative except to use the Forest Area for the implementation of the plan having national priority and if there shall be no significant adverse effect in the environment while conducting such plan, Government of Nepal may give assent to use any part of the Government Managed Forest, Community Forest, Lease hold Forest or Religious Forest for the implementation of such plan". Our study also shows that there are no other alternatives for the location of this RVT except this Gumba Danda Community Forest Area. Similarly, our study also shows that the construction of RVT within this forest area may not be an environmental issue because only clearing of bushes around the RVT construction area is required and it will not have significant impact on the flora & faunas. Hence, the prerequisite of community forest area for the proposed project is as per Section 68 (1) of Forest Act 2049 (1993).



*K. P. Jee*

Engineer

Table 8: Land Requirement &amp; Ownership Details for the project components

**A. Intake Details**

| S. No. | Project Components  | Land Requirement (m <sup>2</sup> ) | Land Availability (m <sup>2</sup> ) | Type of Source   | Requirement | Ownership |
|--------|---------------------|------------------------------------|-------------------------------------|------------------|-------------|-----------|
| 1.     | Gitang Khola Intake | 100 m <sup>2</sup>                 | 100 m <sup>2</sup>                  | Perennial Stream | Permanent   | GoN       |
| 2.     | Bhandi Khola Intake | 100 m <sup>2</sup>                 | 100 m <sup>2</sup>                  | Perennial Stream | Permanent   | GoN       |
| 3.     | Rate Khola          | 100 m <sup>2</sup>                 | 100 m <sup>2</sup>                  | Spring           | Permanent   | GoN       |
| 4.     | Mewa Khola          | 100 m <sup>2</sup>                 | 100 m <sup>2</sup>                  | Perennial Stream | Permanent   | GoN       |

Source: Due Diligence Report, Ilam, 2018

**B. WTP & RVT Details**

| S. No. | Project Components                            | Land Requirement (m <sup>2</sup> ) | Land Availability (m <sup>2</sup> ) | Type of Land      | Requirement | Ownership                    |
|--------|-----------------------------------------------|------------------------------------|-------------------------------------|-------------------|-------------|------------------------------|
| 1.     | WTP at Charkhade:                             |                                    |                                     |                   |             |                              |
|        | Sedimentation Tank & HRF                      |                                    |                                     |                   |             |                              |
|        | SSF                                           | 3500 m <sup>2</sup>                | 3566 m <sup>2</sup>                 | Existing WTP Land | Permanent   | Gumba Danda Community Forest |
| 2.     | RVT- 1, 50 cum, at Gumba Danda-New            | 150                                | 150                                 | Existing RVT Land | Permanent   | Ilam Municipality            |
| 3.     | RVT- 2, 150 cum, at Gadhi Barrack (RVT A) New | 300                                | 990                                 | Existing RVT Land | Permanent   | WSSDO/GoN                    |
| 4.     | RVT- 3, 120 cum, at Gadhi Barrack (Existing)  |                                    |                                     |                   |             |                              |

| S. No. | Project Components                                      | Land Requirement (m <sup>2</sup> ) | Land Availability (m <sup>2</sup> ) | Type of Land                                                                                                                                      | Requirement | Ownership                           |
|--------|---------------------------------------------------------|------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------|
| 4.     | RVT- 4, 150 cum, at Shikharagar                         | 900                                | 2639                                | Vacant unused GoN Land                                                                                                                            | Permanent   | GoN & Ilam Municipality             |
| 5.     | RVT- 5, 360 cum, at Shikharagar (JICA)                  |                                    |                                     |                                                                                                                                                   |             |                                     |
| 6.     | RVT- 6, 360 cum, at Milan Kendra(JICA)                  | 127                                | 127                                 | Existing RVT Land                                                                                                                                 | Permanent   | Ilam Municipality                   |
| 7.     | RVT- 7, 50 cum, at Campus Danda                         | 127                                | 127                                 | Vacant unused land                                                                                                                                |             | Ilam Campus under Ilam Municipality |
| 8.     | RVT- 8, 125 cum, at Tundikhel (Existing)-Rehabilitation | 127                                | 127                                 | Existing RVT Land                                                                                                                                 |             | Ilam Municipality                   |
| 9.     | RVT- 9, 150 cum, at Golkharka(New)                      | 254.32                             | 4070                                | Private Land belonging to Mr. Gyanendra Prasad Shiwakoti. The owner has provided consent to sell 8 anna at present market rate out 8 ropani plot; | Permanent   | Mr. Gyanendra Prasad Shiwakoti      |
| 10.    | RVT- 10, 150 cum, at Tilkini (New)                      | 127                                | 127                                 | Barren                                                                                                                                            | Permanent   | Adarsha HS School under GoN         |

Source: Due Diligence Report, Ilam, 2018

93. The above given table shows that except for RVT-1 & RVT -9, the land requirement belongs to either Government or Ilam Municipality. The land required for the newly proposed RVT-1 belongs to Gumba Danda Community Forest Area. The written consent

letter has already been received from the women user's group of this community forest. Similarly, the barren private land proposed for the RVT at Golakharka (RVT-9) belongs to by Mr. Gynendra Kumar Shiwakoti. He has given authorized written consent to sell the required 8 anna out of 8 ropani 1 anna 1 daam land parcel of plot no 1087, located in Ilam Municipality (former) ward no 3(kha). The survey shows that his family is economically stable. He has multiple income sources including agriculture and government service. His source of income is government service as well as agriculture and his monthly income is about NRs.75,000.00. Mr Siwakoti owns more than 3257 (three thousand two hundred and fifty seven) anna (164 Ropani) of fertile land in Ilam. Hence, there will be no problem in purchasing the land required for the construction of the proposed RVT9.



Engineer

94. The transmission and the distribution pipelines will be laid down along the public road within the existing Right of Way (RoW).

**b) Energy Requirement**

95. There will be requirement of energy use either for any construction activities or for workers camp. Generally, Petroleum fuel & Electricity is used as a source of energy at the construction site. There is also possibility of use of solid fuel biomass like firewood by workers. However, burning of biomass releases carbon emissions. Hence, burning of biomass should be prohibited. Instead, cooking fuel like kerosene or gasoline fuel should be provided to the workers. For lighting facilities at construction site as well as worker's camp, electricity should be used as source of energy. While, for construction works, On-site Diesel Generators and Concrete Mixing Plant using petroleum fuel as well as electricity can be used.

**c) Human Resource Requirement**

96. Human Resources are the main functional units of the construction projects. The contractor should ensure that the project has sufficient human resources. The human resources include Skilled Labours and Unskilled labours. For ensuring punctuality and sincerity in work schedule, hiring local human resources especially labours would be preferable. As per design estimate, the total number of Skilled Labors and Unskilled Labours are 87,285 and 404,684 respectively. Similarly, during operation phase, human resources for operation & maintenance should be mobilized by the concerned WUSC.

**d) Construction Materials**

97. For ensuring availability, the local construction materials would be more preferable. The construction materials like stone, sand & aggregates can be locally brought from the authorized local vendor. There is no requirement of quarrying hence, there will be no need of crusher plant for the proposed project.
98. The material other than Stone, Aggregate and sand have been envisaged to procure from Chandragadhi, Jhapa which includes Bricks, Cement, Iron bar and Iron sections. It is about 52km from Phikkal Bazaar, Ilam. Other miscellaneous construction materials like pipe materials, fittings, sanitary items etc. will be purchased from the available and nearest market areas.
99. As per the detailed design estimate, the total quantity of these major construction materials required for the overall project construction activities will be around as follows:

Stone: 1723 m<sup>3</sup>

Sand: 2518 m<sup>3</sup>

Aggregate: 3117 m<sup>3</sup>

Cement: 1477 tonnes

Bricks: 58698 nos.

Reinforcement Bars: 288 tonnes

100. Other miscellaneous construction materials like pipe materials, fittings, sanitary items etc. will be purchased from the available and nearest market areas. As per the detailed design, the total estimated quantity of pipe materials for pipe laying works, house connection works and for other project components is; a) DI Pipes is 5356m, b) PE pipes is 142,873m and c) GI pipes is 776m.

**e) Camp Site**

101. The proposed project has provision of worker's camp site to ensure worker's safety & rights during construction phase. The contractor will temporarily facilitate the construction workers with well equipped worker's camp. The camp site will be located nearby the construction sites at various tentative locations that includes a) Gitang Khola Intake Area; b) Rate Khola Intake Area; c) Mewa Khola Intake Area; d) Along Transmission Main Route Near Deurali; e) Between Bhandi Khola & CC Near Chhpagiri; f) Near Gumba RVT; g) Near Gadhi RVT; h) Near Tilkini RVT; i) Near Golkharkha RVT This is depicted in the *Figure 4* given below. There will be provision of proper drainage, sanitation and basic utilities at camp site to ensure good health & sanitation behaviour of each workers.

**f) Stockpiling Site**

102. There is also provision of the stockpiling site which will be located nearby the construction site so that the stockpiled construction materials would be readily available. Various locations for this stockpiling site have been proposed that is same as that of the location of camp site which has been clearly described in the above section. This is depicted clearly in the *Figure 4* given below. This location ensures that the proposed stockpiling sites do not interfere any natural drainage courses, drain inlets or concentrated flows of storm water. This ensures the control of blockage problems to these features that may be caused by some materials like soil, cement, rubbles etc. These locations are adjacent to worker's camp site so that the stockpiled materials will be under proper supervision of the workers. To

control wind erosion, water or dust palliative will be applied to stockpiles and the bagged materials will be placed on ballets under cover.

**g) Cut and Fill Volume of Muck**

103. Cut & Fill Volume of muck after earthworks has been estimated during detailed design of this proposed project. After using the excess of cut in filling works, the resulting muck will be disposed off properly to Spoil Disposal Site. As per detailed design, the total quantity of cut volume of muck is  $71,789 \text{ m}^3$  and of fill volume of muck is  $71,848 \text{ m}^3$ . Hence, the remaining volume of muck after backfilling will be  $59 \text{ m}^3$  which will remain as excess spoil. This will be managed by disposing into the proposed spoil disposal site.

**h) Spoil Disposal Site**

104. There will be also provision of Spoil Disposal Site at various tentative locations that includes a) Along Transmission Main Route near Dhadbari; b) Near Dadakharka; c) Near Ghaleta; d) Gadhithumka; e) Tundikhel RVT and f) Bistagaun near Mechi Highway. The location of each Spoil Disposal Site is depicted in the Figure 4 given below. Each location of this Spoil Disposal Site ensure environmental safety. Each of this location is nearby the existing roads so that it will be easy to transport the excess spoil and to dispose off to the approved landfill sites of the project town .

**2.5 Sanitation Components**

105. There are five existing public toilets in the project area, which have been observed to be insufficient. Hence, new public toilets have been proposed at three identified areas that includes Dhobi Dhara, Tundikhel and Adrasha Krishi Bazaar. However, the exact location of these public toilets has not been yet established and the required land has not been acquired. The wastewater from public toilets will be treated through a septic tank and soak pit at each site.

**2.6 Project Impact Area**

106. The project impact area refers to the area of the project town which is susceptible to either significant or insignificant impacts by the proposed project. This impact areas is delineated by demarcating the geographical boundary of the impact area on the topographical map. The impact areas has been delineated as "Core Project Area", and "Surrounding Project Area" on the basis of proximity and magnitude of the impacts due to the proposed project activities.

107. Here, the Core Project Area indicates the area required permanently as well as temporarily for the proposed project. This area refers to the service area as well the

area where the construction of the project components will be carried out. Hence, here, regarding this proposed project, this core area includes the service area of the proposed project which comprises complete area of ward no.6 & 7 and partial area of ward number 8 & 9 of Ilam Municipality.

108. This also includes the construction area where the proposed project components will be constructed. Hence, this also covers the following areas:

- a) Intake Areas: i) Gitang Khola-WN 2 of Sandakpur Municipality; ii) Bhandi Khola-WN 2 of Ilam Municipality; iii) Rate Khola- WN 2 of Sandakpur Municipality and iv) Mewa Khola- WN 2 of Sandakpur Municipality
- b) WTP Areas; WN 5
- c) RVT Areas; i) RVT 1 at Gumbadanda WN 5; ii) RVT 2 at Gadhi Barrack WN 6; iii) RVT 3 at Gadhi Barrack WN 6; iv) RVT 4 at Shikharnagar WN 7; v) RVT 5 at Milankendra (JICA) WN 7; vi) RVT 6 at Campus Danda WN 7 ; vii) RVT 7 at Tundikhel(JICA) -WN 7; viii) RVT 8 at Golkharka – WN 9 and ix) RVT 9 at Tilkini WN 8
- d) Transmission Mains: WN 2 & 5 of Ilam Municipality

109. The Surrounding Project Area indicates the area within the immediate surroundings of the core area of proposed project. It includes the area of the project town which is closely associated with the core area of the project. Hence, here in this proposed project, the surrounding area covers partial areas of ward 2 of Sandakpur Rural Municipality and partial areas of wards 2, 4, 5, 6, 8 & 9.

110. The Core Area & Surrounding Area of the proposed project is depicted in the figure given below:

Figure 5: Project Impact Area

**Engineer**

TAECICOM JV

## **2.7 Project Activities**

111. To carry out IEE study, information on the proposed activities of the proposed project needs to be collected. The study categorizes the project activities on the basis of project phase. This has been listed below:

### **2.7.1 Construction Activities**

112. The list of construction activities of the proposed project are given below:
- a) Construction of Internal Approach Roads
  - b) Establishment of Temporary Facilities for workers
  - c) Establishment of the Stockpiling Areas
  - d) Establishment of the Spoil Disposal Sites
  - e) Enforcement to workers to use personal protective equipments (PPE) as per condition
  - f) Rehabilitation of Existing Intakes
  - g) Construction of Proposed Project Components
  - h) Earthworks Excavation & Prompt Backfilling with Compaction
  - i) Slope Protection Measures like Gabion Wall Construction, Retaining Wall Construction
  - j) Provision of temporary alternative access to the shops & houses if their permanent access is hindered by the pipeline excavation works
  - k) Air Quality Monitoring
  - l) Water Quality Monitoring
  - m) Noise Quality Monitoring
  - n) Supervision on daily activities of workers to control waste generation
  - o) Management of Solid Wastes generated from the labour camp and construction sites
  - p) Dismantling of Temporary Facilities after the completion of construction works

### **2.7.2 Operation Activities**

113. The list of operation activities of the proposed project are given below:
- a) Water Quality Monitoring
  - b) Proper Implementation of Water Safety Plan (WSP)
  - c) Regular Monitoring by WUSC to ensure effective operation of water treatment plants
  - d) Regular Cleaning of Sedimentation Tank
  - e) Frequent Washing of Sand within Slow Sand Filter

- f) Disinfection of treated water at dosing unit by the WUSC operator by properly handling of chemicals
- g) Occasional Removal of Algae if found settled down at the bottom of the reservoir tank
- h) Operation & Maintenance of the project components whenever required

## 2.8 Financial & Economical Aspects

114. The commercial viability of the proposed project is based on the financial and economical aspects of the project. To ensure the worthiness of the investment on the project, analysis on financial & economical aspects is necessary which has been undertaken with TDF financing/loan of 25%, with recovery of 5% per annum till 20 years period plus 5 years grace period, after handover of the project to WUSC by collecting the water tariff from the consumers or each household based on water consumption. Simialrly, 70% of the project cost will be invested to the project and 5% of the project cost will be collected by WUSC from each and every household. While collecting the upfront cash, WUSC will make a certain rule/modality. However, the financial analysis is carried out to recover the loan with interest within the time frame, fund required for O & M and some additional fund for the future. Here, the financial analysis estimates the positive rate of return in terms of cash or values whereas economic analysis measures the effect of the project on the social benefit in the national perspective.

### 2.8.1 Water Tariff Band

115. Financial viability is assessed with the proposed tariff structure, with the sensitivity analysis in the scenario: (i) Cost increase by 10% (ii) Revenue decrease by 10% and (iii) Cost increase and revenue decrease both by 10%. The determination of water tariff is based on consumption-based system. The tariff structure is designed on the basis of affordability and willingness to pay; and tariff has also been set to ensure benefit to sustain the project after the design period.
116. The tariff structure has been set out for the households consuming 100 lpcd or 15.40 cum for fully plumbed and 65 lpcd or average 10.01 cum per month for yard tap connection depending upon the household size. The water tariff has been set at NRs. 240 for first band HH consuming water up to 6 cum, NRs. 60 per cum for 7 to 10 cum per month and NRs. 90 per cum per HH consuming water more than 11 cum of water. The tariff structure is based on the weighted average of all the categories; which is considered to be less than the AIFC. The tariff structure is based on household income and consumer's ability and willingness to pay.



117. Although households may have the ability to pay, willingness to pay (WtP) is usually related to the quality of service. Urban household in Nepal, have generally access to less than adequate water supply. Thus among many urban dwellers, there is a willingness to pay (WtP) a higher price for improved WS services.
118. Focusing on ATP rather than WtP, households should be expected to be able to pay at least 3-5% of their household incomes for good quality WS services. That is, they should pay up to the accepted levels of ATP or affordability. The reasoning behind this is that consumers receive a service that is not only convenient, but also results in clear health related benefits, when coupled with a sanitation and hygiene education program designed to maximize the health benefits of the improved WS services.
119. According to the detailed engineering design report, the tariff rate per month of the household is within the affordability limit of the household income under different strata, which is less than 5 percent of the household income of low and middle-income groups.

## **2.8.2 Capital Cost Recovery**

120. Capital cost recovery is a prime feature of this Project. The proposed tariff system as mentioned above is a part of this capital cost recovery. Here, capital cash recovery refers to the repayment of the loan by the users that has been provided to them. Here, cash recovery plan is the repayment back of 25% loan provided by TDF within the 25 years with 5 years grace period of the initial project at the rate of 5% as interest. The following given table gives the detail of cash recovery;



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Table 9: Cash Flow & Financial Position together with WUSC tariff structure

| Ilam Water Supply & Sanitation Project |            |            |            |             |             |             |             |             |             |             |
|----------------------------------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Year                                   | 3          | 5          | 7          | 9           | 11          | 13          | 15          | 17          | 19          | 21          |
| B.S.                                   | 2076       | 2079       | 2082       | 2085        | 2088        | 2091        | 2094        | 2097        | 2100        | 2103        |
| Water Sale                             | 30,214,696 | 31,744,315 | 34,185,155 | 36,813,673  | 39,644,299  | 42,692,574  | 45,975,233  | 48,302,729  | 48,302,729  | 48,302,729  |
| New connection                         | 1,098,960  | 1,127,880  | 1,214,640  | 1,301,400   | 1,417,080   | 1,503,840   | 1,648,440   | 1,706,280   | 1,706,280   | 1,706,280   |
| Total Income                           | 31,313,656 | 32,872,195 | 35,399,795 | 38,115,073  | 41,061,379  | 44,196,414  | 47,623,673  | 50,009,009  | 50,009,009  | 50,009,009  |
| Personnel                              | 4,662,000  | 5,360,355  | 6,205,281  | 7,183,388   | 8,315,670   | 9,628,427   | 11,143,793  | 12,900,333  | 14,933,749  | 15,680,436  |
| Energy                                 | 30,860     | 32,212     | 34,689     | 37,356      | 40,229      | 43,322      | 46,653      | 50,240      | 54,103      | 55,456      |
| Spare & Other                          | 3,725,000  | 3,851,130  | 4,049,016  | 4,257,888   | 4,478,322   | 4,711,053   | 4,711,053   | 4,724,847   | 4,767,081   | 4,781,415   |
| Chemicals                              | 300,000    | 330,750    | 362,884    | 443,237     | 513,102     | 593,979     | 593,979     | 593,979     | 593,979     | 593,979     |
| Total Cost                             | 8,917,860  | 9,574,447  | 10,671,870 | 11,921,849  | 13,347,322  | 14,974,782  | 16,465,478  | 18,269,400  | 20,348,892  | 21,111,286  |
| Tariff Band                            |            |            |            |             |             |             |             |             |             |             |
| 0-6                                    |            | 210        | 231        | 254         | 280         | 307         | 338         | 372         | 409         | 450         |
| 10-Jul                                 |            | 53         | 58         | 64          | 70          | 77          | 85          | 93          | 102         | 113         |
| 20-Nov                                 |            | 79         | 87         | 95          | 105         | 115         | 127         | 140         | 153         | 169         |
| 21-30                                  |            | 118        | 130        | 143         | 157         | 173         | 190         | 209         | 230         | 253         |
| >30                                    |            | 177        | 195        | 214         | 236         | 259         | 285         | 314         | 345         | 380         |
| Cash In Hand with Users                |            | 18,879,860 | 57,763,614 | 100,124,731 | 100,150,884 | 111,275,111 | 125,884,972 | 147,598,618 | 177,647,748 | 208,597,700 |
| Installment                            |            | 18,820,763 | 18,820,763 | 18,820,763  | 18,820,763  | 18,820,763  | 18,820,763  | 18,820,763  | 18,820,763  | 18,820,763  |
| Number of Taps 85 %                    |            | 3,194      | 3,350      | 3,516       | 3,690       | 3,874       | 4,066       | 4,268       | 4,478       | 4,618       |
| Tariff Increase 10% every 3 Years      |            |            |            |             |             |             |             |             |             |             |

Source: PEDR Volume II, 2018  
 Date: 11/11/2018  
 Engineer: [Signature]  
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### 2.8.3 Social Benefit Cost

121. Social Benefit Cost assesses the economic efficiency of the project through the systematic calculation of social costs and social benefits. All flows of benefits and costs over time are expressed on a common basis in terms of their net present value, regardless of whether they are incurred at different times. For this, EIRR needs to be determined which is based on all costs and benefits streams in economic price. For a project to be acceptable, the EIRR should be greater than the economic opportunity cost of capital. In the analysis, the EIRR is determined at 34.58 percent, which is greater than EOCC of 12 percent. The details are tabulated below:

Table 10: Social Benefit Cost

| Years of Operation                         | 1           | 5           | 10          | 15          | 20          | 25          |
|--------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Direct Benefit                             |             |             |             |             |             |             |
| - Full Plumbing                            | 36364528    | 40139635    | 45414312    | 51382126    | 58134159    | 58134159    |
| -Yard Taps                                 | 18949375    | 20916564    | 23665173    | 26774971    | 30293422    | 30293422    |
| Institutional                              | 5115488     | 5646542     | 6388544     | 7228051     | 8177876     | 8177876     |
| In Direct Impact                           | 60429391    | 66702741    | 75468029    | 85385148    | 96605457    | 96605457    |
| Economic income                            | 151,073,478 | 166,756,852 | 188,670,072 | 213,462,869 | 241,513,643 | 241,513,643 |
| Connection Charge                          | 2,747,400   | 1,185,720   | 1,359,240   | 1,503,840   | 1,706,280   | 1,706,280   |
| Incremental value                          | 166,180,826 | 183,432,538 | 207,537,079 | 234,809,156 | 265,665,008 | 265,665,008 |
| Total Economic Return                      | 375,596,743 | 62,552,242  | 70,789,827  | 80,058,176  | 90,583,301  | 90,583,301  |
| Expenses                                   |             |             |             |             |             |             |
| O&M                                        | 8,917,660   | 10,290,152  | 12,376,277  | 14,974,782  | 14,980,474  | 15,057,277  |
| - Fixed O&M                                | 8,587,000   | 9,891,657   | 11,872,589  | 14,337,480  | 14,337,480  | 14,407,842  |
| - Variable O&M                             | 330,660     | 398,495     | 503,689     | 637,301     | 642,994     | 649,435     |
| - Variable O&M/m3                          | 0.6         | 0.65        | 0.73        | 0.82        | 0.73        | 0.73        |
| - Variable O&M/m3<br>- Adjusted for Losses | 0.7         | 0.77        | 0.86        | 0.96        | 0.86        | 0.86        |
| Total O&M -<br>Adjusted for Losses         | 8,645,352   | 10,360,475  | 12,465,164  | 15,087,247  | 15,093,944  | 15,171,883  |
| Net Operating Income                       | 366,679,083 | 52,262,089  | 58,413,549  | 65,083,394  | 75,602,826  | 75,526,024  |
| Additional Connections                     |             | 1,185,720   | 1,359,240   | 1,503,840   | 1,706,280   | 1,706,280   |
| Meter Replacement                          | -           | -           | 195,000     | 225,000     | 260,000     | 290,000     |
| Debt                                       |             |             |             |             |             |             |
| Principal Balance                          | -           | -           | 241,303,872 | 203,975,088 | 158,333,050 | 95,528,396  |
| Principal Paid                             | -           | -           | 6,755,609   | 8,622,008   | 11,900,110  | 14,044,343  |

| Years of Operation           | 1           | 5           | 10          | 15          | 20            | 25            |
|------------------------------|-------------|-------------|-------------|-------------|---------------|---------------|
| Cumulative of Principal Paid | -           | -           | 30,710,483  | 69,905,705  | 119,929,845   | 183,774,733   |
| Interest Paid                | -           | -           | 12,065,194  | 10,198,754  | 7,816,653     | 4,776,420     |
| Total Debt Service           | -           | -           | 18,820,763  | 18,820,763  | 18,820,763    | 18,820,763    |
| Annual Payment               |             |             |             |             |               |               |
| Annual Cash Flow             | 366,679,083 | 51,076,369  | 38,038,547  | 44,533,792  | 54,815,784    | 54,708,981    |
| Cumulative Cash Flow         |             |             |             |             |               |               |
| Opening Balance              | -           | 513,205,252 | 696,863,522 | 899,815,972 | 1,142,549,542 | 1,416,431,574 |
| Surplus/Deficit              | 366,679,083 | 51,076,369  | 38,038,547  | 44,533,792  | 54,815,784    | 54,708,981    |
| Closing Balance              | 366,679,083 | 564,281,622 | 734,902,069 | 944,349,764 | 1,197,365,326 | 1,471,140,555 |
| NPV of Loan                  | 366,679,083 | 52,262,089  | 58,413,549  | 65,083,394  | 75,602,826    | 75,526,024    |
| NPV of Project               | 938,991,859 | 156,380,604 | 176,974,566 | 200,145,440 | 226,458,252   | 226,458,252   |
|                              |             |             |             |             |               |               |
| EIRR                         | 40.10%      |             |             |             |               |               |

Source: DEDR, 2018

122. Here, the determination of a) tariff rate considering loan with interest recovery, O & M Cost and some additional fund, b) cash recovery or surplus cost after O & M and c) social benefit cost will help to determine the financial and economic returns for the proposed project. According to the detailed engineering design report, FIRR is positive and the EIRR is higher than EOCC. This indicates the viability of the project in terms of financial and economic aspects.



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### 3. METHODOLOGY

123. To meet the objectives of the IEE study a systematic and integrated methodology was followed by the legal requirements of GoN. The Ministry of Water Supply has already approved the Terms of Reference (ToR) for the IEE study of Ilam Water Supply and Sanitation Project. The IEE study has followed basically the procedures outlined in the approved ToR.
124. The IEE study was conducted as per provisions of the Environmental Protection Rules (1997) following the provision of Rules 5, 7, 10 & 11 in compliance with the schedule 1, 3 & 5.
125. The IEE study has followed the procedures outlined in the approved ToR and has covered the issues delineated therein. The principal steps undertaken in the IEE methodology to accomplish the assignment are briefly discussed below:

#### 3.1 Literature review

126. Available primary and secondary literature in the form of reports and maps; topographic maps, land use maps, aerial photographs, cadastral survey maps, etc. were collected and reviewed to obtain secondary information. Feasibility Study Report, Detailed Engineering Design Report, Due Diligence Report and Socioeconomic Profile were the key documents collected and reviewed to determine the nature and scope of activities of the project that influences the environmental conditions of the proposal area. Likewise, data on climate, rainfall and other meteorological conditions were also collected from Department of Hydrology & Meteorology (DHM). Similarly, published and unpublished reports about environmental standards, Acts, Regulations, etc. were also collected and reviewed. Published and unpublished literature of the project area about biological, social, chemical, physical, and cultural environments in the form of maps, and reports, etc. were collected from various sources and reviewed to get information on the coverage of the studies and fulfill the data gaps.

#### 3.2 Impact Area Delineation

127. To carry out IEE study, the possible areas where the anticipated impacts have either significant or insignificant effects, need to be delineated. To specify the area that would be covered by the assessment, the geographical boundary of the influence area is delineated on the topographical map. This delineating methodology is called Impact Area Delineation. The impact areas have been delineated on the basis of proximity of the construction site to the nearby surrounding areas. The impact areas have been delineated as "Core Project Area",

and "Surrounding Project Area" on the basis of proximity and magnitude of the impacts due to the proposed project activities.

128. **Core Area:** Here, the Core Area indicates the area required permanently as well as temporarily for the proposed project. This area refers to the service area as well the area where the construction of the project components will be carried out.
129. **Surrounding Area:** Here, the Surrounding Area indicates the area within the immediate surroundings of the core area of proposed project. It includes the area of the project town which is closely associated with the core area of the project.

### 3.3 Field Study

130. The field study was carried out in the project service areas in an extensive manner by a multidisciplinary team, comprising a) an Environmental Specialist; b) Water Supply & Sanitation Engineer; c) Sociologist; d) Geo-hydrologist and e) Botanist. During the visit, baseline information on physico-chemical, biological, and socio-economic & cultural conditions of the core area and surrounding areas of the project area were collected using Simple Checklist and Survey Questionnaire method. Similarly, during field study, Rapid Assessment Checklist (**Refer Annex 2A**) has been duly followed in which data regarding physico-chemical, biological, socio-economic & cultural environment has been filled up. The sub-sections below briefly describes the various approaches and methodological tools used during the field study.

#### 3.3.1 Physico-Chemical Environment

131. An extensive physico-chemical environment survey was carried out by delineating the project impact area to collect the baseline information through simple checklist method. Topographic and geomorphological features were observed and documented. Physical features such as topography, air quality, erosion and land stability & land use pattern were also observed and Information in regard to these features were recorded. These data on physico-chemical environment were collected through literature review, field survey & investigation by the team of experts, expert's judgement and stakeholder consultations.
132. The data regarding Climate & Rainfall of the project town was collected from Department of Hydrology & Meteorology, Kathmandu. Similarly, the baseline information regarding water quality was collected by sampling process. This involved collection of four water samples; each from the proposed sources Gitang Khola, Bhandi Khola, Rate Khola & Mewa Khola. These water samples were taken to the certified laboratory for further analysis. The samples of Gitang Khola &

Bhandi Khola were tested at Aastha Scientific Research Service Pvt. Ltd. located at Dillibazar, Kathmandu and the samples taken from Rate Khola & Mewa Khola were tested at Nepal Environmental & Scientific Services (P.) Ltd. Located at Thapathali, Kathmandu. The laboratory analysis primarily measures the value of important parameters that includes pH, Color, Taste & Odor, Total Hardness, Calcium and Iron. Besides this, other parameters were also measured. The values of these parameters were then compared to the value prescribed as per NDWQS to measure the equivalence of the water quality of the proposed sources with NDWQS. This has been presented in a tabular form and has been attached in **Annex 6**.

133. Similarly, information on air quality and noise quality condition was collected through field observation and expert's judgement. For convenience, simple checklist for Physical environment has been prepared and this checklist as included in **Annex 4** is duly followed and filled up during field study. The consultations with the local communities and interviews with a few government officials, schools and representatives of the local bodies also provided aid to assess the physico-chemical aspects.

### 3.3.2 Biological Environment

134. The baseline information regarding biological environment was collected through walkthrough survey throughout the core & surrounding areas of the project area by adopting simple checklist method (**Refer Annex 4**), through professional judgement and local interaction. Types of vegetation and forests were identified based on the species composition. Information on rivers of the project area were also collected through interaction with the locals and through field observation. The protected vegetation (rare, endangered, indigenous, etc.) of the project area as per IUCN Red Book, CITES Appendices, IBAT Report generated by ADB and GoN list species were enumerated based on consultation with the local people and the expert judgement. Similarly, information on the aquatic species were also collected through the expert judgement and discussions with the locals.

### 3.3.3 Socio-economic and Cultural Environment

135. Household surveys were conducted through interviews by simple questionnaire method to obtain information on the socio-economic & cultural environment that includes demography, ethnicity, education, health & sanitation, drinking water condition of the project area, irrigation facility, local traditions, religions, land use patterns, incomes & expenditures and to acquire their perception towards the

proposed project, etc. Information on Migratory patterns of the local people and the Impact of river on settlements & agriculture were also collected. Information on the people residing within the core area of the proposed project town has also been collected through socio-economic survey. The survey covered 100% of the total HHs whereas only 10% of the total HHs was surveyed in detail for this study. The sample of Household Survey Questionnaire that has been filled up during field study has been included in **Annex 4**.

136. Focussed Group discussions (FGD) were also conducted to obtain suggestions and comments from all the potential stakeholders. The checklist followed for FGD and its findings have been included in **Annex 4**. Direct observation (Transect Walk Method) was also conducted to ascertain the existence of the cultural sites, and public institutions such as temples, cremation grounds, historical & archaeological sites, schools, and health posts within the project core areas and to determine the effect on their existence due to project construction activities. During this, findings on the existence of Project Affected Families (PAFs; families whose land or property will be impeded by the project construction activities) were made. Our findings show that no such PAFs exist as the project construction activities will not hinder any of the families residing within the project area. The Consultations with the village elites and Group discussions were done to assess the current situation of the project area community.

### 3.4 Public Notice

137. A public notice of 15 days was published in Arthik Abhiyan Dainik, a national daily newspaper on 2075/09/01. The main aim of the notice is to seek written opinions from the concerned people and institutions regarding the possible impacts that may result from the implementation of the proposal. Copies of the Public Notice has been pasted at the concerned municipality office.

### 3.5 Public Consultation

138. The public consultation program was conducted in the Ilam Municipality Office. There is no dissatisfaction regarding the proposed project.

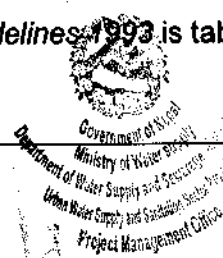
### 3.6 Collection of Muchulkas (Deed of Inquiry)

139. Deed of Inquiry (Muchulka) from the concerned municipality office has been collected within the 15 days from the date of public notice publication. This has been included in **Annex 3**.

### 3.7 Impact Identification, Prediction & Evaluation Methods

140. The information regarding Physico-chemical, Biological and Socio-economic & Cultural aspects as mentioned above has been collected to identify the susceptibility of these aspects to be affected by the proposed project activities. This helped to identify the anticipated environmental impacts of the proposed project. For this, Simple Checklist method has been adopted for the impact identification. This has been carried out by using Rapid Environmental Assessment (REA) Checklist prepared by ADB (*Refer Annex 2A*) and by using simple household survey questionnaire (*Refer Annex 4*) prepared during the desk study. These checklists explain the environmental features or factors that need to be addressed when identifying the impacts of projects and activities.
141. Once all the important impacts had been identified, their potential characteristics were predicted. The baseline data on physical, biological, socio-economic and cultural aspects were used to estimate the likely characteristics and parameters of impacts that includes Nature, Magnitude, Extent and Duration.
142. The nature of each predicted impact has been classified into Direct (D) and Indirect (ID). The magnitude of the impact has been classified into High (H), Medium (M) and Low (L). The extent has been classified into Site-Specific (SS), Local (L), and Regional (R). Similarly, the duration of impact has been classified into Short Term (ST), Medium term (MT), and Long term (LT).
143. Impact predictions are generally made against a baseline established by the existing environment. Hence, during our field study, the baseline data were used as reference point against which the characteristics and parameters of impact related changes were analysed. Impact predictions were also made by considering the future state of the environment. This also requires professional judgement for accuracy.
144. After the impact identification and prediction method, these impacts need evaluation to assess the adversity of adverse impacts and efficiency of beneficial impacts within the project core & surrounding areas. The impacts were evaluated regarding the significance of the predicted impacts. This was done by following the *National EIA Guidelines 1993* according to which scoring for each likely parameters of the impacts was carried out and the level of significance was assessed as recommended by this guidelines.
145. The scoring of impacts as per *National EIA Guidelines 1993* is tabulated below.

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**Table 11: Scoring of Impacts**

| S. No. | Likely Parameters of Impacts | Type                | Scoring as per National EIA Guidelines,1993 |
|--------|------------------------------|---------------------|---------------------------------------------|
| 1.     | Nature                       | Direct              | No Scoring Required                         |
|        |                              | Indirect            |                                             |
| 2.     | Magnitude                    | High (H)            | 60                                          |
|        |                              | Medium/Moderate (M) | 20                                          |
|        |                              | Low (L)             | 10                                          |
| 3.     | Extent                       | Regional ( R)       | 60                                          |
|        |                              | Local (L)           | 20                                          |
|        |                              | Site Specisifc (SS) | 10                                          |
| 4.     | Duration                     | Long Term (LT)      | 20                                          |
|        |                              | Medium Term (MT)    | 10                                          |
|        |                              | Short Term (ST)     | 5                                           |

Source: National EIA Guidelines 1993

146. Then, the significance level of Impact rated will be assessed as per the following table:

**Table 12: Significance of Impacts**

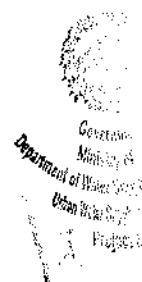
| S. No. | Scoring as per National EIA Guidelines,1993 | Level of Significance as per National EIA Guidelines,1993 |
|--------|---------------------------------------------|-----------------------------------------------------------|
| 1.     | Less than 50                                | Insignificant                                             |
| 2.     | 50 to 75                                    | Significant                                               |
| 3.     | More than 75                                | Very Significant                                          |

Source: National EIA Guidelines 1993

This evaluation was done as per the professional judgement by the key expert team involved in the IEE study.



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#### 4 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

##### 4.1 Nepal's Environmental Policy and Legal Framework

###### *Constitution of Nepal*

147. The Constitution of Nepal is the fundamental law of Nepal.

- Article 30 (1) of the Constitution of Nepal guarantees a "clean environment" as a fundamental right, and elaborates that "every citizen shall have the right to live in a clean and healthy environment".
- Article 30 (3) of the constitution also encourages the state to formulate necessary legal frameworks to balance environment and development.

148. Beside this, the Government of Nepal has passed a series of environmental laws, policies and implementing regulations and standards. Among these, the basic legislations that provide the framework within which environmental assessment is carried out in Nepal are the:

###### ***Environmental Protection Act, 2053 B.S. (1997 A.D.)***

149. Environmental Protection Act (EPA), 1997, which requires a proponent to undertake IEE or EIA of the proposed project and have the IEE or EIA Report approved by the concerned sector agency, respectively, prior to implementation. This EPA:

- (i) sets out the review and approval process of IEE and EIA Reports, that involve informing and consulting stakeholders;
- (ii) stipulates that no one is to create pollution that would cause significant adverse impacts on the environment or harm to public life and health, or to generate pollution beyond the prescribed standards;
- (iii) specifies for the Ministry in charge of environment (currently the MoFE) to conduct inspection of approved projects to ensure that pollution prevention, control or mitigation is carried out according to the approved IEE or EIA Report;
- (iv) provides for the protection of objects and places of national heritage and places with rare plants, wildlife and biological diversity; and
- (v) states that any person/party affected by pollution or adverse environmental impact caused by anybody may apply to the prescribed authority for compensation to be recovered from the polluter/pollution generator.

**Environmental Protection Rules, 2054(1997) with Amendments 2073 B.S. (2017A.D.)**

150. Environmental Protection Rules (EPR), 1997, and its amendments in 1999, 2007 & 2017 defines the implementing rule and regulations of the IEE/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 are required IEE and EIA, respectively, as amended in 2017.
151. Other environmental policies, laws, rules, conventions & standards that provide general context in the environmental assessment of water supply & sanitation works are presented in Table 13 given below:



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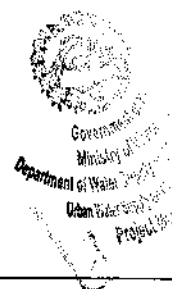
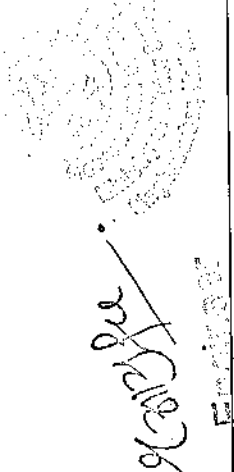


Table 13: Other Relevant Environmental Act, Rules, Plan, Policies, and Guidelines of Nepal

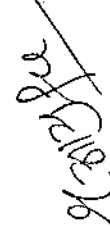
| Act/ Rule Policy/Law/Guidelines                                                                           | Year                  | Relevant Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Remarks                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1.Plans, Policies &amp; Strategies</b>                                                                 |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                         |
| National Environmental Policy & Action Plan (NEPAP)                                                       | 2050 B.S. (1993 A.D.) | Of its five objectives, most relevant to the Project are to (i) mitigate adverse environmental impacts; and (ii) safeguard national & cultural heritage & preserve biodiversity, within & outside protected areas.                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>The subproject will not encroach any physical &amp; cultural heritage areas and will not affect biodiversity.</li> <li>EMP provides measures to mitigate anticipated adverse impacts.</li> </ul> |
| Water Resources Strategy                                                                                  | 2059 B.S. (2002 A.D.) | Among the ten strategic outputs of this strategy, third output focusses on Adequate Supply of and access to potable water and sanitation & hygiene awareness provided.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | This provision will strengthen implementation capacity for the proposed project.                                                                                                                                                        |
| Rural Water Supply and Sanitation National Policy and Rural Water Supply and Sanitation National Strategy | 2060 B.S.(2004 A.D.)  | Recognizes that all people have a right to access to basic water supply and sanitation services and that these services are necessary for socio economic development and to combat waterborne diseases.                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The proposed project ensures easy access to safe, reliable & potable water.                                                                                                                                                             |
| Rural Water Supply and Sanitation Sectoral Strategic Action Plan (Unofficial Translation)                 | 2060 B.S.(2004 A.D.)  | <ul style="list-style-type: none"> <li>This action plan has proposed "Environmental Aspects" as one of its major components.</li> <li>This underscores the environmental aspects of all levels of plans and their implementation and consolidates them according to rules &amp; policies to ensure the execution of development works.</li> </ul>                                                                                                                                                                                                                                                                                                                  | Though this action plan has main focus on rural areas and the proposed project is for urban area, the IEE study has duly followed this strategic action plan as a reference.                                                            |
| National Water Plan-Nepal                                                                                 | 2062 B.S. (2005 A.D.) | <ul style="list-style-type: none"> <li>This includes subsector-wise action programmes in water induced disasters, environmental action plan on management of watershed and aquatic ecosystem, water supply, sanitation and hygiene, irrigation for agriculture, hydropower development, industries, tourism, fisheries, and navigational uses, water-related information systems (Decision Support System for River Basin Planning and Management), legal frameworks, and institutional mechanisms</li> <li>This also includes Environment Management Plan, a strategic document for the implementation of environmental protection measures (including</li> </ul> | This has been considered in IEE study.                                                                                                                                                                                                  |

  
 Ministry of Environment, Conservation and Forestry  
 Department of Environment and Forestry  
 Kathmandu, Nepal

| Act/Rule/Policy/Law/Guidelines                                                    | Year                                             | Relevant Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Remarks                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| National Urban Policy                                                             | 2063 B.S. (2007 A.D.)                            | downstream water pollution and groundwater quality, erosion/landslide and sedimentation, water pollution and sanitation, effect on aquatic life and wetland ecosystem), monitoring (baseline, impacts, and compliance), environmental auditing and institutional and procedural arrangements.<br>The 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. | The IEE study will meet the provisions of this policy.                                                                                                                                                                                                                                        |
| National Urban Water Supply & Sanitation Sector Policy (Final Draft)              | 2065 B.S. (2009 A.D.)                            | The Policy requires the IEE or EIA of proposed WSS projects by the EPA/EPR to (i) incorporate consultations with key stakeholders, including endpoint users; & (ii) specify measures to mitigate environmental impacts before, during construction & operation, as well as corrective measures.                                                                                                                                                                                                                                               | The IEE study will meet the provisions of this policy.                                                                                                                                                                                                                                        |
| Updated 15-yr Development Plan for Small Towns Water Supply and Sanitation Sector | 2066 B.S. (2009 A.D. and Amendments in 2015A.D.) | The Plan emphasizes monitoring and evaluation as an important component of a project to determine the overall impact of a project.                                                                                                                                                                                                                                                                                                                                                                                                            | EMP prescribes performance monitoring & evaluation to minimize the anticipated environmental impacts.                                                                                                                                                                                         |
| National Water Supply & Sanitation Policy (Draft)                                 | 2071 B.S. (2014 A.D.)                            | The goal of this Policy is to reduce urban and rural poverty by ensuring equitable socio-economic development, improving health and the quality of life of the people and protection of environment through the provision of sustainable water supply and sanitation services.                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>The proposed project is solely for provision of sustainable water supply service to Ilam Municipality residents.</li> <li>The IEE study ensures the protection of the environment from the construction activities of the proposed project.</li> </ul> |
| National Forest Policy                                                            | 2075 B.S. (2019 A.D.)                            | <ul style="list-style-type: none"> <li>It ensures sustainability and participatory management of forests, protected areas, watershed, biodiversity, flora &amp; fauna. It also guides the methodology of the management of national forests and protected areas. It also covers periodic assessment and updating of information on forest resources of the country.</li> </ul>                                                                                                                                                                | The proposed project does not have to deal with forest related adverse issues as there is no requirement of occupying forest areas for the proposed project.                                                                                                                                  |

| Act/Rule/Policy/Law/Guidelines      | Year                                                          | Relevant Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                   | Remarks                                                                                                                                                                                                                                          |
|-------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Land Use Policy                     | 2072 B.S. (2015 A.D.)                                         | <ul style="list-style-type: none"> <li>The strategy 3 of Policy 2 has taken into account to maintain a balance between physical infrastructure development and environment.</li> <li>The strategy 3 of Policy 10 focusses on adoption of principle of sustainable development in view of the impact of climate change during any construction and/or development works in order to keep balance between land, environment and development.</li> </ul> | <ul style="list-style-type: none"> <li>The proposed project will maintain balance between construction activities and environmental aspects of the project town.</li> <li>The IEE study ensures this issue.</li> </ul>                           |
| National Urban Development Strategy | 2074 B.S. (2017 A.D.)                                         | <ul style="list-style-type: none"> <li>This strategy assesses the existing conditions of infrastructures, environment, economy and governance, establishes benchmarks and desirable standards.</li> <li>It identifies prioritized strategic initiatives for investment in infrastructure and environment to realize the comparative advantages of urban areas.</li> </ul>                                                                             | The IEE study has duly followed this.                                                                                                                                                                                                            |
| <b>2. Laws &amp; Acts</b>           |                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                  |
| Essential Goods Protection Act      | 2012 B.S. (1955 A.D.)                                         | <ul style="list-style-type: none"> <li>Deems drinking water an essential commodity and strictly protects drinking water.</li> <li>Prohibits any unauthorized use or misuse, stealing, damaging etc. of drinking water.</li> </ul>                                                                                                                                                                                                                     | The proposed project ensures safe, reliable & potable water along with the provision of protection works and metering system to prevent any misuses, stealing and damage problems.                                                               |
| Aquatic Animal Protection Act       | 2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.)) | This act renders punishment to any party introducing poisonous, noxious or explosive materials into a water source or destroying any dam, bridge or water system with the intent of catching or killing aquatic life. It also emphasizes that GoN empowers to prohibit catching, killing and harming of certain kinds of aquatic animals by notification in Nepal Gazette.                                                                            | <ul style="list-style-type: none"> <li>Information of this act will be delivered to the construction workers, as they may get involved in fishing during construction period.</li> <li>This issue has been covered by this IEE study.</li> </ul> |
| Town Development Act                | 2045 B.S. (1988 A.D.)                                         | This act has provision of necessary services and facilities to the residents of the town by reconstructing, expanding and to develop existing towns and by constructing new towns and to maintain health, convenience and economic interest of general public.                                                                                                                                                                                        | The proposed project is solely for provision of continuous water supply facilities as per the increasing demand of water of the increasing population of Rupakot Majhuwagadhi town.                                                              |

  
 Government of Nepal  
 Ministry of Water Supply  
 Urban Development and Sewerage  
 Ilam Water Supply and Sewerage  
 Project Management Office

  
 Engineer

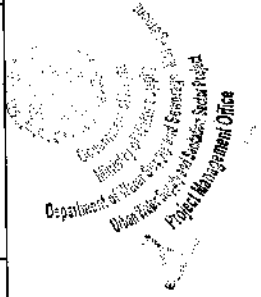
| Act/ Rule Policy/Law/Guidelines            | Year                                                          | Relevant Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                 | Remarks                                                                                                                                                              |
|--------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water Resource Act                         | 2049 B.S. (1992 A.D.)                                         | <ul style="list-style-type: none"> <li>The umbrella Act governing water resource management.</li> <li>Provides for the formation of water user associations and establishes a system of licensing.</li> <li>Prohibits water pollution.</li> </ul>                                                                                                                                                                                                   | WUSC has been formed for this proposed project as per this act and There is provision of control of water pollution through protection works and strict supervision. |
| Forest Act                                 | 2049 B.S. (1993 A.D.) with Amendments - 2055 B.S. (1999 A.D.) | The Act prohibits the extraction of boulders, rocks, pebbles, sand or soil from national forests, defined as all forests, excluding private forests, whether marked or unmarked with forest boundary, to include waste or uncultivated lands, or unregistered lands surrounded by the forest or situated near adjacent forests as well as paths, streams rivers, lakes, riverine lands within the forest.                                           | No trees will be cut. EMP stipulates no quarrying of natural aggregate materials.                                                                                    |
| Land Acquisition Act                       | 2049 B.S. (1993 A.D.)                                         | It guides the compulsory acquisition of land. It also describes that GoN can acquire land at any place and in any quantity by giving compensation pursuant to the act for the land acquired for any public purposes or for operation of any development project initiated by GoN.                                                                                                                                                                   | There is no requirement of land acquisition of private land. All the land required are under the ownership of GoN.                                                   |
| Child Labor Prohibition and Regulation Act | 2056 B.S. (2001 A.D.)                                         | The section 3 of the Act prohibits a child from engaging in work, sub-clause 1 of the clause 3 states "Nobody shall engage in work a child who has not completed fourteen years of age as a labor and subclause 2 states "Nobody shall engage a child in a risk full occupation or work set forth in the Schedule". The section 4 states "Child not to be engaged in work against his will by temptation or fear or pressure or by any other means. | This provision has been stated in EMP.                                                                                                                               |
| Water Supply Management Board Act          | 2063 B.S. (2006 A.D.)                                         | It guides to prevent the misuse of potable water and prevent pollution of potable water                                                                                                                                                                                                                                                                                                                                                             | The proposed project has followed this as it has provision of protection works at the intake site, WTP & RVT sites that will prevent pollution of water.             |
| Solid Waste Management Act                 | 2068 B.S. (2011 A.D.)                                         | Article 4 provides that the management of hazardous, medical, chemical or industrial waste rests upon the generators of such wastes. Management should be as prescribed in the Act. Article 5 provides that individuals and entities must reduce the amount of solid waste                                                                                                                                                                          | EMP prescribes eco-friendly management of solid and hazardous wastes.                                                                                                |

| Act/ Rule Policy/Law/Guidelines                                                              | Year                                                | Relevant Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Remarks                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Labour Act                                                                                   | 2074 B.S. (2017 A.D.)                               | <p>generated while carrying out work or business.</p> <ul style="list-style-type: none"> <li>The Act has provisions for the rights, interest, facilities and safety of workers and employees working in enterprises of various sectors.</li> <li>The Act emphasizes on occupational health and safety of workers and stipulates provision of necessary safety gears and adopting appropriate precautionary measures against potentially hazardous machine/equipment in the workplace.</li> <li>It also specifies to arrange such as removal of waste accumulated during production process and prevention of dust, fume, vapor and other waste materials, which adversely affect the health of workers.</li> <li>It specifies the provision of controlling the communicable diseases at the construction site. It also prohibits mobilization of child as a labor. It emphasizes on the provision of temporary camp, safe drinking water and necessary food supplies to the workers.</li> </ul> | These provisions are stated in EMP.                                                                                                                                                   |
| Local Government Operation Act                                                               | 2074 B.S. (2017 A.D.)                               | <p>The Act gives Province Government the functions, duties &amp; powers to: (i) entrust municipalities with responsibility of WSS services, (ii) conserve &amp; protect their local environment &amp; natural resources; (iii) plan, implement &amp;/or operate &amp; maintain WS projects at local level; (iv) implement or arrange for implementation local sanitation/sewerage &amp; drainage projects; (v) protect cultural heritage &amp; religious sites; &amp;/or (vi) monitor project activities within their respective jurisdictions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                             | Provides a basis for Local Government to monitor the environmental performance of the projects. EMP provides the responsibilities of LGs in EMP implementation.                       |
| <b>3. Rules &amp; Regulations</b><br>Solid Waste (Management & Resource Mobilization), Rules | 2044 B.S. (1987 A.D.) & Amendments 2049 (1992 A.D.) | <ul style="list-style-type: none"> <li>This act focusses on the management of solid waste and mobilization of resources related.</li> <li>These also ensure the health convenience of the common people by controlling the adverse impact on pollution from solid waste.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>This act needs to be reviewed during construction phase.</li> <li>EMP covers the requirement of this rule for the proposed project.</li> </ul> |
| Water Resource Regulations                                                                   | 2050 B.S. (1993 A.D.)                               | This is the umbrella Regulation governing water resource management.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The proposed project has followed these provisions.                                                                                                                                   |

| Act/Rule Policy/Law/Guidelines                                 | Year                  | Relevant Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Remarks                                                                         |
|----------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Drinking Water Regulations                                     | 2055 B.S. (1998 A.D.) | <ul style="list-style-type: none"> <li>Sets out the procedure to register a Water User Association and to obtain a license.</li> <li>Sets out the rights and obligations of Water User Associations and license holders.</li> <li>Regulates the use of drinking water.</li> <li>Provides for the formation of Drinking Water User Associations and sets out the procedure for registration.</li> <li>Deals with licensing of use drinking water.</li> <li>Deals with the control of water pollution and maintenance of quality standards for drinking water.</li> <li>Sets out the conditions of service utilization by consumers.</li> </ul> | The proposed project has followed all these provisions.                         |
| Solid Waste Management Rules                                   | 2070 B.S. (2013 A.D.) | <ul style="list-style-type: none"> <li>GoN has issued these rules by exercising the power conferred by the section 50 of the Solid Waste Management Act, 2068.</li> <li>Section 3 of this rule focuses on Segregation &amp; management of solid wastes.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                            | EMP for this proposed project covers this matter focused by this rule.          |
| Labor Rules                                                    | 2075 B.S. (2018 A.D.) | <ul style="list-style-type: none"> <li>GoN has issued these rules by exercising the power conferred to it under the section 184 of the Labor Act, 2074.</li> <li>Section 7 of these rules deals with Occupational Safety &amp; Health Policy.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                      | EMP for this proposed project covers this matter focused by this rule.          |
| 4. Directives, Guidelines & Manuals<br>National EIA Guidelines | 2048 B.S. (1993 A.D.) | This guidelines aims to assess the environmental impacts likely to be caused by a project, and promote its positive impacts and mitigate or eliminate adverse impacts by undertaking preventive and other effective measures after integrating the environmental impacts in the planning cycle of all the projects to be initiated in Nepal, prior to their initiation, so as to make the economic benefits from development projects sustainable.                                                                                                                                                                                            | This has been followed for evaluation of the anticipated environmental impacts. |
| WHO Air Quality Guidelines, Global Update                      | 2061 B.S. (2005 A.D.) | It provides basis for global standards in air quality that are designed to offer guidance in reducing the health impacts of air pollution.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | During air quality monitoring, this guidelines will be followed.                |
| WHO Guidelines for Drinking-water                              | 2073 B.S. (2017 A.D.) | It provides the recommendation of WHO for managing the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | During water quality                                                            |

| Act/ Rule Policy/Law/Guidelines                                                       | Year                  | Relevant Provisions                                                                                                                                               | Remarks                                                                                 |
|---------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Quality, Fourth Edition                                                               | A.D.                  | risk from hazards that may compromise the safety of drinking water.                                                                                               | monitoring, this guidelines will be considered and followed.                            |
| National Noise Standard Guidelines                                                    | 2068 B.S. (2012 A.D.) | It provides basis for national standards in noise quality that are designed to offer guidance in reducing the health impacts of noise pollution.                  | During noise quality monitoring, this guidelines will be followed.                      |
| Guidelines for Community Noise by WHO                                                 | 2055 B.S. (1999 A.D.) | It provides basis for global standards in noise quality at community level that are designed to offer guidance in reducing the health impacts of noise pollution. | During noise quality monitoring, this guidelines will be followed.                      |
| Working procedure for the use of national forest for national priority projects, 2074 | 2074 B.S. (2017 A.D.) | It emphasizes on the management regarding the use of national /community forests for the implementation of national priority project.                             | During construction activities within the community forest area, this will be followed. |

Source: IEE Study, 2018/019



*[Signature]*  
Engineer



## 4.2 Environmental Agreements

### 4.2.1 International Environmental Agreements (Conventions & Treaties)

152. Nepal is a signatory to many international agreements and conventions related to environmental conservation. However, all of those conventions are not interrelated to the proposed project. The conventions related to the proposed project are as follows:

- a) The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973
- b) International Covenant on Economic, Social and Cultural Rights (ICESCR), 1976
- c) Worst Forms of Child Labour Convention, 1999

153. The relevance of the aforementioned environmental agreements to the Subproject are with their emphasis on human activities to (i) take measures to protect local, as well as global, natural resources and environment; (ii) prevent or reduce the causes of climate change; and (iii) anticipate and mitigate the adverse impacts of climate change. The country is also committed to the Millennium Development Goals, the seventh goal of which is to "ensure environmental sustainability" targeting the reverse of loss of forest and environmental resources, reduction of biodiversity loss, and increase in the proportion of the population with sustainable access to safe drinking water and basic sanitation.

154. The Ilam Water Supply & Sanitation Project does not and will not break or go against Nepal's commitment to these international agreements.

## 4.3 Environmental Standards

155. The key environmental quality standards applied in the GoN IEE (as well as in the ADB IEE) are listed below and their details are featured in **Annex 2B**:

- National Drinking Water Quality Standards 2062 B.S. (2005 A.D.)
- National Ambient Air Quality Standards, for Nepal (NAAQS), 2003 A.D. & Updated in 2012 A.D.
- National Diesel Generator Emission Standard, 2012
- Nepal Vehicle Mass Emission Standard, (NVMES), 2069 B.S. (2012 A.D.)
- The key environmental quality standards applied in the GoN IEE (as well as in the ADB IEE) are listed in Table 14 and their details on the acceptable level criteria of these standards are featured in **Annex 2B**.

Table 14: Relevant Environmental Quality Standards

| Particular                                                      | National Standard                                       | International Standard                                          |
|-----------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------|
| Ambient air quality                                             | National Ambient Air Quality Standards, for Nepal, 2003 | WHO Air Quality Guidelines, Global Update, 2005                 |
| Noise                                                           | National Noise Standard Guidelines, 2012                | WHO Noise Level Guidelines                                      |
| Drinking water quality                                          | National Drinking Water Quality Standards, 2005         | WHO Guidelines for Drinking-water Quality, Fourth Edition, 2011 |
| Emission standard for diesel generator discharge to ambient Air | National Diesel Generator Emission Standard, 2012       |                                                                 |

\* For surface and groundwater quality monitoring, the National Drinking Water Quality Standard shall be applied since these resources are used for drinking.

Source: IEE Study, 2018/019

156. As shown in the above Table 14, *National Ambient Air Quality Standards, for Nepal, 2003* is enforced by GoN that has set quality standards for seven parameters TSP, PM<sub>10</sub>, Sulphur Dioxide(SO<sub>2</sub>), Nitrogen Oxide(NO<sub>2</sub>), Carbon Monoxide (CO), Lead (Pb) and Benzene at national level. Similarly, *WHO Air Quality Guidelines, Global Update, 2005* enforced by WHO has set quality standards for four parameters PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>2</sub> at international level. Both standards provide guidelines to follow and comply the set standards for the ambient air quality during construction period. The acceptable level criteria for ambient air quality as per both standards are given below:

Table 15: Standards for Ambient Air Quality

| Parameter         | Averaging Period | Nepal's Ambient Air Quality Standard (µg/m <sup>3</sup> ) * | WHO Air Quality Guidelines (µg/m <sup>3</sup> ) **, Global Update 2005 | Second Edition, 2000 |
|-------------------|------------------|-------------------------------------------------------------|------------------------------------------------------------------------|----------------------|
| TSP               | Annual           | -                                                           | -                                                                      | -                    |
|                   | 24-hour          | 230                                                         | -                                                                      | -                    |
| PM <sub>10</sub>  | Annual           | -                                                           | 20                                                                     | -                    |
|                   | 24-hour          | 120                                                         | 50                                                                     | -                    |
| PM <sub>2.5</sub> | 1-year           | -                                                           | 10                                                                     | -                    |
|                   | 24-hour          | -                                                           | 25                                                                     | -                    |
| SO <sub>2</sub>   | Annual           | 50                                                          | -                                                                      | -                    |
|                   | 24-hour          | 70                                                          | 20                                                                     | -                    |
|                   | 10-minute        | -                                                           | 500                                                                    | -                    |
| NO <sub>2</sub>   | 1-year           | 40                                                          | 40                                                                     | -                    |
|                   | 24-hour          | 80                                                          | -                                                                      | -                    |
|                   | 1-hour           | -                                                           | 200                                                                    | -                    |
| CO                | 8-hour           | 10,000                                                      | -                                                                      | 10,000               |
|                   | 15-minute        | 100,000                                                     | -                                                                      | 100,000              |
| Pb                | 1-year           | 0.5                                                         | -                                                                      | 0.5                  |
| Benzene           | 1-year           | 20                                                          | -                                                                      | -                    |

Source:

\* National Ambient Air Quality Standards for Nepal 2003. Obtained from Environment Statistics of Nepal 2011, Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal.

\*\* Environmental Health and Safety General Guidelines, 2007. International Finance Corporation, World Bank Group.

\* Air Quality Guidelines for Europe, Second Edition, 2000 WHO Regions: Office for Europe, Copenhagen.

Parameter that either has no national standard value for 24-hour observation or with WHO guideline value for 24-hour observation as more stringent than that specified in the national standards.

157. Similarly, *National Noise Standard Guidelines, 2012* has set the standard noise levels measured in dBA for Industrial area, Commercial Area, Rural Residential Area, Urban Residential Area, Mixed Residential Area and Quiet Area. This also

has provision of standard values for the noise level generated by Water Pumps and Diesel Generator also. This is limited within the country only. For international level, *WHO Noise Level Guidelines* has set the standard noise levels measured in dBA for two areas that includes residential and commercial areas. The standard values for ambient noise quality are given in the table given below:

Table 16: Standards for Ambient Noise Quality

| Receptor / Source      | National Noise Standard Guidelines, 2012 |       | WHO Guideline Values                     |               |
|------------------------|------------------------------------------|-------|------------------------------------------|---------------|
|                        | (dB)                                     |       | for Noise Levels Measured Out of Doors * |               |
|                        | Day                                      | Night | (One Hour L <sub>eq</sub> in dBA)        |               |
|                        |                                          |       | 07:00 - 22:00                            | 22:00 - 07:00 |
| Industrial area        | 75                                       | 70    | 70                                       | 70            |
| Commercial area        | 65                                       | 55    |                                          |               |
| Rural residential area | 45                                       | 40    | 55                                       | 45            |
| Urban residential area | 55                                       | 50    |                                          |               |
| Mixed residential area | 63                                       | 55    |                                          |               |
| Quiet area             | 50                                       | 40    | -                                        | -             |
| Water pump             | 65                                       |       | -                                        | -             |
| Diesel generator       | 90                                       |       | -                                        | -             |

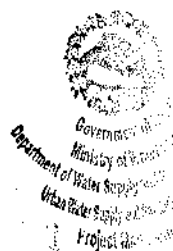
\* Guidelines for Community Noise, WHO, 1999.

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

158. Similarly, *National Drinking Water Quality Standards, 2005* provides guidelines for various parameters for the required frequency of water quality monitoring. This is acceptable at the national level only. For international standards, WHO has set standards for drinking water quality. This is shown in detail in the following table:



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Engineer



**Table 17: Standards for Drinking Water Quality**

| Group       | National Drinking Water Quality Standards, 2006 |           |                            | WHO Guidelines for Drinking-water Quality, 4th Edition, 2011 <sup>1</sup> |
|-------------|-------------------------------------------------|-----------|----------------------------|---------------------------------------------------------------------------|
|             | 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                         | µS/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 <sup>A</sup>     | 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 <sup>AA</sup>                                                           |
|             |                                                 |           |                            |                                                                           |
| Micro Germs | E-coli                                          | MPN/100ml | 0                          | must not be detectable in any 100 ml                                      |
|             | Total Coliform                                  | MPN/100ml | 0 in 95% of samples taken  | 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: National Drinking Water Quality Standards, 2005 and Implementation Directives for NDWQS, 2005

159. *National Diesel Generator Emission Standard, 2012* has been introduced by the Government of Nepal in 2012 for new and in use diesel generators with a capacity of 8 kW-560kW (under the 1997 Environment Protection Act). The emissions standards set for new diesel generator imports is equivalent to Bharat Stage III standards and, for in-use diesel generators, is equivalent to Bharat Stage II. The Diesel Power Generation: Inventories and Black Carbon Emissions in Kathmandu Valley, Nepal 60 emissions limits are set for four major pollutants: CO, HC, NOx, and PM. This is given in detail below:

for four major po



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Department of Water Supply and Sanitation  
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Seal of the Commonwealth of Massachusetts, featuring a Native American figure holding a bow and arrow, surrounded by the text "SIGILLUM REIPUBLICÆ MASSACHUSETTENSIS" and "1780".

**Table 18: National Diesel Generators Emission Standards, 2012****1. Emissions Limits (g/kWh) for Imports of New Diesel Generators**

| Category (kW)  | CO   | HC+NO <sub>x</sub> | PM   |
|----------------|------|--------------------|------|
| kW < 8         | 8.00 | 7.50               | 0.80 |
| 8 = kW < 19    | 6.60 | 7.50               | 0.80 |
| 19 = kW < 37   | 5.50 | 7.50               | 0.60 |
| 37 = kW < 75   | 5.00 | 4.70               | 0.40 |
| 75 = kW < 130  | 5.00 | 4.00               | 0.30 |
| 130 = kW < 560 | 3.50 | 4.00               | 0.20 |

Note: This standard is equivalent to Bharat III standards.

**2. Emissions Limits (g/kWh) for In-use DG Sets**

| Category (kW)  | CO   | HC   | NO <sub>x</sub> | PM   |
|----------------|------|------|-----------------|------|
| kW < 8         | 8.00 | 1.30 | 9.20            | 1.00 |
| 8 = kW < 19    | 6.60 | 1.30 | 9.20            | 0.85 |
| 19 = kW < 37   | 6.50 | 1.30 | 9.20            | 0.85 |
| 37 = kW < 75   | 6.50 | 1.30 | 9.20            | 0.85 |
| 75 = kW < 130  | 5.00 | 1.30 | 9.20            | 0.70 |
| 130 = kW < 560 | 5.00 | 1.30 | 9.20            | 0.54 |

Note: This standard is equivalent to Bharat II standards.

- Sampling collection point should be located at one-third of the DG set stack height.
- kW= Power Factor \* kW
- Testing Methodology: Should be according to ISO 8178 or equivalent to ISO 8178 standard set by the manufacturing country.

Source: Diesel Power Generation, 2014 by The World Bank

#### 4.4 Environmental Assessment Requirements

160. The Project is subjected to the environmental safeguard requirements of both the ADB and Government of Nepal.

##### 4.4.1 Environmental Assessment Requirements of the ADB

161. All projects funded by the ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects funded under ADB loan are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. Concerning the environment, the SPS 2009 is underpinned by the ADB Operations Manual, Bank Policy (OM Section F1/OP, 2010). The policy promotes international good practice as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines<sup>1</sup>.
162. ADB's Environmental Safeguards policy principles are defined in SPS (2009), Safeguard Requirements as per Table 19 and the IEE is intended to meet these requirements.

<sup>1</sup> New Version of the "World Bank Group Environmental, Health, and Safety Guidelines" April 30, 2007, Washington, USA.  
<http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines>

Table 19:SPS 2009 Safeguard Requirements

| SPS 2009 - Safeguard Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment (EA) so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.                                                                                                                                                                                                                                                                                                                                                     | REA has been undertaken, indicating that the Project is <b>NOT</b> : (i) environmentally critical; and (ii) adjacent to or within environmentally sensitive/critical area. The extent of adverse impacts is expected to be local, site-specific, confined within main and secondary influence areas. Significant adverse impacts during construction will be temporary & short-term, can be mitigated without difficulty. There is no adverse impact during operation. Hence, IEE is sufficient. |
| Conduct EA to identify potential direct, indirect, cumulative, & induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical, cultural resources in the context of the project's area of influence. Assess potential transboundary global impacts, including climate change.                                                                                                                                                                                                   | IEE has been undertaken to meet this requirement. (Chapter 7 & 8). No transboundary & global impacts, including climate change.                                                                                                                                                                                                                                                                                                                                                                  |
| Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also, consider the no project alternative.                                                                                                                                                                                                                                                                                                                                                         | Analysis of alternatives is presented in Chapter 6                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Avoid, and where avoidance is not possible, minimize, mitigate, &/or offset adverse impacts and enhance positive impacts using environmental planning & management. Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.                                                                                                                                                           | An EMP has been prepared to address this requirement.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Carry out meaningful consultation with affected people & facilitate their informed participation. Ensure women's participation. Involve stakeholders, including affected people & concerned NGOs, early in the project preparation process & ensure that their views & concerns are made known to & understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to EA. Establish a GRM to receive & facilitate resolution of affected people's concerns & grievances on project's environmental performance. | Key informant and random interviews have been conducted. A grievance redress mechanism for the resolution of valid Project-related social and environmental issues/concerns is presented in Chapter 10.                                                                                                                                                                                                                                                                                          |

*[Signature]*  
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Department of Water Supply and Sewerage  
Kathmandu  
Project Management Office

Ministry of Water Supply  
Kathmandu, Nepal

| SPS 2009 - Safeguard Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Remarks                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disclose a draft EA (including the EMP) promptly, before project appraisal, in an accessible place & a form & language(s) understandable to affected people & other stakeholders. Disclose the final EA, & its updates if any, to affected people & other stakeholders.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The draft IEE will be disclosed on ADB's website before Project appraisal. After getting approval from GoN, Copies of both SPS-compliant IEE and GoN-approved IEE will be made available at the offices of the PMO, ICG and WUSC for public consultation.                                                                                                                                                |
| Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | EMP implementation, reporting and disclosure of monitoring reports are in this IEE.                                                                                                                                                                                                                                                                                                                      |
| Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources. | The project does not encroach on areas of critical habitats. No trees will be cut. However, ground cover and low shrubs in the project footprint and some work easement will have to be removed from the transmission main. Although in due time, ground cover is expected to grow over the backfilled affected area naturally, EMP recommends seeding of the re-surfaced area to accelerated re-growth. |
| Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phase-outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.                                           | This requirement is only minimally applicable to the Project in the aspect of waste generation, e.g., effluent from septic tanks and generated sludge and sludge disposal from water supply and sanitation structures. The Project will not involve hazardous materials subject to international bans/phase-outs.                                                                                        |
| Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | EMP provides measures to mitigate health and safety hazards during construction and operation.                                                                                                                                                                                                                                                                                                           |

| SPS 2009 - Safeguard Requirements                                                                                                                                                                                                                                                                                                                                                | Remarks                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| communities.                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                              |
| Conserve physical, cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during the environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation. | The Project will not affect any physical, cultural resource. The EMP recommends the measure/s mitigate the adverse impact on PCR in case of the chance find. |

Source: Safeguard Policy Statement, ADB, 2009 and IEE Study, 2018/019

#### 4.4.2 Environmental Impact Assessment Requirements of Government of Nepal

163. The Environmental Protection Rules (EPR) defines the environmental impact assessment process that should be followed in the preparation, review, and approval of environmental assessment reports. The process applicable to the Project is summarized in Table 20 given below.

Table 20: The GoN IEE Report Preparation, Review, Approval and Implementation Process

| Steps in the Process                                                                                                                                                                                                                                  | Remarks                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Proponent refers to EPR Schedules 1 & 2 for the required environmental assessment (IEE or EIA) to carry out.                                                                                                                                          | The project requires an IEE.                                         |
| If proposed project requires an IEE, Proponent prepares an IEE schedule of work/ToR using the format prescribed in Schedule 3 of the EPR and submit this to the CSA for approval.                                                                     | The project has secured an approved ToR.                             |
| Proponent carries out IEE according to the approved work schedule/ToR and prepares an IEE Report following the format prescribed in EPR Schedule 5 and incorporating stakeholders' feedback applying the consultation procedure specified in the EPR. | The project carried out IEE and prepared the IEE Report accordingly. |
| Proponent submits 15 copies of the IEE Report along with the project proposal and recommendation of the Municipality to the CSA.                                                                                                                      | Project submitted documents accordingly for review and approval.     |
| CSA conducts review and grants approval of IEE Report.                                                                                                                                                                                                |                                                                      |
| ➤ If the review reveals project implementation to have no substantial adverse impact on the environment, CSA approves within 21 days from receipt of the report.                                                                                      |                                                                      |
| ➤ If the review reveals the necessity to carry out an EIA, Proponent conducts an EIA following the prescribed EIA process.                                                                                                                            |                                                                      |
| Proponent implements approved IEE Report and any terms and conditions given with the approval.                                                                                                                                                        | Project has not started and being implemented                        |
| CSA monitors and evaluates the impact of project implementation. When necessary, issue directives to the Proponent to institute environmental protection measures.                                                                                    | Project has not started and being implemented                        |
| MoWS conducts the environmental audit after two years of project commissioning/operation.                                                                                                                                                             | Project has not started and being implemented                        |

Source: IEE Study 2018/019

## 5 EXISTING ENVIRONMENT

### 5.1 Existing Physical Environment

#### 5.1.1 Landforms and Topography

164. The project area is a hilly region which is mostly known as Mahabharata Range. The altitude of the project area ranges from an elevation of 401m above mean sea level (amsl) at the riverbed to 1407 m amsl at the top of Ilam hill. The main Ilam Bazaar lies at an altitude of 1228m amsl. Mountain terrains in Ilam are of gentle slopes. The less steep slopes together with a moist climate provides suitability for important cash crops like tea and cardamom.
165. The term "Ilam" itself describes its topography as the word "Ilam" comprises two words derived from Limbu language – "I" (winding) and "Lam" (Way) which means winding way. The topography of Ilam is such that it has several winding paths crisscrossing on the way.

#### 5.1.2 Geology & Soil

166. 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.
167. All fresh rocks are strong, weathering is pronounced along less steep terraces that are covered either by residual soils or colluviums.

#### 5.1.3 Land use pattern

168. Generally, the agricultural land dominates the land use pattern of the project area. This is followed by forests and residential areas. Likewise, the remaining area has been used by rivers & rivulets and commercial areas.
169. The survey shows that out of total 2666.19 ha land covered by the project area, 50.59% area is covered by agriculture followed by forest with 34.93%. The residential covers 8.00% area of the project area. Likewise, Riverine and Lake Area and Public service area covers 3.43% and 2.29% respectively. Other coverage is not potentially significant.

#### 5.1.4 Water Resources

170. The project district, Ilam is rich in water resources, as there are various sources of water. The project area has potentiality of surface water only. The major river of the municipality are Mai Khola (which lies in the east) and Puwa Khola (which lies in the west). Ilam municipality is a sub water-shed area of the Mai River system.

Besides this, there are also other rivers like Rate Khola, Mewa Khola, Chhange Khola, Gitang Khola and Bhandi Khola. All these rivers are potential source of the proposed project; however, each of them has limitation. There are series of hydropower stations in these rivers, which seems to be major obstacle to utilize some of these sources.

171. Technically, Gitang Khola, Bhandi Khola, Rate Khola & Mewa Khola have been considered for the proposed project. The proposed Rate Khola & Mewa Khola are the tributaries of Mai Khola, which eventually drain into Kankai Mai.

#### 5.1.5 Climate

172. 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. In winter, there is much less rainfall in Ilam than in summer. The climate here is classified as Cwa by Koppen and Geiger. The huge difference in altitude influences the variation in climate within the municipality.

#### 5.1.6 Water Quality

173. During the survey, respondents were asked in term of existing water quality in the project area. The survey revealed that out of total 2798 respondents, about 7.10% (198) feel as good quality, 73.10% (2046) feel satisfactory or moderate, and 8.1% (227) respondents feel bad in term of water quality. Similarly, the survey also shows that 11.7% (327) respondents are not able to evaluate the existing water quality.
174. The WSSDO constructed water treatment plant (WTP) at Charkhade to treat water from Bhandi 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 disinfection unit at WTP site but is rarely used. So, the existing water supply system is supplying water to consumers virtually without any treatment.
175. 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.

Engineer

176. During field survey, water samples collected from the existing sources were tested for various physical and chemical parameters. The test reports show that all parameters of water quality of the sample collected are observed to be within the permitted value of NDWQS. The result of this water quality test is shown in detail in **Annex 6**.

177. Similarly, during field study, simple bacteriological tests (Coliform P/A Test Vial) which has been developed by ENPHO to determine the presence of Coliform bacteria at the water source was carried out. This on-site bacteriological test is based on the principle developed by Manja et. al in 1982. The test is based on the readily observable formation of black precipitate iron sulfide in the test bottle, as a result of the reaction of  $H_2S$  with iron. The results of the Coliform P/A Test Vial shows that the samples collected are contaminated with bacteria.

#### 5.1.7 Air Quality

178. Air pollution is generally 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. Air emissions come from household cooking, open burning, and moving vehicles. Emissions from these sources are scattered regarding both locations and timing. However, the field observation shows that the magnitude of air quality problems in Ilam is not that severe.

#### 5.1.8 Acoustic Environment

179. 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.

#### 5.1.9 Landslide Susceptibility

180. The project town lies in hilly region hence, there is possibility of landslide. But, there is no record of occurrence of significant landslide in the project area. The study reveals that temporary landslide may occur. However, this can be mitigated through precautionary measures during project construction.

### 5.2 Existing Biological Environment

#### 5.2.1 Flora

181. Ilam District is blessed with natural beauty of floral diversity. The site specific vegetation types are described below. The major plant life forms available in the project area are given in **Table 21** below:

Table 21: Plant Life Forms Found in the Project Area

| S.No. | Scientific Name                  | Local Name                | Family           | Life Forms    |
|-------|----------------------------------|---------------------------|------------------|---------------|
| 1     | <i>Rubus Ellipticus</i>          | Ainselu                   | Rosaceae         | Shrubs        |
| 2     | <i>Embllica officinalis</i>      | Amala (Indian Gooseberry) | Euphorbiaceae    | Trees         |
| 3     | <i>Pieris ovalifolia</i>         | Angeri                    | Ericaceae        | Shrubs        |
| 4     | <i>Adhatoda vasica</i>           | Asuro                     | Acanthaceae      | Shrubs        |
| 5     | <i>Michelia Champaca</i>         | Aule Chaanp               | Magnoliaceae     | Trees         |
| 6     | <i>Melia azedarach</i>           | Bakena/Bakaino            | Meliaceae        | Trees         |
| 7     | <i>Desmodium confertum</i>       | Ban Gahat                 | Fabaceae         | Shrubs        |
| 8     | <i>Ficus bengalensis</i>         | Bar                       | Moraceae         | Trees         |
| 9     | <i>Terminalia bellirica</i>      | Barro                     | Combretaceae     | Trees         |
| 10    | <i>Aegle marmelos</i>            | Bel (Wood Apple)          | Rutaceae         | Trees         |
| 11    | <i>Semecarpus anacardium</i>     | Bhalayo                   | Anacardiaceae    | Trees         |
| 13    | <i>Populus ciliate</i>           | Bhote Pipal               | Salicaceae       | Trees         |
| 14    | <i>Lagerstroemia Parviflora</i>  | Bot Dhayaro               | Lythraceae       | Trees         |
| 15    | <i>Schima wallichii</i>          | Chilaune                  | Theaceae         | Trees         |
| 16    | <i>Bassia butyracea</i>          | Chiuri                    | Sapotaceae       | Trees         |
| 17    | <i>Berberis aristata</i>         | Chutro                    | Berberidaceae    | Trees         |
| 18    | <i>Debregeasia salicifolia</i>   | Daar                      | Urticaceae       | Shrubs        |
| 19    | <i>Garuga pinnata</i>            | Dabdabe                   | Burseraceae      | Trees         |
| 20    | <i>Mussaenda macrophylla</i>     | Dhobini                   | Rubiaceae        | Shrubs        |
| 21    | <i>Colebrookea oppositifolia</i> | Dhusure                   | Lamiaceae        | Shrubs        |
| 22    | <i>Dioscorea bulbifera</i> L.    | Gitthe Tarul              | Dioscoreaceae    | Climbers/Vine |
| 23    | <i>Callicarpa macrophylla</i>    | Guenlo                    | Verbenaceae      | Shrubs        |
| 24    | <i>Lannea coromandelica</i>      | Hallunde                  | Anacardiaceae    | Trees         |
| 25    | <i>Terminalia chebula</i>        | Harro                     | Combretaceae     | Trees         |
| 26    | <i>Syzygium cumini</i>           | Jamun                     | Myrtaceae        | Trees         |
| 27    | <i>Phoebe lanceolata</i>         | Jhankri syaula            | Lauraceae        | Trees         |
| 28    | <i>Ficus lacor</i>               | Kabro (Seto)              | Moraceae         | Trees         |
| 29    | <i>Myrica esculenta</i>          | Kafal                     | Myricaceae       | Shrubs        |
| 30    | <i>Adina cordifolia</i>          | Karam/Karma               | Rubiaceae        | Trees         |
| 31    | <i>Castanopsis indica</i>        | Katus                     | Fagaceae         | Trees         |
| 32    | <i>Acacia catechu</i>            | Khair                     | Leguminosae      | Trees         |
| 33    | <i>Ficus semicordata</i>         | Khanayo                   | Moraceae         | Trees         |
| 34    | <i>Sapium insigne</i>            | Khiro                     | Euphorbiaceae    | Trees         |
| 35    | <i>Morus alba</i>                | Kimbu                     | Moraceae         | Trees         |
| 36    | <i>Cochlospermum religiosum</i>  | Kumbhi                    | Bixaceae         | Trees         |
| 37    | <i>Schleichera trijuga</i>       | Kusum                     | Sapindaceae      | Trees         |
| 38    | <i>Litsea monopetala</i>         | Kutmero                   | Lauraceae        | Trees         |
| 39    | <i>Dueabanga grandiflora</i>     | Lampate                   | Lythraceae       | Trees         |
| 40    | <i>Macaranga pustulata</i>       | Malato                    | Euphorbiaceae    | Trees         |
| 41    | <i>Engelhardtia spicata</i>      | Mauwa                     | Juglandaceae     | Trees         |
| 42    | <i>Prunus cerasoides</i>         | Painyu                    | Rosaceae         | Trees         |
| 43    | <i>Erythrina stricta</i>         | Phaledo                   | Fabaceae         | Trees         |
| 44    | <i>Ficus religiosa</i>           | Pipal                     | Moraceae         | Trees         |
| 45    | <i>Shorea robusta</i>            | Sal                       | Dipterocarpaceae | Trees         |
| 46    | <i>Pinus roxburghii</i>          | Sallo                     | Pinaceae         | Trees         |
| 47    | <i>Terminalia alata</i>          | Sajh                      | Combretaceae     | Trees         |
| 48    | <i>Calotropis procera</i>        | Seto Aank                 | Apocynaceae      | Trees         |
| 49    | <i>Osbeckia nepalensis</i>       | Seto Chulsi               | Melastomataceae  | Trees         |
| 50    | <i>Vitex negundo</i>             | Simali                    | Lamiaceae        | Trees         |
| 51    | <i>Mallotus philippensis</i>     | Sindure                   | Euphorbiaceae    | Trees         |
| 52    | <i>Albizia chinensis</i>         | Siris                     | Leguminosae      | Trees         |

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| S.No. | Scientific Name           | Local Name | Family      | Life Forms |
|-------|---------------------------|------------|-------------|------------|
| 53    | <i>Dalbergia sisoo</i>    | Sisam      | Fabaceae    | Trees      |
| 54    | <i>Bauhinia vareigata</i> | Tanki      | Leguminosae | Trees      |
| 55    | <i>Alnus nepalensis</i>   | Uttis      | Betulaceae  | Trees      |

Source: IEE Field Visit Survey, 2017

## 5.2.2 Fauna

182. Some species of mammals available in the project area is given below. The status of these mammals are as per IUCN & IBAT reports.

Table 22: Mammals in the Project Area

| S. No. | Scientific Names                 | Common Names           | Local Name         | Status |
|--------|----------------------------------|------------------------|--------------------|--------|
| 1      | <i>Macaca assamensis</i>         | Assamese Macaque       | Kalo Badar         | LC     |
| 2      | <i>Panthera pardus</i>           | Common Leopard         | Chituwa            | VU     |
| 3      | <i>Neufelis nebulosa</i>         | Clouded Leopard        | Ban Biralo         | LC     |
| 4      | <i>Vulpes vulpes</i>             | Fox                    | Fyauro             | LC     |
| 5      | <i>Canis aureus</i>              | Golden Jackal          | Syaal              | LC     |
| 6      | <i>Mos hosmour</i>               | Hill Mouse             | Musa               | LC     |
| 7      | <i>Felis Chaus</i>               | Jungle Cat             | Ban Dhade          | LC     |
| 8      | <i>Viverra zibetha</i>           | Large Indian Civet     | Thulo Nir Biralo   | LC     |
| 9      | <i>Funambulus sp.</i>            | Squirrel               | Lokharke           | LC     |
| 10     | <i>Taphozous longimanus</i>      | Long-winged Tomb Bat   | Lampakhete Chamero | LC     |
| 11     | <i>Hytrix brachyuran</i>         | Malayan Porcupine      | Dumsi              | LC     |
| 12     | <i>Martes flavigula</i>          | Yellow Throated Marten | Malsapro           | LC     |
| 13     | <i>Macaca mulatta</i>            | Rhesus Monkey          | Rato Bandar        | LC     |
| 14     | <i>Semnopithecus schistaceus</i> | Nepal Grey Langur      | Dhedu              | LC     |
| 15     | <i>Rattus sikkimensis</i>        | Sikkim Rat             | Musa               | LC     |
| 16     | <i>Canis lupus</i>               | Wolf                   | Bwanso             | LC     |

Source: IEE Field Visit Survey, 2017

183. Some of the birds reported in the forest areas are listed in Table 23. The status of these birds are as per IUCN & IBAT reports.

Table 23: List of Birds in the Project Area

| S.No. | Scientific Names                                  | English Name                   | Local Names      | Status |
|-------|---------------------------------------------------|--------------------------------|------------------|--------|
| 1.    | <i>Ictinaetus malayensis</i>                      | Black Eagle                    | Dronak Chil      | LC     |
| 2.    | <i>Ithaginis cruentus</i>                         | Blood Pheasant                 | Chilime          | LC     |
| 3.    | <i>Megalaima australis</i> (Psilopogon asiaticus) | Blue-throated Barbet           | Basanta          | LC     |
| 4.    | <i>Ketupa zeylonensis</i>                         | Brown Fish Owl                 | Malaha Huchil    | LC     |
| 5.    | <i>Ninox scutulata</i>                            | Brown Hawk Owl (Brown Boobook) | Kalpechak        | LC     |
| 6.    | <i>Eudynamis scolopacea</i>                       | Common Koel/Western Koel       | Koili            | LC     |
| 7.    | <i>Tyto alba</i>                                  | Common Barn Owl                | Gotho Latokosero | LC     |
| 8.    | <i>Arborophila</i>                                | Common Hill                    | Piura            | LC     |

| S.No. | Scientific Names                                                  | English Name            | Local Names             | Status |
|-------|-------------------------------------------------------------------|-------------------------|-------------------------|--------|
|       | <i>torqueola</i>                                                  | Partridge               |                         |        |
| 9.    | <i>Acridotheres tristis</i>                                       | Common Myna             | Dangre Rupi             | LC     |
| 10.   | <i>Coturnix coturnix</i>                                          | Common Quail            | Battai                  | LC     |
| 11.   | <i>Tragopan satyra</i>                                            | Crimson Horned Pheasant | Munal                   | NT     |
| 12.   | <i>Megalaima virens</i><br>( <i>Psilopogon virens</i> )           | Great Barbet            | Nyauli                  | LC     |
| 13.   | <i>Passer domesticus</i>                                          | House Sparrow           | Ghar Bhangera           | LC     |
| 14.   | <i>Cuculus micropterus</i>                                        | Indian Cuckoo           | Kafal Pakyo             | LC     |
| 15.   | <i>Pavo cristatus</i>                                             | Indian Pea Fowl         | Mayur                   | LC     |
| 16.   | <i>Lophura leucomelanos</i>                                       | Kalij Pheasant          | Kalij                   | LC     |
| 17.   | <i>Corvus macrorhynchos</i>                                       | Large Billed Crow       | Kaalo Kag               | LC     |
| 18.   | <i>Cuculus sparveriioides</i>                                     | Large Hawk Cuckoo       | Pahadi Biu Kuhiyo       | LC     |
| 19.   | <i>Caprimulgus macrurus</i>                                       | Large Tailed Night Jar  | Lampuchhre Chaite Chara | LC     |
| 20.   | <i>Falco columbarius</i>                                          | Merlin                  | Sano Baaz               | LC     |
| 21.   | <i>Streptopelia orientalis</i>                                    | Oriental Turtle Dove    | Tame Dhukur             | LC     |
| 22.   | <i>Psittacula cyanocephala</i>                                    | Plum-headed Parakeet    | Tuisi Suga              | LC     |
| 23.   | <i>Gallus gallus</i>                                              | Red Jungle Fowl         | Luinche                 | LC     |
| 24.   | <i>Pycnonotus cafer</i>                                           | Red Vented Bulbul       | Jureli                  | LC     |
| 25.   | <i>Celeus brachyurus</i><br>( <i>Micropternus brachyurus</i> )    | Rufous Woodpecker       | Sanotame Lahanche       | LC     |
| 26.   | <i>Zoothera dauma</i>                                             | Scaly Thrush            | Gobre Chachar           | LC     |
| 27.   | <i>Turdoides nipalensis</i><br>( <i>Acanthoptila nipalensis</i> ) | Spiny Babbler           | Kade Bhyakur            | LC     |
| 28.   | <i>Ciconia episcopus</i>                                          | Woolly Necked Stork     | Lovi Papi Garud         | VU     |
| 29.   | <i>Parus spilonotus</i><br>( <i>Machlolophus spilonotus</i> )     | Yellow Cheeked Tit      | Pitmuhar Chichilkote    | LC     |

Source: IEE Field Visit Survey, 2017

184. The commonly found reptiles and amphibians observed in the project area are presented in Table 24. The status of these reptiles & amphibians are as per IUCN & IBAT reports.

Table 24: List of Reptiles and Amphibians Found in the Project Area

| S. No. | Scientific Name             | English Name                 | Local Name                   | Status |
|--------|-----------------------------|------------------------------|------------------------------|--------|
| 1.     | <i>T. albolabris</i>        | Green Pit Viper              | Haryau                       | LC     |
| 2.     | <i>Boiga trigonata</i>      | Indian Gamma Snake           | Adhoo Sarpa, Tirishe, Batasa | LC     |
| 3.     | <i>Ovophis monticola</i>    | Chinese Mountain pit viper   | Chhirbire Sarpa              | LC     |
| 4.     | <i>Japalura tricarinata</i> | Three Keeled Mountain Lizard | Chheparo                     | LC     |

| S. No. | Scientific Name                  | English Name           | Local Name              | Status |
|--------|----------------------------------|------------------------|-------------------------|--------|
| 5.     | <i>Duttaphrynus Himalayanus</i>  | Himalayan Toad         | Lekhali Khasre Bhyaguto | LC     |
| 6.     | <i>Euphyllotis cyanophlyctis</i> | Skittering Frog        | Ahale Bhyaguto          | LC     |
| 7.     | <i>Zootoca vivipara</i>          | Common Lizard          | Mausuli                 | LC     |
| 8.     | <i>Calotes versicolor</i>        | Oriental Garden Lizard | Chheparo                | LC     |

Source: IEE Field Visit Survey, 2017

185. Similarly, common fishes found in the project area are given in Table 25. These species are found in the nearby water bodies of the project area that includes Mai Khola, Puwa Khola, Chhange Khola, Rate Khola, Mewa Khola & Gitang Khola.

Table 25: List of Fishes Found in the Project Area

| S. No. | Scientific Name                                | English Name         | Local Name    | Status |
|--------|------------------------------------------------|----------------------|---------------|--------|
| 1      | <i>Garra annandalei</i>                        | Annandale Garra      | Chuche Buduna | LC     |
| 2      | <i>Glyptothorax indicus</i>                    | Catfish              | Kabre         | LC     |
| 3      | <i>Neolissocheilus hexagonolepis</i>           | Copper mahseer       | Katle         | LC     |
| 4      | <i>Channa gachua</i>                           | Dwarf Sankehead      | Hile          | LC     |
| 5      | <i>Heteropneustes fossilis</i>                 | Stinging Catfish     | Singhi        | LC     |
| 6      | <i>Psilorhynchus pseudocheneis</i>             | Stone Carp           | Tite          | LC     |
| 7      | <i>Nemacheilidae (Schistura Multifasciata)</i> | Stone Loach          | Gadela        | LC     |
| 8      | <i>Tor tor</i>                                 | Tor Mahseer/Tor barb | Sahar         | LC     |
| 9      | <i>Schizothoracichthys sp</i>                  | Trout                | Asala         | LC     |
| 10     | <i>Barilius vagra</i>                          | Vagra Baril          | Faketa        | LC     |

Source: IEE Field Visit Survey, 2017

### 5.2.3 Protected Area

186. No national parks and protected areas exist in the project area.

### 5.2.4 Forest Area

187. The location of the proposed RVT-1 of 50m<sup>3</sup> capacity and small guard house is within Gumbadanda Community Forest Area. The forest type is mixed forest type where especially sallo trees, Peepal trees are found.

### 5.2.5 Aquatic Biodiversity

188. The project area is also rich in aquatic biodiversity as the project town is rich in water resources as explained in section 5.1.4. The details of aquatic species available within the project area have already been provided in the above given Table 16. The fish species listed in this table are found in the nearby rivers of the project town that includes Mai Khola, Puwa Khola, Rate Khola, Mewa Khola, Gitang Khola and Bhandi Khola.

### 5.3 Socio-economic and Cultural Environment

#### 5.3.1 Demographic Features

##### 5.3.1.1 Settlement pattern

189. The project town is located in hilly area with heterogeneous ethnic composition. Most of the government and non government offices are located in ward no. 7, which is the most densely populated area of the service area. The core Ilam bazaar area is also located in ward no 7.
190. The 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. Major settlements of this Municipality are shown in the table given below.

**Table 26: Settlement of the Project Area**

| Ward No. | Name of Settlement                                                          |
|----------|-----------------------------------------------------------------------------|
| 6        | Taragaun, Tilkeni, Ranigaun, Beninagar, Singfring                           |
| 7        | Malapath, Ratnechowk, Hakimtole, Tudikhel, Suntalabari, Chiyabari, Kuldhara |
| 8        | Thinggaun, Golbasti, Golkharka Bhanjyang, Bistagaun,                        |
| 9        | Pipalbote, Ghosgaun, Buddhanagar, Chureghanti, Mathilo Barbhai              |

Source: Socioeconomic Survey 2017

##### 5.3.1.2 Population Distribution

191. As the service area of the project town covers whole wards of former Ilam municipality, the total population of historical time has been used for the population assessments of the area and presented below:

**Table 27: Population of the former Ilam Municipality**

| Year | Population |
|------|------------|
| 1971 | 7,299      |
| 1981 | 9,733      |
| 1991 | 13,197     |
| 2001 | 16,240     |
| 2011 | 18,633     |

Source: Socioeconomic Survey, 2017

192. However, the Municipality has increased its judiciary area more than six folds than the previous area during May 2017 by incorporating adjoining former VDCs. The formation of the new municipality has been described in earlier (section 1.2). Therefore, the present population assessment of newly formed municipality has been carried out with the help of neighboring VDCs' population data. The ward-

wise population of the project town according to the census, 2001 and 2011 has been presented below:

Table 28: Population of the Ilam Municipality

| 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        |
| 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 & 2011

193. As per census data of 2011 A.D., the calculated total population of Ilam Municipality (after incorporating new adjoining areas) is 48,536. The population of former Ilam municipality (considering only old areas of the former ward) is 18,633 during 2001. The populations of the municipality during 2001 were 43,279, and the population of the former municipality was 16,240. The analysis of census population shows that the overall annual growth rate of the municipality is only 1.15%. Ward number 3 of the municipality has declining population growth in last one decade.
194. 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 densities of other remaining wards area less than 10PPHA. The overall population density of the municipality increased slightly from 2.51 PPHA (2001 A.D.) to 2.81 (2011 A.D.) PPHA. This may be due to increase in the area of the municipality. If we compare the former scenario, the overall population density of the project area increased slightly from 6.10 PPHA (2001 A.D.) to 7.00 PPHA (2011 A.D.) persons per hectare. This data has been extracted from Central Bureau of Statistics 2001 & 2011.

195. The consultants conducted a socio-economic survey in 2017 A.D. of the proposed service area. It shows that the total population of the service area is 20,704 which is tabulated below:

Table 29: Beneficiaries households

| Ward         | HHs          | Population    |
|--------------|--------------|---------------|
| 6            | 5            | 3,367         |
| 7            | 1,119        | 9,823         |
| 8            | 5            | 3,025         |
| 9            | 6            | 4,489         |
| <b>Total</b> | <b>2,798</b> | <b>20,704</b> |

Source: Socioeconomic Survey 2017

### 5.3.2 Caste/Ethnic Groups

#### 5.3.2.1 Ethnicity and caste

196. 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 socioeconomic survey of the subproject area also reflects the cross-section of major ethnic groups of the country.
197. The survey revealed that out of total 2798 households, Brahmin/Chhetri are the major groups comprising of 57.3% (1604) households within the service area. Similarly, Janajati/ethnic (Limbu, Magar, Rai, Sherpa, Tamang, Gurung, Newar, etc.) are the second largest group. It comprises 37% (1035) of total household whereas, Dalit and other castes (Madeshi, Musalman, etc.) comprises only 4.9% (137) and 0.8% (22) respectively.

### 5.3.3 Economic Features

#### 5.3.3.1 Economic Activities

198. The economy of the municipality is extensively agrarian although most of the households in the project area depend on more than one occupation. During the household survey of the project area, the detailed data has been collected regarding the major occupation and economic activities of all the households. The survey shows that out of total 2798 households, the highest number of population, i.e., 45.20% (1264) are engaged in Agriculture, whereas 18.20% (508) population depend on the business and 17% (476) of the population are engaged in service (either government or private). Similarly, about 0.9% (25), 6.1% (171) and 6.6% (184) of total household head are dependent upon industry, remittance and labour respectively while only 6.1% (170) household heads are involved in other miscellaneous occupations.

*Engineer*



199. Ilam is known for its six "A"s: are Alu (Potato), Olan (Milk), Alainchi (Cardamom), Aduwa (Ginger), Amriso (Broom Grass), and Akabare khursani (Round Chillies),etc. although tea, bamboo, flowers and silk are also produced in Ilam. Agricultural commodities helps to increase the Agricultural Gross Development Product. Beside these, the tourism sector also contributes in the economy of Ilam. New Hotels are increasing in Ilam due to upgraded tourism business. There is also practice of operating local market place which is locally called "Haat Bazaar", on Sundays and Thursdays every week in Ilam Bazaar.
200. There are about 22 hotels/lodges in the project area. The existing financial institutions are Agricultural Development Bank, Nepal SBI Bank, Century Bank, Machhapuchhre Bank, Excell Development Bank etc. and various cooperatives.

### 5.3.3.2 Monthly Income Details

201. As it has already been mentioned that the survey revealed that the main sources of household income of the service area are agriculture, business, service,remittance, labour and industry. Out of 2798 households, 40.9% (1145) households have a monthly income of the range (Rs. 20,001- Rs.50,000) and about 26.10% (729) households have a monthly income of the range (Rs.10,876 - Rs.20,000). Likewise, the survey also shows that 8.8% (247) of households are earning more than Rs. 50,000 and 16.5% (462) HHs are earning in the range (Rs. 7501-Rs.10,875). Similarly,only 7.7% (215) of total households fall under the poor category as they are only earning less than Rs 7,500 per month. The table given below gives details on the distribution of mean monthly household income.

Table 30: IncomeLevel ofHouseholdsby Ward

| S.N. | Income LevelRange | Ward |      |     |     | Total | %    |
|------|-------------------|------|------|-----|-----|-------|------|
|      |                   | 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

### 5.3.3.3 Monthly Expenditure Details

202. The socioeconomic survey has also assessed the details on the monthly expenditure of each households of the service area. The survey revealed that among 2798 households, 10.50% (293) HHs expend less than Rs. 7500 per month. Similarly, 31.0% (866) households have monthly expenditure level of the range

(Rs. 7,500-10,875) whereas 34.10% (955) of household's expenses are in the range of Rs. (10,876 to 20,000). Likewise, about 22.90% (641) of total households expend within the range (Rs 20,001-50,000) per month. Similarly only 1.50% (43) of household's expenses are more than Rs. 50,000. Hence, it is found that expenditure level is less than income level of households within the service area. So, it can be assumed that capacity for upfront cash contribution and affordability of community for regular tariff collection after implementation seems high. Details of monthly expenditure level are presented in the table given below:

Table 31: Expenditure Level of Households by Ward

| S.N. | Expenses          | Ward |      |     |     | Total | %    |
|------|-------------------|------|------|-----|-----|-------|------|
|      |                   | 6    | 7    | 8   | 9   |       |      |
| 1    | <Rs. 7,500        | 76   | 115  | 34  | 68  | 293   | 10.5 |
| 2    | Rs. 7501-10,875   | 130  | 314  | 186 | 236 | 866   | 31.0 |
| 3    | Rs. 10,876-20,000 | 193  | 339  | 209 | 214 | 955   | 34.1 |
| 4    | Rs. 20,001-50,000 | 123  | 332  | 75  | 111 | 641   | 22.9 |
| 5    | >Rs. 50,000       | 7    | 19   | 9   | 8   | 43    | 1.5  |
|      | Grand Total       | 529  | 1119 | 513 | 637 | 2798  | 100  |

Source: Socio-economic survey 2017

#### 5.3.3.4 Willingness to Pay

##### a) Monthly Water Tariff

203. The sampled survey was carried out to observe the response of the community towards the willingness to pay for monthly water tariff. As per the findings, out of total 140 sampled households, 57.1% (80) households prefer to pay monthly water tariff from Rs. 151 to 200 whereas about 12.90% (18) of households prefer to pay tariff from Rs. 201-250. Similarly, another 15.0% (21) of households are willing to pay between Rs. 251-300 per month. Likewise, the survey also shows that only 5.70% (8) of HHs are willing to pay from Rs. 301 to Rs.350 while only 4.3% (6) households are willing to pay between Rs. 351 & Rs.400. The survey also shows that only 1.4% (2) and 3.6% (5) households are willing to pay between Rs. 401 & Rs.450 and more than Rs 500 respectively. Details information about willingness to pay monthly water Tariff is presented in the table given below.

Table 32: Willingness to pay for monthly tariff by Ward

| S.N. | Tariff Range | Ward |   |   |   | Total | %   |
|------|--------------|------|---|---|---|-------|-----|
|      |              | 6    | 7 | 8 | 9 |       |     |
| 1    | >Rs. 500     | 0    | 2 | 0 | 3 | 5     | 3.6 |
| 2    | Rs. 401-450  | 0    | 2 | 0 | 0 | 2     | 1.4 |
| 3    | Rs. 351-400  | 0    | 6 | 0 | 0 | 6     | 4.3 |
| 4    | Rs. 301-350  | 1    | 3 | 0 | 4 | 8     | 5.7 |

| S.N. | Tariff Range | Ward |    |    |    | Total | %    |
|------|--------------|------|----|----|----|-------|------|
|      |              | 6    | 7  | 8  | 9  |       |      |
| 5    | Rs. 251-300  | 3    | 13 | 2  | 3  | 21    | 15.0 |
| 6    | Rs. 201-250  | 4    | 9  | 1  | 4  | 18    | 12.9 |
| 7    | Rs. 151-200  | 14   | 28 | 24 | 14 | 80    | 57.1 |
|      | Grand Total  | 22   | 63 | 27 | 28 | 140   | 100  |

Source: Socio-economic survey 2017

#### b) Up-front Cash Contribution

204. To assess details on willingness to pay for upfront cash contribution, the detailed socioeconomic survey was carried out. As per the survey, 98.03% (2743) of total 2798 HHs showed willingness to pay 5% up-front cash contribution for the proposed project. That means only 1.96% (55) of total 2798 HHs seemed unwilling for upfront cash contribution. It shows that most of the HHs are ready to contribute required upfront cash so far. Similarly, most of the poor HHs has also shown interest towards this project and willingness for cash contribution even there is provision of free tap connection to poor household. This indicates the longing, the people of the project town have for the proposed project.

#### 5.3.3.5 Affordability

205. The study has also assessed affordability of community in terms of monthly income level for expense on water supply & sanitation service. Hence, while assessing the income level of households, it has been observed that about 7.70% (215) of 2798 households falls below poverty level as per the implementation guidelines (Income < 7500 per month). This means more than 85% of households can afford monthly water tariff and contribute for up front cash. Hence, affordability of the community has been observed as encouraging and positive towards the program.
206. The WUSC can manage provision of subsidy to poor households for regular monthly tariff assessing the economic condition and affordability

#### 5.3.4 Education & Skills

##### 5.3.4.1 Education

207. The institutional data shows that there are total 19 educational institutions including campus for higher education, higher secondary schools, secondary schools as well as primary schools in service area with 9109 people including students, staffs and teachers. Similarly, our survey also shows that almost of all the educational institutions rely on tap water provided by existing water supply

system. Likewise, during survey, it has also been observed that all the educational institutions have water sealed latrines .

208. The socioeconomic survey also assessed on the education status of teach household head. The survey revealed that only 3.8 % (107) of household head of the project area are illiterate. Whereas, just literate ratio is 43.6% (1219) and more than SLC to above MA are 35.8% (1002). Details of education status of household head are presented in the table given below:

**Table 33: Education Status of Household Head by Ward**

| S.N. | Education    | Ward |       |     |     | Total | %     |
|------|--------------|------|-------|-----|-----|-------|-------|
|      |              | 6    | 7     | 8   | 9   |       |       |
| 1    | Illiterate   | 25   | 35    | 20  | 27  | 107   | 3.8   |
| 2    | Literate     | 236  | 462   | 180 | 341 | 1,219 | 43.6  |
| 3    | Primary      | 29   | 46    | 64  | 26  | 165   | 5.9   |
| 4    | Secondary    | 86   | 95    | 76  | 48  | 305   | 10.9  |
| 5    | SLC          | 60   | 182   | 66  | 72  | 380   | 13.6  |
| 6    | Intermediate | 46   | 139   | 52  | 37  | 274   | 9.8   |
| 7    | Bachelor     | 30   | 104   | 28  | 46  | 208   | 7.4   |
| 8    | MA           | 17   | 52    | 21  | 27  | 117   | 4.2   |
| 9    | Other        | 0    | 4     | 6   | 13  | 23    | 0.8   |
|      | Grand Total  | 529  | 1,119 | 513 | 637 | 2,798 | 100.0 |

Source: Socio-economic survey 2017

### 5.3.5 Health and sanitation

209. The socioeconomic survey also revealed that medical facilities for diagnosis and treatments are available in the service area. There is one district hospital with 50 bed capacities & 56 staffs. Similarly, there is also another hospital called Sing Fing Hospital with 15 bed capacities and 27 staffs. Similarly, some polyclinics, pharmaceutical stores and medical shops are also available in Ilam Bazaar area.
210. The survey revealed that cases of waterborne diseases such as diarrhea, dysentery, stomach aches and skin disease etc. are found to be very few. Similarly, it has also been observed that the cases of mortality by water related diseases are nil. The information related to water borne and communicable disease was crossed checked by visiting hospital and health posts within the service area. According to the obtained information, out of 165 sampled population, only 0.20%(25) population suffered from diarrhea whereas 0.50% (63) suffered from dysentery. Similarly, about 0.7% (77) suffered from other diseases such as skin diseases, stomach pains, fever etc.

### 5.3.6 Community Infrastructure

#### 5.3.6.1 Existing Drinking Water Condition

##### a) Existing Water Supply

211. Ilam had a facility of piped water supply system since 1937 A.D. This is still the major water supply system in the Municipality, which collects water from two sources (Gitang Khola and Bhandi Khola). It has been expanded up to four times to meet the growing water demand of the municipality. DWSSM, JICA, WSSDO and Ilam Municipality were involved in the expansion of the system at different phases.
212. At the very beginning, Mahabir Shamsheer Rana, the then BADA HAKIM (chief of an area), built a water supply system with five taps to supply water to government offices, the police, and the jail. The system obtained water from the source of Bhadi Khola located 16 km from the municipality and water was collected in 3 reservoir tanks, each of 5,000 liters capacity. Ilam continued to get water through the same system for several years even after the declaration of Ilam as a municipality in 1958. In 1978, DWSSM improved the existing system by increasing the size of the transmission line to increase the flow of water. Later in 1991/92, JICA improved and expanded the system by increasing the size of the transmission line, expanding distribution pipe network and building new reservoir tanks.

##### b) Source Description

213. Till 1998 A.D., Bhandi Khola was the only source for the existing water supply system. With the increasing population pressure and expansion of the municipality, Bhandi Khola source befitted insufficient to meet the increasing demand for water. In 1998 A.D., WSSDO Ilam tapped new water source at Gitang Khola, which is located at former Maimajhuwa VDC while presently, it falls under Sandakpur rural municipality. It is around 31 km far from Ilam.
214. At Municipal level, currently, there are two sub-systems that includes Major System and Minor System. The major system is the one which collects water from the two major sources (Bhandi Khola and Gitang Khola). The details of major sources which, can be used in the upcoming project have been presented below in a tabular form.

Table 34 :Existing Major Source Details

| Particulars        | Source1      | Source2             |
|--------------------|--------------|---------------------|
| Name of the Source | Bhandi Khola | Gitang Khola        |
| Former Location    | Sumbek -2    | Former Maimajhuwa 5 |

| Particulars         | Source1                | Source2 |
|---------------------|------------------------|---------|
| PresentLocation     | WN2of IlamMunicipality |         |
| Type(Spring/Stream) | Stream                 | Spring  |
| Sourceyield(lps)    | 5lps                   | 16 lps  |

Source: Detailed Engineering Design Report, 2017

215. Similarly, minor systems consists of nine local sources located within the municipality. It is estimated that the Municipality has been consuming 3.366 lps from these minor sources altogether. However, all these minor sources were not measured in recent years and are said to be decreasing.

**Table 35: Existing Minor Source Details**

| S.No. | Local sources | Location | SourceYield (lps) |
|-------|---------------|----------|-------------------|
| 1     | Kharka        | 8        | 0.071             |
| 2     | Singhbahini   | 9        | 0.33              |
| 3     | Aitandhara    | 8        | 0.18              |
| 4     | Bhalubanse    | 9        | 0.53              |
| 5     | Sisne         | 9        | 0.91              |
| 6     | Chiyabari     | 9        | 0.53              |
| 7     | Devithane     | 9        | 0.2               |
| 8     | Jordhara      | 9        | 0.39              |
| 9     | Sukilumba     | 9        | 0.225             |
|       |               | Total    | 3.366             |

Source: Detailed Engineering Design Report, 2017

**c) Transmission Lines, Distribution Lines and Storage Capacity**

216. The water from Gitang Khola is collected at a connection chamber at Bhandi Khola source through 18 km transmission line of 110/125 mm dia and PE/GI pipes. The water from Bhandi Khola source is mixed here and is supplied to Water Treatment Plant at Charkhande through 13 km transmission line of 150 mm diameter GI pipe. The total transmission pipeline is about 31 km under the main system. WSSDO has laid 20 km of new PE lines from Gitang Khola since last six years. After the PPTA study, the municipality is laying new transmission line from Gitang Khola to existing WTP to draw about 16 lps design as recommended in the PPTA report.
217. A few years back (2014 A.D.) WSSDO completed construction of a WTP at Charkhnade, which covers seven ropanis (0.36 ha) of land. It consists of a sedimentation tank (ST); horizontal roughening filter (HRF) and a slow sand filter (SSF). It is designed for 25 lps covering both sources Bhadi Khola and Gitang Khola. Reportedly, the design has been done in such a way that the water from the Bhandi source is supposed to pass through the horizontal roughing filters (HRF) and the slow sand filters (SSF) only as the source is a spring with less turbidity. But the water from Gitang Khola needs to be treated by the sedimentation tank (ST),

HRF and SSF consequently as the water is from a stream. And the design envisaged laying of the separate transmission line for Bhandi Khola source. But in reality, a single transmission line conveys water from both sources to the WTP which overloads it. Moreover, the quality of sand used in WTP is reported of poor quality, which makes the WTP operation poorly. There is a disinfection unit, but it is not in operation.

218. The water from the WTP is supplied to the consumers through three different sub-systems. They are Gadi sub-system (6.06 km); Shikhar Nagar sub-system (8.58 km) and Gumba Danda sub-system (3.84 km). Through these sub-systems pipe network, the water received from the WTP is collected in service reservoirs and supplied to the consumers.
219. The cumulative storage capacity of the existing system is 1005.5 m<sup>3</sup>. Capacity of the redundant and under construction reservoir has not been considered. The storage capacity is very high as compared to drawing discharge. The storage capacity is more than 58% of the daily supply. The details are tabulated below:

Table 36: Existing Storage Reservoir Details

| SN | Name               | Location     | Capacity m <sup>3</sup> | Year of Constructio | Type         | Remarks              |
|----|--------------------|--------------|-------------------------|---------------------|--------------|----------------------|
| 1  | GumbaDanda         | INP-WN 6     | 60                      | 2000 A.D.           | RCC-R        | Operating            |
| 2  | GadhiBarrack       | INP-WN 6     | 48                      | 1977 A.D.           | StoneMasonry | LeakingNon-Operating |
| 3  | ShikharNagar       | INP-WN 7     | 165                     | 1979 A.D.           | StoneMasonry | Old but Operating    |
| 4  | ShikharNagar       | INP-WN 7     | 0                       | 1983 A.D.           | StoneMasonry | Redundant            |
| 5  | ShikharNagar       | INP-WN 7     | 38                      | 1995 A.D.           | StoneMasonry | Operating            |
| 6  | ShikharNagar       | INP-WN 7     | 42                      | 1998 A.D.           | StoneMasonry | Damaged              |
| 7  | ShikharNagar(JICA) | INP-WN 7     | 360                     | 1991 A.D.           | FiberGlass   | Operating            |
| 8  | MilanKendra(JICA)  | INP-WN 7     | 87.5                    | 1991A.D.            | FiberGlass   | Operating            |
| 9  | Tundikhel(JICA)    | INP-WN 7     | 125                     | 1991 A.D.           | FiberGlass   | Operating            |
| 10 | CampusDanda        | INP-WN 7     | 80                      | 2001 A.D.           | RCC-R        | Operatingbut         |
| 11 | GadhiBarrack       | INP-WN 6     | 0                       | 2017 A.D.           | RCC-C        | UnderConstruction    |
|    |                    | <b>Total</b> | <b>1005.5</b>           |                     |              |                      |

Source: Detailed Engineering Design Report, 2017

220. Apart from these reservoirs of the main system, there are about seven reservoirs served by the local sources having a cumulative capacity of 193 m<sup>3</sup>. The largest reservoir is of about 60 m<sup>3</sup> and is located at Sisne of Chiyabari Mul.
221. Under the main system, the water is supplied from these service reservoirs to the consumers through six distribution systems, which are named after the RVT location. They are Gumba Danda, Gadi, Shikhar Nagar, Milan Kendra, Campus and Tundikhel distribution systems. Gumba Danda, Gadi and Shikhar Nagar

distribution systems receive water from the WTP at Charkhade through the individual pipeline. The other distribution systems (Milan Kendra, Campus, and Tundikhel) receive water from the Shikhar Nagar RVT. It is estimated that the total length of the distribution lines is about 24 km. They are of GI, DI and PE. In general, they have been laid along the roads and are exposed. The existing distribution pipelines are very old and unable to supply water in sufficient quantity in many areas. This has encouraged people to take direct connections with the service reservoir. As a result, there are numerous spaghetti connections all along the city. It makes it difficult to quantify the actual length of the distribution system.

222. Currently, about 2,985 households (including offices and institution) have been connected to the existing systems managed by the Municipality. Till date, 2,500 HHs have been registered as consumers under the main system, whereas 505 HHs are under local sources. Similarly, there are seven community taps and two public taps to serve the poor community, whereas all others are private connections.

223. It is reported that the existing system has been providing 864,000 liters per day, i.e., ten lps in the dry season, which is in actual, not formally measured. In reality, the total production, distribution, and losses of water of the existing system are not known.

**d) Coverage**

224. The main system which collects water from the two major sources (Bhandi Khola and Gitang Khola) has been providing water services to the core area of Municipality. The core area of the municipality is a complete area of WN 7 and a partial area of WN 9, whereas local sources are supplying water to the partial area of additional wards (WN 8) in addition to partial areas of WN 9.

225. This shows that the existing piped water supply system serves only three wards of the municipality (WN 6, 8 and 9) or former six wards (WN 1 to 6). Other former wards of the Municipality use tap water through locally managed sources. However, some of the wards, located at the foothill of the Municipality, are deprived of tap water and are dependent on spouts and direct consumption of water from the river.

**e) Service Level and Consumption**

226. Due to limited water, the supply is intermittent with 1½ hrs on an alternate day. Moreover, the supply is not reliable as there is a frequent breakdown of the

system. The local people, especially business organizations, rely on water supplied by private tankers. No groundwater resources have been used. Currently, the rainwater harvesting system has been installed in three locations, and four are under consideration.

**f) Water Quality**

227. The WSSDO constructed Water Treatment Plant (WTP) at Charkhade to treat water from Bhandi 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.
228. 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.

**g) Operation Costs & Tariff**

229. Ilam WSSDO handed over the water supply system to the Municipality in 1998 A.D., and since then it has been operating it. It constitutes a separate water supply section for the operation of the system. This section is responsible for operation & maintenance of the system and carries out minor repair works. The Ilam Municipality has 93 staffs, out of which 35 are working in this section in different capacities.
230. The Municipality has been operating the main system as well as the local systems and the tariff has been fixed differently for these systems. For the main system, the minimum water tariff rate is NRs. 200 up to 10 m<sup>3</sup> use and NRs. 150 per 10 m<sup>3</sup> for local systems. The details have been presented below in tabular form:

**Table 37: Existing Tariff Structure**

| Water Consumption in m <sup>3</sup> | Water Tariff Rate (NRs./month) |
|-------------------------------------|--------------------------------|
| Up to 8                             | NRs. 200                       |
| 8 to 10 unit                        | 25/unit                        |
| 10 to 15 unit                       | 30/unit                        |
| 15-20 unit                          | 40/unit                        |
| 20-30 unit                          | 50/unit                        |

| Water Consumption in m <sup>3</sup> | WaterTariffRate(NRs./month) |
|-------------------------------------|-----------------------------|
| 30 to100unit                        | 55/unit                     |
| >100unit                            | 60/unit                     |

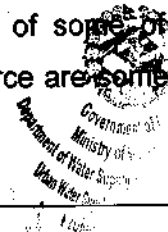
Source: Detailed Engineering Design Report, 2017

231. Similarly, the municipality is discouraging non-meter tap by introducing a penalty of a minimum of NRs.5000 at first month for a non-functional meter or tap without a meter. The consumers have to pay the water tariff within 30 days of the meter reading. A late fee is charged at 35% in the second month and 45% in the third month.

#### **h) Problems of the existing system**

232. The existing system is not able to meet the water demand, supply is intermittent, and the supplied water is of poor quality. The major problems of the existing system are presented below:
- The existing system is about 80 years old. During field study, it has been identified that the existing water supply system is said to be about 82 years old. Despite having been rehabilitated and expanded four times, the system is still not able to meet the current water demand. The expansion work of the existing system lags far behind urbanization and population growth. The demand is roughly four times the supply; The quality of sand in SSF of the existing WTP is said to be poor which results in ineffective operation of WTP. The study also shows that the existing disinfection unit is also not in operation. It is observed that the existing distribution pipelines are very old and unable to supply water in sufficient quantity in many areas. This compelled people to take direct connections with the service reservoir. As a result, numerous distribution mains entangled with each other can be observed to be laid all along the project town.
  - The Municipality water supply system consists of one major system with Bhandi Khola and Gitang Khola sources and nine local sources. The yield of the local sources is limited and will not be able to meet the demand of such a large city as Ilam. The yield at Bhandi Khola cannot be increased much. The Gitang Khola has enough water availability, but due to lack of transmission pipeline and public limitation on the quantity of water, the source was not properly utilized. The limitation of some of the existing sources and underutilization of Gitang Khola source are some of the major

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reasons that the Municipality has an acute shortage of water. Currently, the supply is intermittent.

- The Municipality has been operating the existing system since July 1998. But the limitation on technical know-how, financial resources, and skilled workforce, the Municipality has not been able to operate the system efficiently. The expansion is beyond its capacity in its present form. It is said that 75% of the Municipality problems are related to water supply. On water sector, the Municipality is in the loss. The institution is so weak in operating the system that the local people and the Municipality itself are not satisfied with the services;
- The Municipality is willing to hand over the operation of the system to an alternative organization, but no such organization exists.
- The distribution pipelines are laid haphazardly with spaghetti-like connections everywhere. The network is so old and under-designed that it can-not convey enough water to meet growing demand. In many places, the land owners do not allow pipelines to be laid in their land. This has created a mentality where everybody wishes to have direct connections from the reservoir itself. The management of these distribution pipelines is considered one of the major problems at present and will be in future during implementation of the project;
- The existing Water Treatment Plant (WTP.) is hardly in operation. As a result, the supplied water is not treated, and the water is supplied as it comes from the sources.

### 5.3.6.2 Existing Sanitation Situation

#### a) Sanitation Facilities

233. The survey has revealed that majority of the households have household latrine facilities within the project area. Out of total 2798 households, about 98% (2743) of households have latrine facilities, and only 2% (55) does not have latrines in their house.

234. The survey also shows that about 72.20% (2021) households have pour flush latrine whereas 12.20% (341) households have pit latrines. About 9.2% (258) have ventilated pit latrine whereas 4.4% (123) of the households are using cisterns flush type of pit latrine as shown in the table given below.



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235. The existing latrines in the houses as well as in the 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.

Table 38: Type of Toilets in use in Project Area

| S.N. | Type of Toilet        | Ward No.   |             |            |            |              | %          |
|------|-----------------------|------------|-------------|------------|------------|--------------|------------|
|      |                       | 6          | 7           | 8          | 9          | Total        |            |
| 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        |
|      | <b>Grand Total</b>    | <b>529</b> | <b>1119</b> | <b>513</b> | <b>637</b> | <b>2,798</b> | <b>100</b> |

Source: Socio-economic Survey, 2017

**b) Drainage Facilities**

236. There is no proper drainage system for storm water as well as for the domestic sewage in the Project area. As the terrain is mostly steep, people are less concerned about storm water drain. This information was collected as it can be useful for resolving drainage problem that may arise during pipeline excavation works. Other in-depth information regarding this issue were not collected as this does not fall under the scope of the project.

**c) Wastewater Management Practices**

237. There is no sewerage system in the project area. The socioeconomic survey revealed that wastewater from each individual is managed on their own within the house. The survey shows that 98% of 2798 HHs have their own toilets. Similarly, there is no wastewater treatment plant within the Municipality to treat domestic sewage/septage. Likewise, the survey also shows that 99% of the sampled HHs showed interest in improving the septage management system and are interested to pay for it. However, this issue does not fall under the scope of the proposed project. Hence, this will not be considered in the design of the proposed project.

**d) Solid Waste**

238. The major sources of waste generation in Ilam Municipality are households, hotels, hospitals, vegetable and fruits market, meat stores, groceries, clothing/ fancy stores/tailors etc. The survey revealed that out of 140 sampled households, 88.57% (124) of households are disposing of domestic solid waste in pits near to the house, 7.14% (10) of households use private collectors and only 1.43% (2) households prefer to dispose solid waste either at pit or container managed by

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municipality. It was observed that the respondents have sufficient knowledge about improperly managed solid waste that may affect public health and the surrounding environment. There has been no study about types and volume of solid wastes. The details on the practice adopted by the people of the project town for the disposal of solid waste is given in the following table.

Table 39: Solid Waste Management Practice

| S.N. | 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 Municipality | 0         | 0         | 0         | 2         | 2          | 1.43  |
| 4    | Others                                | 0         | 4         | 0         | 0         | 4          | 2.86  |
|      | <b>Grand Total</b>                    | <b>22</b> | <b>63</b> | <b>27</b> | <b>28</b> | <b>140</b> |       |

Source: Socio-economic survey, 2017

239. However, this solid waste issue is not covered under the scope of the proposed project. The above given information on solid waste is just to assess the existing condition of the project town. Nonetheless, this information can be useful for the waste management during project construction period.

e) **ODF Situation in Service Area**

240. Ilam Municipality has already been declared as Open Defecation Free (ODF) area. The newly formed municipality with merged former VDCs have already been declared as ODF area on different dates. They are tabulated below:

Table 40: ODF Details of the project town

| S.N. | Name of Municipality/VDC | ODF Declaration Date |
|------|--------------------------|----------------------|
| 1    | Former Ilam Municipality | 2071/01/25           |
| 2    | Former Sakhejung VDC     | 2069/09/02           |
| 3    | Former Sumbek VDC        | 2070/11/14           |
| 4    | Former Puwamajhuwa VDC   | 2070/04/10           |
| 5    | Former Barbote VDC       | 2070/06/11           |
| 6    | Former Godak VDC         | 2071/01/31           |
| 7    | Former Soyak VDC         | 2071/02/21           |
| 8    | Former Siddhithumka VDC  | 2071/03/17           |
| 9    | Former Sangrumba VDC     | 2071/01/14           |

Source: Socio-economic survey, 2017

241. This indicates that people of the project town are quite aware about the sanitation practice. However, the proposed project expects to strengthen the existing improved sanitation condition of the project town further through the provision of public toilets.

### 5.3.6.3 Local Institutions

#### a) Existing Institutional Situation

242. The main institutions involved in the water supply and sanitation field are DWSSM, 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 NCDC, NRCS, and others have been implementing community-based rural water supply 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.
243. DWSSM 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 NRs. 5 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 small town water supply subproject.
244. 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 (Bhandi 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 following this document.

#### b) Water Supply and Sanitation User's Association

245. The WUSC was registered in Water Resource Committee, Ilam as per the Water Resource Act-2049 and Water Resource Rules, 2050. It is mainly responsible for

the effective management and improvement of the existing water supply system in Ilam bazaar.

246. The name list and position of the existing WUSC are given in the table given below:

**Table 41: 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             | Members          |
| 6    | Ms. Susila Sapkota          | Members          |
| 7    | Mr. Dhan Bahadur Thapamagar | Members          |
| 8    | Mr. Rudra Sampang           | Members          |
| 9    | Mr. Indra Ghimire           | Members          |

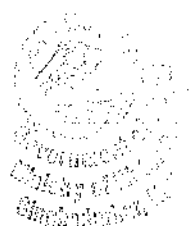
Source: Socio-economic survey, 2017

247. 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.

**c) Organization Structure of operators of Existing System**

248. The existing Ilam Bazar Water Supply and Sanitation Committee consist of nine members representing from various clusters within the service area. The executive committee consists of 7 male and 2 female members and one female member has been working as position of vice chairman in key executive post of WUSC. According to the caste/ethnicity status of WUSC body, Brahmin/Chhetri and Janajati groups occupy 3 and 6 respectively.

249. The organization structure of the office of the Ilam Municipality has been presented below, which shows that there is a separate section "Water Supply Management Section". This is shown in the figure given below:



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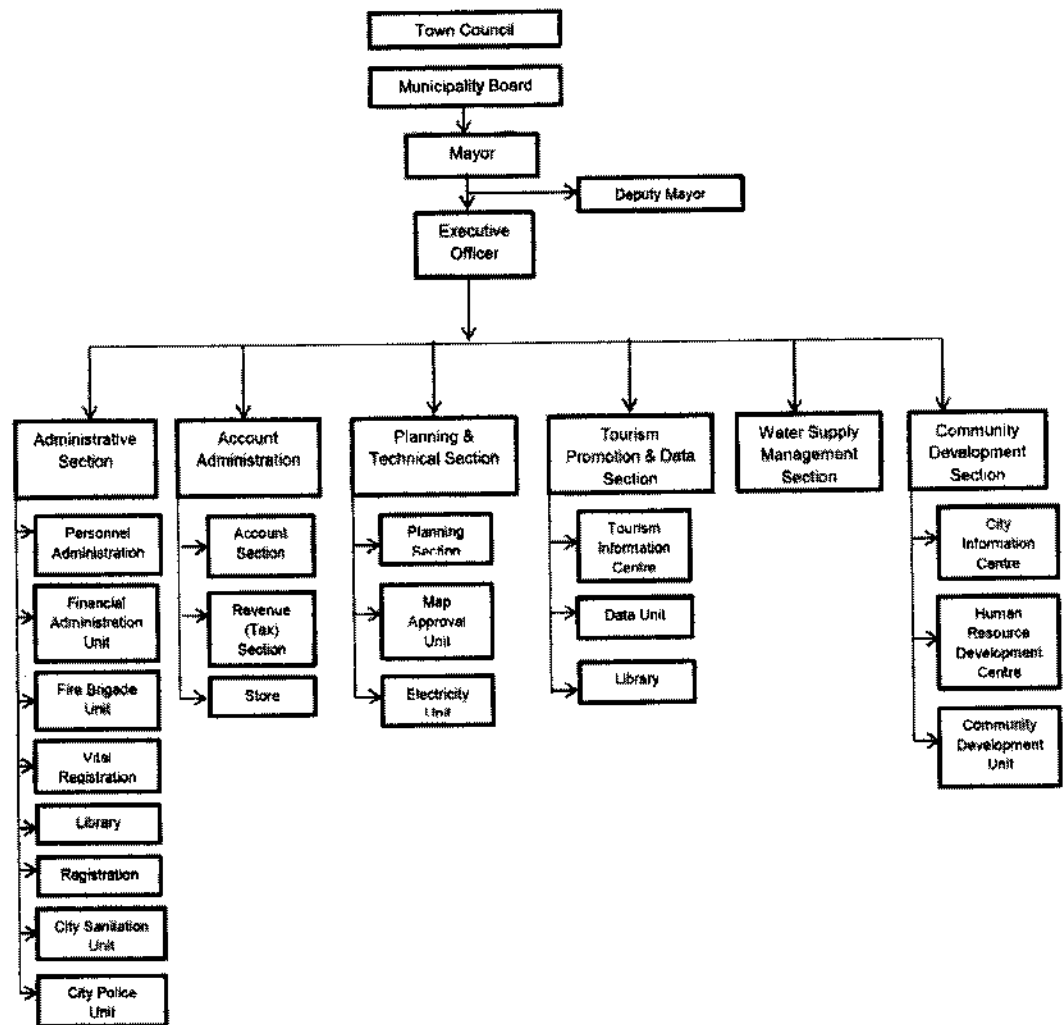
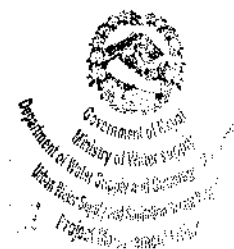


Figure 6: Organizational Structure of Ilam Municipality

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## 6. ANALYSIS OF ALTERNATIVES

### 6.1 With and Without Project Alternatives

250. Analysis of the alternatives of the proposed project is another important process of IEE study that will help to assess the feasibility of the project in regard to technical, environmental & social aspects. Primarily, this involves two alternatives that includes "Without Project" or "Do-nothing" Alternative and "With Project" Alternative.

#### 6.1.1 Without Project Alternatives or Do-nothing alternatives

251. "Without Project" or "Do-nothing" Alternative carried out study on the existing water supply system to analyze the condition of the project town in the absence of the proposed project.

252. The study shows that the residents of the project area are consuming either untreated or partially treated water from the existing water supply system. Though there are not any evidence of impacts of untreated water on the lives of local people at present situation, there is possibility of incidence of water-borne diseases in the future due to poor access to safe and potable water supply. This will result in the health hazards in the project area exposing the surroundings to environmental problems.

253. The existing water supply system in the project area is intermittent and is not able to meet the increasing demands of the increasing population of the project area. Insufficient water supply will compel them to control the use of water for various purposes even for sanitation practices. Lack of water in the sanitation practices like flushing of water after use of latrine, bathing, washing clothes etc. will demote the domestic hygiene of the project area. This may pose outbreak of diseases like Typhoid, Cholera, Dysentery etc. This may in turn result in the environmental problems.

254. 'Without Subproject' or 'Do-Nothing' alternative will toughen the chance of the occurrence of the abovementioned threats to the environment of the project area. Without subproject, people of the project area will continue to consume the partially treated or untreated water from the existing water supply system. Drinking untreated water will increase the risk of bacterial infection resulting health issues that will obviously have impact on public health, animal health and the health of the ecosystems. Similarly, 'Do-Nothing' alternative will constrain the locals to be content with the intermittent water supply service.

255. This would further impede (i) further social and economic development of the municipality, (ii) fundamental right related to health as guaranteed in Constitution of Nepal (Article 35) that says that "Every citizen shall have the right of access to clean drinking water and sanitation", (iii) Goal of National Urban Water Supply & Sanitation Sector Policy, 2009 (Final Draft) to ensure the socio-economic development, improved health status and quality of life of urban populations, including the poor and marginalised, through the provision of sustainable water supply and sanitation services and protection of the environment and (iv) Nepal's delivery of its commitment to SDG 6th to increase the proportion of the population with sustainable access to safe drinking water and basic sanitation.
256. Beside this, 'Do-Nothing' alternative has one positive aspect as it may prevent the service area of the project town from the susceptibility towards the anticipated environmental impacts of this proposed project. However, for this only positive aspect, it will be irrational to ignore the hardship that locals of this project town are facing for safe, reliable and potable water. Hence, 'Do-Nothing' alternative will not be better option to be followed in order to get rid of the anticipated environmental impacts as these environmental impacts can either be avoided or minimized by suitable mitigation measures.

#### 6.1.2 With Project Alternative

257. With Project Alternative was also analyzed by envisaging the likely benefits of the proposed project. The analysis shows that the proposed sub project will be the best alternative to overcome the aforementioned threats that is likely to occur in the absence of this subproject. With the Subproject 21,433 populations (2019) will have convenient access to reliable and adequate safe and potable water supply. The balanced health condition of the people of the project area will be ensured through consumption of well-treated drinking water. Similarly, the adequate supply of water will encourage people to use water generously for sanitation practice ensuring good hygiene of the people. In overall, the 'with subproject alternative' will bring about improved public health and living environment that will contribute to improved quality of life in the project municipality.
258. Hence, the 'with project' alternative will contribute to the realization of the Updated 15-Yr Development Plan for Small Towns Water Supply & Sanitation Sector, compliance with the fundamental right related to health as guaranteed in Constitution of Nepal (Article 35), fulfillment of Goal of National Urban Water

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Supply & Sanitation Sector Policy, 2009 (Final Draft) and the delivery of Nepal's commitment to SDG 6.

259. Along with this, the limitation of "Without Project" Alternatives regarding continuous water supply system, treatment system and susceptibility to water borne diseases leads to opt for "With Project" Alternative. The proposed sub project will be the best alternative to overcome the aforementioned threats that is likely to occur in the absence of this subproject. This "With Project" Alternative also involves analysis of alternatives to assess the most cost-effective, reliable and efficient system that can serve the design population. The alternatives regarding "With Project" Alternative is described in detail in the following section.

#### **With No Forest Alternative**

260. As it has already been mentioned in section 5.2.4 that the project components including RVT 1 and Small Guard House have been proposed to be constructed within Gumba Danda Community Forest Area. As per section 2.4.13, the proposed project requires about 150sqm area of the community forest. Hence, during alternative analysis, 'With No Forest' option has also been considered so that occupying of forest area could be avoided for the construction of those project components. However, in all the three possible options that have been proposed for this project during feasibility study phase, the structures from WTP to the distribution network remain the same. There are no other possible options which do not include Community Forest for RVT 1 construction.

#### **6.1.2.1 Alternatives Relative to Planning and Design**

261. The system alternatives need to be developed to assess the most cost-effective, reliable and efficient system that can serve the design population. As per Feasibility Study Report by PPTA team, the system design for the town has been done under three scenarios. Optimization of a proposed water supply system can be done regarding system layout, alternative technology, alternative materials and alternative source. However, in case of Ilam, development of system alternatives has been done using alternate sources of water keeping other parameters constant.

##### **i) Alternative Sources**

262. The environmental factors of the water source will also help to choose the best alternative source to be adopted for any proposed project. These factors include Possibility of Source Depletion, Location of source, Susceptibility of source to the

erosion etc. Regarding this proposed project, there are various alternative sources available in the nearby vicinity to meet the overall demand for this project.

263. The first option considers the use of existing sources (16 lps from Gitang Khola and four lps from Bhandi Khola) and tapping new sources (10 lps from Gitang Khola down-stream of existing hydropower and ten lps from Rate Khola). The system has been designed as a gravity system in which water from all four sources is conveyed to the WTP under gravity.
264. The second option considers the use of existing sources as in first option (16 lps from Gitang Khola and four lps from Bhandi Khola) and tapping new sources (10 lps from Rate Khola and ten lps from Mewa Khola).
265. The third option considers the use of existing sources as in option I and II and tapping new sources (10 lps from Puwa Khola and ten lps from Rate Khola). The water from the Puwa Khola is also collected through gravity system.
266. All the sources proposed in each of three alternatives are environmentally safe.

## ii) Alternative Design

267. The environmental issues can be a deciding factor to choose the best alternative design among the list of alternatives. The design of each of three proposed alternatives is environmentally sound. There is no such difference among the proposed alternatives. The main difference is in use of different sources with different transmission pipelines.

## iii) Selected Alternative Scheme

268. All three proposed options are gravity systems with similar service areas and structures from WTP to distribution network. The difference is in use of different sources with different transmission pipelines. Technically all options are feasible. Environmentally they are not much different. Socially all these options are on equal footing.
269. The financial analysis of all three options have been carried out. The results of the analysis show that all options are financially feasible. The capital cost of the option 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 II has been chosen as the best option for the project." The comparison of three options have been presented in the table given below:

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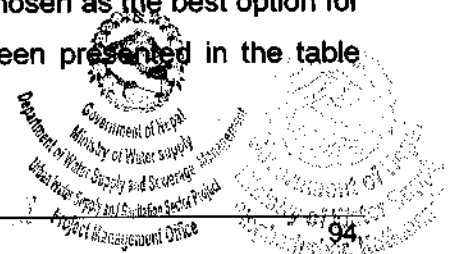


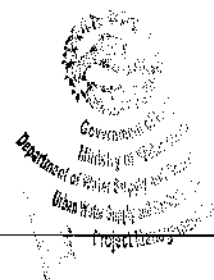
Table 42: Cost Comparisons of Various Options Based on PPTA Report

| S.N. | Particular                           | Option1        | Option2          | Option3        |
|------|--------------------------------------|----------------|------------------|----------------|
| 1    | Total Capital Cost in NRs.           | 621,469,238.07 | 581,211,702.95   | 608,591,632.00 |
| 2    | Annual O&M Costs in NRs.             | 6,400,184.87   | 6,182,469.47     | 6,330,669.11   |
| 3    | Total Base Year Population (No)      | 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         |
| 6    | Capital Cost/PopServed               | 42,467.49      | 39,716.53        | 41,587.51      |
| 7    | O&M Cost/PopServed                   | 437.35         | 422.47           | 432.60         |
|      | Remarks                              |                | Preferred Option |                |

Source: Detailed Engineering Design Report, 2018



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## 7 ANTICIPATED ENVIRONMENTAL IMPACTS

270. The anticipated environmental impacts are mainly categorized into two viz., Beneficial Impacts and Adverse Impacts on the basis of its negative and positive significance. This is then further categorized into four impacts that includes i) Impact on Physical Environment, ii) Impact on Biological Environment, iii) Impact on Chemical Environment and iv) Impact on Socio-economic Environment, based upon the effects on the existing environment. These impacts are sub divided into three categories based upon the project phase that includes i) Design Phase, ii) Construction Phase and iii) Post Construction (Operation & Maintenance) Phase. These impacts are discussed below in detail .

### 7.1 Beneficial Impacts

271. The development of water and sanitation facilities will have numerous beneficial impacts on individuals as well as to the entire community. Availability of clean and adequate drinking water and sanitary facility are basic human needs. Also, any development efforts aimed at improving water and sanitation needs of an area will significantly contribute towards improving the quality of life of that area. Some of the major beneficial impacts of the project are categorized below:

#### 7.1.1 Impact on Socio-economic Environment

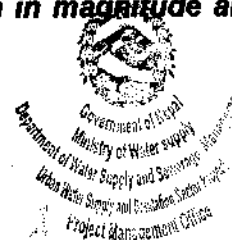
##### 7.1.1.1 Construction Phase

##### a) Employment Generation

272. The project will generate direct employment opportunities to the local people of the area. . The construction activities of the proposed project will offer the locals a grand opportunity to be engaged in the proposed project activities as either skilled or non-skilled workers in terms of their proficiency. The main target group for this benefit is People relying on daily wages. The socioeconomic survey shows that only 6.6% (184) of total 2798 households have to rely on labour/daily wages. Hence, this project will be beneficial to this 6.6% of total households. The amount of money earned by the local people will somehow increase the local economy thereby reducing the chances of seasonal migration of the local people depending upon daily wages works to survive.

***The impact is direct in nature, local in extent, high in magnitude and short-term in duration.***

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**b) Skill Enhancement**

273. 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 such as construction of intakes, treatment plant, valve chambers, buildings, public toilets etc. will provide transferable skills. In future, these skills will be a plus point for the locals in any relevant work as such. Hence, this benefit is targetted to the local people relying on daily wages and those to be involved in labor works of this proposed project.

***The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.***

**c) Local trade and business opportunity**

274. The proposed project will directly add in building business opportunity within the area. As construction work involves a lot of human resources, some grocery stores and, agriculture and livestock product will gain a momentum in the vicinity of the construction site. This will boost the local trade and business sector. Similarly, procurement of locally available construction materials will also help to improve the local trade and business opportunity. The main target group for this beneficial impact is local people involved in local business sector. The socioeconomic survey shows that about 18.20% (508) and only 0.9% (25) of total 2798 HHs are involved in business and industry sector respectively. Though the target group quantity is not so significant, the enhancement of local trade & business opportunity will be fruitful to these people. This will further boost the local trade & economy.

***The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.***

**7.1.1.2 Operation Phase**

**a) Improved health and hygiene**

275. Deteriorating water quality and unsanitary conditions are often the causes of waterborne communicable diseases. The socioeconomic survey revealed that the cases of waterborne diseases such as diarrhoea, dysentery, stomach ache and skin disease etc. are found very few in numbers. Similarly, cases of mortality by water related diseases are nil. However, it is not certain that this condition will be well maintained in the future too. The provision of water treatment plant under the proposed project components will provide solution to this uncertainty. After the implementation of the project, easy access to safe & potable water will maintain the health & hygiene of the local people. This will also help to reduce the chance of



occurrence of water-borne communicable diseases within the project area in the future. This will also help them in bringing a decrease in medical expenses that may require to be incurred if any incidence of water borne diseases is observed. As this proposed project aims to provide safe, reliable & potable drinking water to the proposed service area of the project town, the main target group of this beneficial impact will be beneficiaries or people residing in the service area of this proposed project.

***The impact is direct in nature, local in extent, high in magnitude and long-term in duration.***

**c) Increased economic opportunity**

276. After the completion of the project there is a possibility of migration of people from rural areas towards the town due to easy access to reliable water supply facilities and transcend opportunities. The increased economic level will add great value to the land thereby uplifting their economic status. The main target group for this beneficial impact will be people of the service area involved in business & industry

***The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.***

**c) Social Empowerment**

277. Social Empowerment refers to the process of self empowerment enabling to overcome the sense of powerlessness in the society. This covers Gender Equity, Women's Participation and Social Inclusion. The proposed project will be able to enhance this social empowerment through easy access to safe & potable water and through various capacity building programs. Gender Inequality that is still prevailing within the project town is expected to be eliminated through the implementation of the proposed project.
278. As per the sampled household survey carried out in 2017, 57.65% of female are observed to be involved in water fetching & storage and 42.35% of male are observed to be involved in this activity. This indicates that women are more responsible for fetching water in comparison to the men though there is only slight difference. As the proposed project aims to provide water supply service to each household through private connection, easy access to safe & potable water through the implementation of this proposed project will contribute towards their betterment. It is because the time that may be spent for fetching water will be saved and could be utilized in various other activities. The improved water supply system will contribute towards their better health and hygiene through the provision of safe &

potable water. This will in turn ensure the maintenance of health & hygiene of other family members as the sampled survey also shows that 69% of female are involved in taking care of family members especially children and senior citizens.

279. The proposed project also encourages women participation in the project related activities by enforcing at least two women in water user's committee. As per the Table 39 given above, two female members are appointed as members of Ilam Water Supply Users & Sanitation Committee among which one is appointed as Vice Chairperson and one as a general member. Their involvement in WUSC will provide them the opportunity to actively participate in meetings, discussions and many other decision making level processes. The socioeconomic survey revealed that in comparison to men, women have much more work load regarding household activities though the gender inequality is gradually decreasing in urban areas like Ilam Municipality. Hence, women of the project area are mostly entangled within the household activities. The involvement of women members in WUSC will be the exemplary effort to encourage other women to come out of the cocoon within which they have been entwined by household activities for decades and isolated from the society. The proposed project will also give emphasis on various activities like stakeholder consultations, meetings etc. to persuade women to actively participate in project related activities.

280. The proposed project also expects to enhance the condition of underprivileged people (Dalits & Poor People). There is no provision of water supply service to each household in the existing water supply system. Hence, Dalits & poor people are deprived of water supply service. But, the proposed project has included each and every household of the proposed service area. Hence, this proposed project has also prioritized Social Inclusion.

***The impact is indirect in nature, local in extent, low in magnitude and long-term in duration.***

281. Overall, the Project will lead to enhanced public health and urban environment, significantly contributing to the improvement in the quality of life of Ilam Municipality residents.

282. 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. The summary of impact matrix of beneficial issues of the project is given in Table 43.



Table 43: Summary of Impact Matrix of Beneficial Issues of the project

| Beneficial Impacts            | Impact Rating |           |        |          |                        |
|-------------------------------|---------------|-----------|--------|----------|------------------------|
|                               | Nature        | Magnitude | Extent | Duration | Rating                 |
| <b>Construction Phase</b>     |               |           |        |          |                        |
| Employment Generation         | D             | H (60)    | L (20) | ST (5)   | Very Significant (85)  |
| Skill Enhancement             | ID            | M (20)    | L (20) | LT (20)  | Very Significant (80)  |
| Local Trade and Business      | D             | M (20)    | L (20) | LT (20)  | Very Significant (80)  |
| <b>Operation Phase</b>        |               |           |        |          |                        |
| Improved Health and Hygiene   | D             | H (60)    | L (20) | LT (20)  | Very Significant (100) |
| Increase Economic Opportunity | ID            | M (20)    | L (20) | LT (20)  | Very Significant (80)  |
| Women empowerment             | ID            | L (10)    | L (20) | LT (20)  | Significant (50)       |

Source: National EIA Guidelines, 1993 & IEE Field Study

**Note: 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

### Significance of Impact

Total Score: More than 75 : Very Significant

50-75 : Significant

Less than 50 : Insignificant

## 7.2 Adverse Impacts

### 7.2.1 Impact on Physical Environment

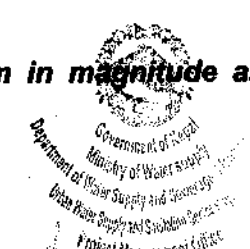
#### 7.2.1.1 Design Phase

##### a) Soil Erosion & Slope Instability

283. During design phase, there is possibility of incorporation of sloped areas due to which construction activities in such area may result in soil erosion and slope instability.

**The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.**

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### 7.2.1.2 Construction Phase

#### a) Soil Erosion & land surface disturbance

284. 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 as the bazaar area lies on the top of the hills. Unorganized disposal of the excavated earth can disturb the street surface and decrease the value of the area where it is disposed. The activity as such will be a discomfort to the road users and inhabitants.

285. Similarly, the proposed project involves the construction of Internal Access Road that includes 100m of gravel road and 100 m<sup>2</sup> of RCC stretches. The construction activities for this may result in Slope Instability and Landslides due to site clearance and earthwork excavation works.

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

#### b) Spoil Disposal

286. Inappropriate disposal of spoils from the construction activities may result in gullyng and erosion of spoil tips especially when it is combined with unmanaged surface water runoff. This leads to destruction of vegetations, damage to agricultural lands and destruction to property at downhill through direct deposition. This will affect the people possessing those agricultural lands as well as the anticipated properties.

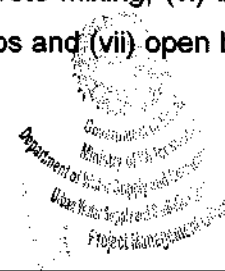
***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

#### c) Air Pollution

287. There will be greater impact on air quality from the inadequately managed or haphazard project activities that includes: (i) earthworks such as clearing, grubbing, excavations, and drilling especially during dry seasons; (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; (v) on-site rock crushing and concrete mixing; (vi) burning of firewoods for cooking & heating in work and labour camps and (vii) open burning of solid waste by workers.



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288. These activities may increase dust, carbon, monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons in the air. This will affect the construction workers, people residing in this area and the passers by.

***The impact is indirect, local to regional in extent, medium in magnitude and short-term in duration.***

**d) Noise**

289. Noise-emitting construction activities include earthworks, rock crushing, 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 high in areas where noise-sensitive institutions such as healthcare and educational facilities are situated. This will affect the construction workers, people residing in this area and the passers by.

***The impact is direct in nature, local in extent, high in magnitude and short-term in duration.***

**e) Generation of solid waste & waste water from construction sites and worker's camp**

290. During construction phase, generation of solid waste & waste water from the construction sites and workers camp are likely to create nuisance in the surroundings. Soil runoff from the construction site may lead to off-site contamination (particularly during rainy season). Similarly, Improper disposal of construction debris may lead to off-site contamination of water resources. Unmanaged solid waste & effluent from workers camp may contaminate the surroundings. This will affect the construction workers, people residing in this area and the passers by.

***The impacts are direct in nature, local in extent, medium in magnitude and long-term in duration.***

**f) Accidental Leakage or Spillage of Stored Fuel/Chemicals**

291. During construction phase, there will be requirement of storage of fuel/chemicals. During the process of storage and handling process, there is possibility of accidental leakage or spillage of stored fuel/chemicals. If not removed quickly, the spilled chemicals/fuel may be absorbed by the floor. This may lead towards the contamination of soil & water. This will affect the community living around this area.

***The impacts are direct in nature, local in extent, medium in magnitude and long-term in duration.***

**g) Impact on Land Use Pattern**

292. The construction of the proposed project components will occupy significant area of the land within the core area. This will affect the current land use pattern as the land to be used for the construction of these components could be used for other purposes like agricultural, residential etc. This effect will be direct in nature.

293. As the construction works of the proposed water supply project start, there will be possibility of influx of people from the nearby areas of the project town to this project town. This will in turn increase the population of the project area which may lead towards change in land use pattern within the core area in haphazard manner. Arable land may be converted to settlement areas. Unstable land may also be used for planned areas. Hapazard cutting of sloped areas may be done to increase settlement areas. The unmanageable land is the main reason behind the destruction of the environment. The effect will be indirect in nature.

294. This will be affecting the people residing within the core area of the project.

***The impacts are both indirect & direct in nature, local in extent, medium in magnitude and long-term in duration.***

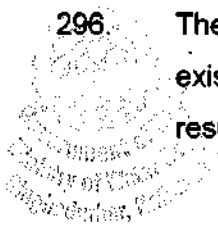
**h) Disruption to Natural Drainage**

295. The pipe laying works along ROW of the public road within the service area of the proposed project may disrupt the existing natural drainage system as the natural drainage flow may be interfered by the construction activities that includes earthworks, backfilling, stockpiling etc. This can have significant consequences like Localised Flooding, Channel Erosion, Landslides etc affecting the residents of that area.

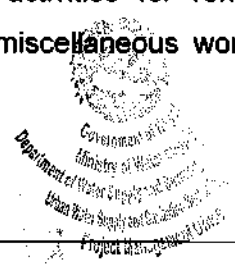
***The impacts are direct in nature, local in extent, medium in magnitude and long-term in duration.***

**i) Haphazard Disposal of Dismantled Debris**

296. The proposed project also involves dismantling activities for rehabilitation of existing intakes, for pipe laying works and other miscellaneous works. This will result in the generation of dismantled debris.



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297. Similarly, after the completion of construction works, the temporary facilities like labour camps, stockpiling sites, temporary toilets etc. needs to be dismantled immediately. The dismantled properties in the form of debris if not properly and instantly disposed off, may create nuisance in the surroundings. This may degrade the environmental quality. This will affect the people living nearby the haphazardly disposed places and even the construction workers also.

***The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.***

## 7.2.2 Impact on Biological Environment

### 7.2.2.1 Construction Phase

#### a) Impacts on Flora and Fauna

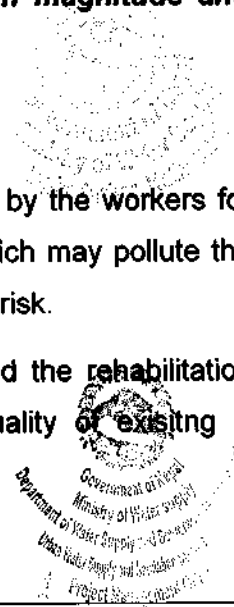
298. Some of the project components like RVT-1 and Guard House need to be constructed within the community forest area. Hence, the construction works of these components may affect flora & fauna available in that area, however, the effect may be insignificant. Similarly, there is no requirement of cutting trees except clearing of some bushes and shrubs. Similarly, during pipe laying works, some of the top soil may be lost.
299. The construction of Internal Access Road will also have impact on flora through certain loss of vegetation due to clearing activities.
300. Haphazard site clearing, parking, and movement of construction vehicles and equipment, stockpiling, illegal harvesting of forest resources as fuel (NTPF) for cooking by workers and hunting of animals will result in unnecessary loss of vegetation & fauna beyond Project footprints.

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

#### b) Impacts on Aquatic Life

301. During construction phase, nearby water bodies may be used by the workers for their daily activities like waste disposal, sanitation activities which may pollute the river quality which in turn lead the habitat of aquatic life towards risk.
302. Similarly, the construction works for the proposed Intakes and the rehabilitation works of the existing intakes may also contaminate the quality of existing & proposed sources affecting the aquatic habitat.

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***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

**c) Forest Fire**

It has already been mentioned that RVT1 and Guard House have to be constructed within the Gumba Danda Community Forest area. During construction of these components, there is greater possibility of accidental forest fire that may be due to carelessness of workers or sudden accidental causes. This forest fire in turn will result in various consequences that includes impact on flora & fauna, destroying of nutrients by the ashes, soil erosion etc.

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

**d) Forest Encroachment**

303. Due to construction activities, there will be regular inflow & outflow of the people to the forest area. This may result in possibility of encroachment of forest area. This will have direct impact on flora & fauna as their habitat will be disturbed by the forest encroachment. This will also discourage the ability of the forest vegetation to recover. Workers involved in the construction activities may use firewood of the forest areas which is illegal in actual.

***The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.***

**7.2.2.2 Operation Phase**

**a) Impacts on Aquatic Life**

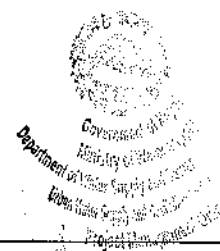
304. The effluent produced from the filter backwashing, if discharged directly into the nearby water bodies, may pollute the water bodies endangering the existence of aquatic lives . This impact will be more troublesome during dry season when the flow will be less and self cleansing capacity of the river will be less.

***The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.***



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### 7.2.3 Impact on Chemical Environment

#### 7.2.3.1 Construction Phase

##### a) Impacts on Water Quality of the nearby rivers

305. During construction phase, there is high possibility of nearby rivers like Gitang Khola, Rate Khola, Mewa Khola, Mai Khola etc. to be polluted due to the chance of disposal of solid wastes by the workers and poor sanitation behavior of the workers. This will lower the water quality of these water bodies. Polluted water bodies will be detrimental to aquatic life as well as to the health of people relying mainly on the river and streams as sources of water for drinking and other domestic uses.
306. Similarly, some sections of the distribution pipeline will cross water bodies, exposing these resources to risks of pollution caused by poorly managed construction sediments, wastes and hazardous substances.

***The impact is direct in nature, local to regional in extent, medium in magnitude and short-term in duration.***

#### 7.2.3.2 Operation Phase

##### a) Impacts on Quality of Water Stored in Reservoir

307. Irregularity in the supervision of the operation of distribution system may lead to excessive algae growth in service reservoir which may produce toxins reducing the water quality within the reservoir and this may cause serious illness in humans consuming water. The algal growth may also impart earthy taste & odor.

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

##### b) Impacts on Water Bodies

308. The sedimentation tank requires periodic cleaning through periodic removal of sediments settled down (Raw Sludge) at the bottom of the tank. The removed sediments or sludge from sedimentation tank needs to be properly disposed. But, there is high chance of disposal of sludge directly into the nearby water bodies. This will degrade the water quality of the river. This impact will be more troublesome during dry season when the flow will be less and self cleansing capacity of the river will be less.

***The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.***

## 7.2.4 Impact on Socio-economic Environment

### 7.2.4.1 Design Phase

#### a) Structural Instability

309. Ilam municipality belongs to hilly region hence, it is prone to seismic activity. As per report on Socio-Demographic Impact Study on Nepal Earthquake 2015 prepared by CDPS (TU), Ilam district is also affected by the massive earthquake that shook various parts of Nepal in April 25, 2015. If certain seismic activity again occurs in the future, this may result in cracking of structure leads to facility failure and public discomfort. Though this impact will be experienced during operation phase, this should be considered during design phase so that such possibility of structural failure can be reduced to greater extent through safe design of earthquake resistant structures.

***The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.***

#### b) Health & Safety of Community & Workers

310. During design phase, if the project components are designed without focusing on the health & safety of community & workers, it will have greater impact on socio-economic environment.

***The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.***

#### c) Damage to the existing utilities

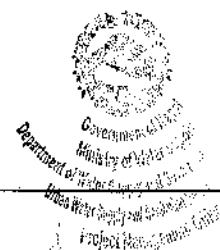
311. During construction phase, if the proposed pipelines interfere any of the existing utilities, there is greater possibility of those utilities getting damaged. This will create discomfort to the people getting facilities from those damaged utilities. Similarly, there is also possibility of some fraud people to take advantage of this impact and may make false claims for damaged utilities. Though this problem appears during construction phase, its mitigation measure should be considered during design phase. Hence, this impact is categorized for design phase.

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***



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#### 7.2.4.2 Construction Phase

##### a) Community health and safety hazards

312. Overall, communities will be exposed to cross-cutting threats from construction's impacts on air and water quality, ambient noise level; mobility of people/goods/services; accesses to properties/economic activities/social services; service disruptions, etc. Communicable and transmittable diseases may potentially be brought into the community by construction workers.

***The impact is indirect in nature, local in extent, medium in magnitude and short-term in duration.***

##### b) Workers' Health and Safety Hazards

313. Workers will also be exposed to the cross-cutting threats of the impacts above during construction. Inadequate supply of safe/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 also be potentially exposed to communicable and transmittable diseases in the community and the workforce.

***The impact is indirect in nature, local in extent, medium in magnitude and short-term in duration.***

##### c) Traffic Congestion

314. The core Ilam bazaar area may be susceptible to traffic congestion during pipeline laying works as the road of this area is a bit narrower that may provide discomfort to the passer-by & shopkeepers and may obstruct the daily activities of the people living in that area .

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

##### d) Disruption to Local Vendor's Business

315. The construction works during pipe laying activities may disrupt local vendor's business as the construction activities may obstruct their customers to have easy & direct access to their shops. This may hamper their daily business activities.

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

**e) Mobilization of Child Labor**

316. During construction period, there is possibility of mobilization of child labor by the contractors which is against the Child Labor Prohibition Act, 2000 as child labor deprives children off their childhood and their right to education, health, safety and moral development.

***The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.***

**f) Impacts on the Sustainability of Works**

317. Nepal is a seismic prone country. It is the geographical location of Nepal that makes it extremely susceptible to seismic activity from the nearby Indian and Tibetan plates. Historically, Nepal has been prone to significant disasters resulting in mass destruction and claiming thousands of lives. Most recently, on 25 April 2015, a 7.8 magnitude earthquake struck in Gorkha district that resulted in the loss of life of thousands of people. As per *Nepal Disaster Management Reference Handbook (2017)*. Center for Excellence in Disaster Management and Humanitarian Assistance, this devastating earthquake affected over 50 districts in Nepal. Ilam, the project district could not remain untouched from this disaster. Nepal is still experiencing repeated but random tremors of various magnitude. Hence, we cannot ignore the fact that there is high possibility of occurrence of such seismic events in the future that will be experienced in the project town also. If this occurs during the construction period of the proposed project, this may unsustain the project by causing damage to the unsettled/unfinished/uncured and/or completed structures affecting their structural integrity.

***The impact is direct in nature, local in extent, high in magnitude and short-term in duration.***

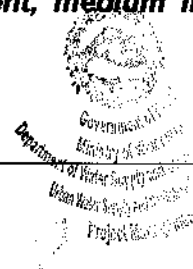
**g) Damage to the existing utilities**

318. During the construction phase, while excavating the earth, there is possibility of the existing water supply distribution pipelines getting damaged in a few places particularly in the market area. Similarly, the existing paved as well as unpaved road will also get damaged. This will obviously create discomfort to the people and people will be deprived of regular facilities they are getting from the existing utilities.

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***



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#### 7.2.4.3 OperationPhase

##### a) Occupational Health and Safety Hazards

319. Worker's exposure to, and/or mishandling of chemicals and other hazardous substances pose health and safety hazards.

***The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.***

##### b) Delivery of Unsafe Water

320. Unsafe water delivered due to any one or combinations of the following will have impact on public health: (i) accidental human error in chlorine dosing; (ii) accidental spill of hazardous substances; (iii) leaks in the system; (iv) lack of environmental quality monitoring; (v) inadequate maintenance and housekeeping; and (vi) deteriorating quality of groundwater resource without parallel upgrading the water treatment process.

***The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.***

##### c) Impacts on Consumer's Health

321. Irregularity in the supervision of the operation of distribution system may lead to excessive algae growth in service reservoir which may produce toxins causing serious illness in humans consuming water. The algal growth may also impart earthy taste & odor which may create dismay to the consumers and this may result in customer complaints that may lead to protests also.

***The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.***

##### d) Non-sustainability of Services or Completed Works

322. This issue will arise and result in disruption in smooth operation of water supply service with the Operator's disregard of the impacts of the following during operation: (i) climate change-induced drought; (ii) seismic events; (iii) Lack of Sense of ownership & affordability; (iv) Lack of institutional capacity & policy compliance and (v) Ineffectiveness in O & M.

***The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.***

The summary of impact matrix of adverse issues of the project is given in Table 44.

Table 44: Summary of Impact Matrix of Adverse Issues of the Proposed Project

| Adverse Issues                                                                    | Impact Rating |           |        |          |                       |
|-----------------------------------------------------------------------------------|---------------|-----------|--------|----------|-----------------------|
|                                                                                   | Nature        | Magnitude | Extent | Duration | Rating                |
| <b>A) Impacts on Physical Environment</b>                                         |               |           |        |          |                       |
| <b>i) Design Phase</b>                                                            |               |           |        |          |                       |
| Soil Erosion & Slope Instability                                                  | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| <b>ii) Construction Phase</b>                                                     |               |           |        |          |                       |
| Soil Erosion & Land Surface Disturbances                                          | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Spoil Disposal                                                                    | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Air Pollution                                                                     | ID            | M (20)    | R (60) | ST (5)   | Very Significant (85) |
| Noise Pollution                                                                   | D             | H (60)    | L (20) | ST (5)   | Very Significant (85) |
| Generation of Solid Waste & Wastewater from the construction site & worker's camp | D             | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Accidental Leakage or Spillage of Stored Fuel/Chemicals                           | D             | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Impact on Land Use Pattern                                                        | D & ID        | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Disruption to Natural Drainage                                                    | D             | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Haphazard Disposal of Dismantled Debris                                           | D             | M (20)    | L (20) | LT (20)  | Significant (60)      |
| <b>B) Impacts on Biological Environment</b>                                       |               |           |        |          |                       |
| <b>i) Construction Phase</b>                                                      |               |           |        |          |                       |
| Impacts on Flora and Fauna                                                        | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Impacts on Aquatic Life                                                           | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Forest Fire                                                                       | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Forest Encroachment                                                               | ID            | M (20)    | L (20) | LT (20)  | Significant (60)      |
| <b>ii) Operation Phase</b>                                                        |               |           |        |          |                       |
| Impacts on Aquatic Life                                                           | D             | M (20)    | L (20) | LT (20)  | Significant (60)      |
| <b>C) Impacts on Chemical Environment</b>                                         |               |           |        |          |                       |
| <b>i) Construction Phase</b>                                                      |               |           |        |          |                       |
| Impacts on Water Quality of the nearby rivers                                     | D             | M (20)    | R (60) | ST (5)   | Very Significant (85) |
| <b>ii) Operation Phase</b>                                                        |               |           |        |          |                       |
| Impacts on Quality of Water Stored in the reservoir                               | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Impact on Water Bodies                                                            | D             | M (20)    | L (20) | LT (20)  | Significant (60)      |
| <b>D) Impacts on Socio-</b>                                                       |               |           |        |          |                       |

| Adverse Issues                                    | Impact Rating |           |        |          |                       |
|---------------------------------------------------|---------------|-----------|--------|----------|-----------------------|
|                                                   | Nature        | Magnitude | Extent | Duration | Rating                |
| <b>economic Environment</b>                       |               |           |        |          |                       |
| <b>i) Design Phase</b>                            |               |           |        |          |                       |
| Structural Instability                            | ID            | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Health & Safety of Community & Workers            | ID            | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Damage to the existing facilities                 | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| <b>ii) Construction Phase</b>                     |               |           |        |          |                       |
| Community Health and Safety Hazards               | ID            | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Workers' Health and Safety Hazards                | ID            | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Traffic Congestion                                | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Disruption to local vendor's business             | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Mobilization of Child Labor                       | ID            | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Impacts on the sustainability of works            | D             | H (60)    | L (20) | ST (5)   | Very significant (85) |
| Damage to the existing facilities                 | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| <b>iii) Operation Phase</b>                       |               |           |        |          |                       |
| Occupation Health and Safety Hazards              | ID            | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Delivery of Unsafe Water                          | D             | M (20)    | L (20) | LT (20)  | Significant (60)      |
| Impacts on Consumer's Health                      | D             | M (20)    | L (20) | ST (5)   | Insignificant (45)    |
| Non Sustainability of Services or Completed Works | ID            | M (20)    | L (20) | LT (20)  | Significant (60)      |

Source: IEE Field Study, 2017

**Note: 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.**

**Significance of Impact**

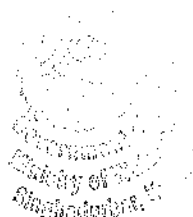
Total Score: More than 75 : Very Significant

50-75 : Significant

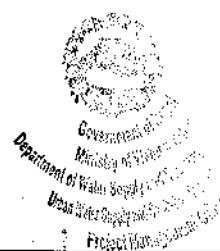
Less than 50 : Insignificant

323. The above given table shows that Air Pollution, Noise Pollution, Impacts on Water Quality of nearby rivers and Impact on Sustainability of Works are evaluated as "Very Significant". However, if the mitigation measures for these impacts are

properly adopted, these impacts would not be problematic for the project implementation. Apart of this, the **Table 44** also shows that some impacts are insignificant & some are significant. The best way to avoid these impacts is to follow the proposed mitigation measures and to implement them effectively. The proposed mitigation measures of each of the above mentioned adverse impacts are discussed in detail in the Chapter 8.



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Engineer



## 8. MITIGATION & AUGMENTATION MEASURES

The anticipated environmental impacts discussed in the earlier chapter are either adverse or beneficial. To sustain the project, it is necessary to deal with these impacts properly. Hence, the IEE study has proposed the effective measures to cope with these impacts. Here, the proposed measures include a) Mitigation Measures to reduce or eliminate or avoid the adverse impacts and b) Augmentation Measures to maximize the beneficial impacts. Both of these mitigation as well as augmentation measures are discussed below in detail.

### 8.1 Mitigation Measures

#### 8.1.1 Impact on Physical Environment

##### 8.1.1.1 Design Phase

##### a) Soil Erosion & Slope Instability

324. The mitigation measures can be as follows;

- Incorporate measures and sites for handling excessive spoil materials
  - Incorporate drainage plan in final design
- PMO, RPMO & DSMC are the main responsible bodies to carry out the above mentioned mitigation measures.

##### 8.1.1.2 Construction Phase

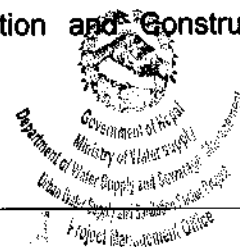
##### a) Soil Erosion & land surface disturbance

325. During construction, precautionary measures will be taken, proper backfilling trenches will be done, and the excavated soil will be protected against erosion. The key elements to proper backfilling include:

- Protecting the foundation from damage during backfilling
- Using the right backfill materials
- Compacting the backfill
- Final finishing the subgrade to ensure that water drains away from the foundation

326. During construction of Internal Access Road, Soil Erosion & Land Surface Disturbances will be mitigated through appropriate slope protection measures like Gabion Wall Construction, Retaining Wall Construction and Construction of Drainage Structures.

*K. P. J. J.*  
Engineer



**b) Spoil Disposal**

327. Spoils should be safely disposed by adopting the following mitigation measures:

- Follow Spoil Management Plan as included in **Annex 2E**.
- Use of excess Spoil or Soil for filling depressed areas or borrow pits wherever possible.
- Appropriate disposal of Spoil at the designated places.
- Spoils should not be disposed on natural drainage paths, canals and other infrastructures.
- Provision of toe walls and retaining walls to protect the erosion of disposed spoils.
- Provision of proper drainage, vegetation and adequate protection against erosion at the Spoil Disposal Site.

**c) Air Pollution**

328. The measures to mitigate the impacts on air quality include: (i) confining earthworks according to an Excavation Segmentation Plan that should be part of EMP; (ii) watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, 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) 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 in access roads and work sites to a maximum of 30 kph; (viii) Strict Prohibition of open burning of solid waste by the workers; (ix) Use of Vehicles complying with NVMES, 2069 B.S.; (x) Use of equipments/machinery that comply with applicable emission standards of GoN i.e., NAAQS, 2012; (xi) Use of Diesel Generators complying with National Diesel Generator Emission Standard, 2012 and (xii) Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking by the concerned contractor.

**d) Noise Pollution**

329. The measures to mitigate the noise pollution include: (i) using equipment that emits the least noise, well-maintained and with efficient mufflers; (ii) restricting noisy activities to daytime and overtime work to avoid using noisy equipment; (iii) limit engine idling to a maximum of 5 minutes; (iv) spread out the schedule of material,

spoil and waste transport; (v) minimizing drop heights when loading and unloading coarse aggregates; (vi) Use of Vehicles complying with NVMES, 2069 B.S. and (vii) Use of equipments/machinery that comply with applicable emission standards of GoN i.e., National Noise Standard Guidelines, 2012 and (viii) Use of Diesel Generators complying with National Diesel Generator Emission Standard, 2012

e) **Generation of solid waste & waste water from construction sites and worker's camp**

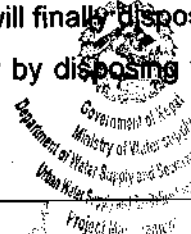
330. The mitigation measures for this impact is briefly described below:

**Construction Wastes:**

- Adopt 3R (Reduce, Reuse & Recycle) concept
- Ensure storage areas are secure, safe and weatherproof.
- Management of Reusable Wastes
- Sale of Recyclable wastes to Scrap Dealer
- Final Disposal of Bio degradable solid wastes
- Avoid over ordering of construction materials to the extent possible. This will be challenging as it requires strong coordination with the concerned contractors as it cannot be made mandatory. However, it is not impossible too to coordinate with the contractors in this regard.
- Use standard size & quantity of construction materials.
- Construct earthen drains to reduce the runoff from the stockpiles.

**Solid Wastes & Effluent from Worker's Camp:**

- Adopt Segregation of Solid Waste (3R Concept) on the basis of being biodegradable or non-biodegradable. It is because non-biodegradable wastes cannot be broken down by decomposers and their disposal poses a big problem.
- Management of biodegradable wastes that includes food waste, paper waste, biodegradable plastic, etc. by any suitable processes that include Composting & Incineration. If these two processes are not possible then, the wastes shall be either managed by handing over these wastes to the municipality waste collectors who will finally dispose those wastes to the landfill sites of the project town or by disposing those wastes to the burial pits at suitable place.



- Non biodegradable wastes like glass,plastics & metals shall be managed by reusing them for site use or selling them to scrap dealers instead of disposing them.
- Strict Prohibition on open incineration of solid wastes & Strict Prohibition on use of plastic materials to minimize the quantity of plastic wastes as much as possible.
- Construct the temporary latrines with temporary soak pits & septic tanks within the camp site for proper disposal of sewage.
- Provide temporary but proper drainage system for proper outlet of waste water generated from cooking practices adopted by the workers.
- Employ local people from nearby villages to maximum extent possible.It will minimize the number of workers residing at worker's camp. Lesser the number of people, lesser will be the solid waste & effluent generated.However, it cannot be made mandatory because availability of local people with required skills will not be ensured at the time of construction.

**f) Accidental Leakage or Spillage of Stored Fuel/Chemicals**

331. The mitigation measures for this impact is briefly described below:

- Provision of well managed storage site.
- Organize awareness programs for the workers responsible for handling fuel/chemicals prior to the construction works.
- Supervise workers to handle fuel/chemicals properly during transportation as well as storage.
- Use of spill kit materials to block flow and prevent discharge to nearby water bodies
- Scatter the Sawdust, sand or dry soil over the area of spill and leave for few minutes to soak up the fule/chemical. So, availability of saw dust, sand or dry soil should be ensured in the store.
- Regular Inspection Visit to the storage site to inspect the leakage of the stored container of fuel/chemical.

**g) Impact on Land Use Pattern**

332. The mitigation measures for this impact are as follows:

- Selection of barren and public land only for the construction of project components.

- Avoid the acquisition of private and agricultural land for the construction of project components.
- Monitoring on the haphazard land use & planning by the concerned authority.

**h) Disruption to Natural Drainage**

333. The mitigation measures for this impact are as follows:

- Avoid the natural drainage pathways for pipe laying works.
- Stockpile the excavated materials at safe but nearby place.
- Restore natural drainage system if the drainage system during construction is blocked.

**i) Haphazard Disposal of Dismantled Debris**

334. The mitigation measures for this impact are as follows:

- Immediate Response on handling of dismantled debris.
- Segregation of Dismantled Debris
- Adopt 3R (Reduce, Reuse & Recycle) concept to minimize the quantity of dismantled debris.
- Sale of Recyclable Wastes to Scrap Dealer

**8.1.2 Impact on Biological Environment**

**8.1.2.1 Construction Phase**

**a) Impacts on Flora & Fauna**

335. The mitigation measures for this impact include:

- (i) Replace the excavated top soil to its original position after the completion of pipe laying works
- (ii) Re-vegetating disturbed slopes and grounds, as applicable
- (iii) Awareness programs regarding the policy related to the conservation of existing flora & fauna, to the workers prior to the construction and the community during various meetings and discussion programs;
- (iv) Adopt the suitable mitigation measures proposed to minimize noise pollution as mentioned above in 8.1.1 d).
- (v) Regular Monitoring by DSMC & PMO
- (vi) The forest area will be used as per Section 68 (1) of Forest Act 2049 (1993) which has also been mentioned in Section 2.4.14

*[Signature]*  
Engineer

**b) Impacts on Aquatic Life**

336. The mitigation measures for this impact include: i) Strict Monitoring on the daily activities of workers ; ii) Provision of temporary but well equipped toilets; iii) Restriction to workers from fishing; iv) Adopt measures mentioned above in section 8.1.1 (e) for the solid waste management

**c) Forest Fire**

337. The mitigation measures for this impact include: (i) Prohibition on burning dry grass or debris ; (ii) Prohibition on camp fires & smoking within the forest area to the workers;(iii) Keeping fire fighting equipment stand by within the construction sites; (iv) Provision of safety trainings regarding forest fire to the construction workers prior to construction.

**d) Forest Encroachment**

338. The mitigation measures for this impact include: (i)Strict & Regular Monitoring during the entry of workers for the construction workers, (ii) Mobilization of the concerned community forest groups, (iii) Legal Provision along with imposing fines as punishment for those responsible for forest encroachment & (iv) Provision of trainings to the construction workers to provide support in controlling encroachment.

**8.1.2.2 Operation Phase**

**a) Impacts on Aquatic Life**

339. The mitigation measures for this impact are as follows:
- Strict monitoring to the operators involved to discourage Direct discharge of the effluent to the water bodies.
  - Proper Implementation of Water Safety Plan (WSP).

**8.1.3 Impact on Chemical Environment**

**8.1.3.1 Construction Phase**

**a) Impacts on Water Quality of the nearby rivers**

340. Mitigation measures will be implemented before the construction stage to prevent the contamination of drinking water source and other environmental receptors from worker camps and construction site toilets septage. The mitigation measures includes;

- Appropriate design of septage disposal will minimize the risks to public health. The appropriate 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 watertight. Septage disposal pit will be designed and constructed in accordance with international best practice and acceptable standards. This will include, locating disposal pits at least 300 m away from the nearest dwelling and 30 m downstream of the drinking water source, The pits will be installed on relatively flat land with no more than 8 % slope and sites selected for locating of pits will not be where food crops are grown. The sanitation condition will be maintained to deter flies, mosquito breeding, free from odor. The septage disposal site will ensure no disturbances to nearby community forests.

In additional to this, other mitigation measures include

- disposing of spoils or excess soils as free filling materials as soon as possible;
- locating temporary storage areas on flat grounds and away from main surface drainage routes;
- shielding temporary storage areas with sandbags
- implementing eco-friendly solid and hazardous waste management, disposing them promptly;
- providing adequate water supply and sanitation facilities at work sites.
- Strict supervision on the behaviour of workers for the waste management as well as sanitation behaviour and monitoring the workers to manage the wastes properly.
- Strict & Regular Monitoring during pipe laying works

The contractor, RPMO & DSMC are the main responsible bodies to carry out the above mentioned mitigation measures.

#### **8.1.3.2 Operation Phase**

##### **a) Impacts on Quality of Water Stored in Reservoir**

341. The mitigation measures for this impact are as follows:

- Proper Implementation of Water Safety Plan (WSP).
- Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC.

*Chirya*  
Engineer



**b) Impact on Water Bodies**

342. The mitigation measures for this impact are as follows:

- Disposal of raw sludge to the appropriate landfill sites of the proposed project town
- Use of raw sludge for agricultural land.
- Avoid direct discharge of the raw sludge to the water bodies through strict monitoring to the operators involved.
- Proper Implementation of Water Safety Plan (WSP).

**8.1.4 Impact on Socio-economic Environment**

**8.1.4.1 Design Phase**

**a) Structural Instability**

343. This impact can be mitigated through proper design of earthquake resistant structures as per standard and code of practice.

PMO, RPMO & DSMC are the main responsible bodies for the adoption of this mitigation measure.

**b) Health & Safety of Community & Workers**

344. The mitigation measure for this impact involves;

- Training on Community Health & Safety Hazards by DSMC by disseminating information in regard to this through training manuals, photographs & documents related to safety.
- PMO, RPMO & DSMC are the main responsible bodies to carry out the above mentioned mitigation measures.

**c) Damage to the existing facilities**

345. The mitigation measures for this impact includes;

- Coordinate with the concerned agencies to finalize the pipe network layout to avoid damage to the existing utilities.
- Design & Locate pipelines away from existing utilities during design as far as possible.
- Provide budget for restoration/replacement of damaged utilities.
- Photographs of construction sites before and after the construction to avoid the false claims.
- Prompt Reinstatement of paved as well as unpaved roads after completion of excavation works for pipe laying.



346. PMO, RPMO & DSMC/Contractor are the main responsible bodies to carry out the above mentioned mitigation measures.

#### 8.1.4.2 Construction Phase

##### a) Community Health & Safety Hazards

347. The mitigation measures for this impact include: (i) Contractor's implementation of EMP; (ii) adequate lighting, temporary fence, reflecting barriers and signage at active work sites; (iii) Contractor's preparedness in emergency response; and (iv) adequate dissemination of GRM and Contractor's observance/implementation of GRM.

##### b) Worker's Health & Safety Hazards

347. The mitigation measures for this impact include:

(i) Comply Labor Act (2017) of GoN; (ii) Train all site personnel regarding environmental health and safety as like in design phase by DSMC & Contractors; (iii) Provide Personal Protective Equipment (PPEs) to workers that includes protective clothing, helmets, goggles and other equipments designed to protect the wearer's body from injury or infection and ensure their effective usage; (iv) Require workers to wear high visibility clothes; (v) Exclude public from worksites; (vi) Maintain accident reports and records; (vii) Make first aid kits readily available; (viii) Maintain hygienic accommodation in work camps; (ix) Ensure uncontaminated water for drinking, cooking, and washing; (x) Assure clean eating areas; (xi) Make sure sanitation facilities are readily available, Provide medical insurance coverage for workers; (xii) Provide adequate space and light to the camp site; (xiii) Adequate supply of potable water to the camps and good sanitation within camps; (xiv) Provide medical insurance coverage for workers; (xv) Provide orientation for guest visitors; (xvi) Ensure that visitors do not enter hazard areas unescorted; (xvii) Ensure moving equipment is outfitted with audible backup alarms; (xviii) Hearing protection equipment enforced in noisy environment and (xix) Chemical and material storage areas need to be marked clearly.

##### c) Traffic Congestion

348. This impact cannot be avoided because the structure of the bazaar area is very congested. However, this impact can be mitigated as follows;

- The trench for pipeline should not be abandoned and the contractor should be recommended to backfill the trench immediately followed by compaction right after completion of pipe laying works.

- The contractor will be accountable to provide signage at appropriate locations indicating available alternate access routes to minimize traffic disruptions.
- The contractor will have to provide access to shops and residences using simple wooden walkways.
- Provision of alternative way for vehicular movement and pedestrians if possible
- The contractor shall follow the Traffic Management Plan especially at Ilam Bazaar Area, the sample of which has been attached in **Annex 2D**.

The contractor and DSMC are the main responsible bodies to mitigate this impact.

**d) Disruption to Local Vendor's Business**

349. The mitigation measures for this impact includes;

- Avoid delay in construction works and Prompt Backfilling accompanied by compaction right after completion of pipe laying works without delay.
- Provision of temporary access to the shops through provision of planks.

350. Pre-notify the vendors regarding the construction works that may hinder their daily activities and Coordinate with them properly.

**e) Mobilization of Child Labor**

351. The mitigation measures for this impact includes;

- As the Child Labor Prohibition Act, 2000 states that "No Child having not attained the age of 14 years shall be engaged in works as a laborer" during mobilization, provision for the requirement of submission of the citizenship certificate of each labor, should be made.
- During contract agreement, the agreement by the contractor to follow Child Labor Prohibition Act, 2000 and Child Labour Prohibition Rules & Regulations, 2006, should be made.

**f) Impacts on Sustainability of Works**

352. The mitigation measures for this impact includes;

- After every seismic event, the contractor must conduct engineering investigation of built structures and implement the necessary corrective actions immediately as a mitigation measure for this impact.
- Prepare Emergency Preparedness and Response Plan

**g) Damage to the existing facilities**

353. If during construction phase, the problem regarding damage to the existing facilities arises, then it will be the fault of the people involved in construction works as this problem will be considered during design phase. This problem will arise only if no carefulness is adopted by the workers and if the pipeline layout drawings prepared during design phase is not strictly followed. Hence, the mitigation measure for this impact is to monitor construction workers to adopt carefulness and to strictly follow the layout drawings.

354. Similarly, during excavation works, damage to the existing paved as well as unpaved roads can be mitigated through reinstatement works. The proposed project has provision for this reinstatement works and the cost estimate has been included in the the detailed design cost estimate of this proposed project.

**8.1.4.3 Operation Phase**

**a) Occupational Health and Safety Hazards**

355. The mitigation measures for this impact include; (i) installation of clear, visible signage in premises on safety measures; and (ii) setting up a mechanism for the quick response to spills of chemical and hazardous substances.

**b) Delivery of Unsafe Water**

356. The mitigation measures for this impact include; (i) ensuring the correct operation of water treatment plant to meet satisfactory water quality; (ii) providing safe storage for chemicals; (iii) ventilation of Housed dosing unit for chlorine and (iv) train operators for handling chlorine for which Chlorine Use Guidelines as included in **Annex 5** will be followed.

**c) Impacts on Consumer's Health**

357. The mitigation measures for this impact are as follows:

- Regular Monitoring by the WUSC
- Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC.
- Monitoring & Proper Implementation of WSP.

**d) Non-sustainability of Services or Completed Works**

358. The following mitigation measures to avoid non-sustainability of services or completed works are as follows:

Engineer

- WUSC should monitor yield closely especially in the dry season and during a climate-change-induced drought.
- After every seismic event, WUSC should conduct engineering investigations of completed works and implement the necessary corrective actions without delay. This shall involve preparation of Emergency Preparedness & Response Plan and Immediate Implementation of this plan after any seismic event.
- Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs
- Carrying out regular O & M with effectiveness through proper management of WUSC.

## **8.2 Augmentation Measures**

### **8.2.1 Impact on Socio-economic Environment**

#### **8.2.1.1 Construction Phase**

##### **a) Employment Generation**

359. The augmentation measures for this beneficial impact will be as follows:

- Recommend contractor to employ local people by giving high priority to women and under privileged group as far as possible.
- Ensure equity in provision of wages to both male as well as female labors.

##### **b) Skill Enhancement**

360. The augmentation measures for this beneficial impact will be as follows:

- Making a proper work plan and code of conduct during the construction period.
- Provision of regular hands on training to the workers during the project construction period

##### **c) Local trade and business opportunity.**

361. The augmentation measures for this beneficial impact will be as follows:

- Recommend contractor to give priority to the local products during procurement of construction of materials.
- Priority also will be given to local services like grocery stores, tea shops, hotel & restaurants etc. during the entire construction period.
- Provision of regular hands on training to the workers during the project construction period



## 9. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

### 9.1 Stakeholder Consultation & Participation

365. Stakeholder consultation and participation is an essential process in project preparation. It is also a part of information disclosure. It will disseminate as well as collect information regarding the proposed project by involving various stakeholders that includes Key Informant Interviews, Stakeholders Meetings, Focus Group Discussions (FGD), On-site discussions with WUSC and Random Field Interviews. The checklists & findings of FGD has been included in **Annex 4** and the minutes of various meetings undertaken during field visits are also included in **Annex 3**.
366. This stakeholder consultation requires the analysis of stakeholders through the identification of the potential participants and the methods of their involvement. The table given below illustrates the concerned stakeholders of the proposed project that will have either primary or secondary.

Table 45: Stakeholder Analysis & Mapping

| S.N. | Stakeholders                                       | Primary <sup>2</sup> | Secondary <sup>3</sup> | Stakeholders' Role or Interest                                                                                                                                                                                                                       | Level of Influence |
|------|----------------------------------------------------|----------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 1.   | Government of Nepal                                |                      | ✓                      | It is the executive and central body.                                                                                                                                                                                                                | High               |
| 2.   | Ministry of Water Supply (MoWS)                    |                      | ✓                      | It is the lead executive agency and is responsible for policy coordination, guidance, review of programs, ensuring that all aspects relevant to achieve the objective of the project and for sustaining the improved services to the required level. | High               |
| 3.   | ADB                                                |                      | ✓                      | It supports government of Nepal in improving and enhancing the existing water supply service.                                                                                                                                                        | Medium             |
| 4.   | Department of Water Supply and Sewerage Management |                      | ✓                      | It is the lead implementing agency and works under MoWS with the responsibility of planning, implementation, operation, repair & maintenance of the proposed project.                                                                                | High               |
| 5.   | DWASH-CC                                           |                      | ✓                      | It provides coordination in the preparation of local WASH plans with inputs from WASH sector actors and in the effective implementation of the local plans related to this project.                                                                  | High               |

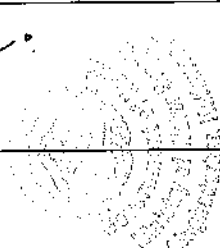
<sup>2</sup> Primary Stakeholders: people, groups and institutions affected positively (beneficiaries) or negatively (involuntarily resettled) by the proposed program

<sup>3</sup> Secondary Stakeholders: people, groups and institutions that are important intermediaries in the program delivery process

| S.N. | Stakeholders                                    | Primary <sup>2</sup> | Secondary <sup>3</sup> | Stakeholders' Role or Interest                                                                                                                                                                        | Level of Influence |
|------|-------------------------------------------------|----------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 5.   | UWSSP, PMO, RPMO & DRTAC                        |                      | ✓                      | It is responsible in successfully implementing the proposed project activities, establishing coordination with ADB & GoN and managing day to day activities at municipality levels.                   | High               |
| 6.   | Town Development Fund (TDF)                     |                      | ✓                      | TDF will assist the project municipality conducting financial appraisal of the proposed project and advice DWSSM on its outcomes prior to the start of detailed design process.                       | High               |
| 7.   | Local Bodies (DCC, Municipality & Ward Offices) |                      | ✓                      | It is responsible for establishing coordination with the implementing agency. Here, the municipality will be also responsible for policy compliance as well as for addressing public protests if any. | High               |
| 8.   | Community Forest User's Group                   |                      | ✓                      | It is responsible for establishing coordination with the contractor during construction works within the community forest area.                                                                       | High               |
| 9.   | Forest Security Personnel                       |                      | ✓                      | It is responsible for establishing coordination with the contractor during construction works and for establishing harmony between locals and construction workers within the community forest area.  | High               |
| 8.   | DSMC                                            |                      | ✓                      | It will assist PMO & RPMO in the overall planning, implementation and monitoring of the project activities regarding environmental & social safeguards requirements.                                  | High               |
| 9.   | WUSC                                            |                      | ✓                      | It is responsible for O & M of the proposed water supply system. It will also facilitate the concerned authorities during planning as well as construction phase.                                     | High               |
| 10.  | Households (Families & Individuals)             | ✓                    |                        | They are the main beneficiaries and are benefitted by the provision of enhanced & improved continuous water supply service.                                                                           | Low                |
| 11.  | Contractors, Petty Contractors                  |                      | ✓                      | It is responsible for bidding for works and involved in the construction of the proposed project.                                                                                                     | Low                |
| 12.  | Local Technicians/Plumbers                      | ✓                    |                        | This group will be benefitted through the increased work opportunities related to construction works of the proposed project.                                                                         | Low                |

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Government of Nepal  
Ministry of Water Supply,  
Urban Water Supply and Sewerage  
Ilam Water Supply and Sewerage Project

| S.N. | Stakeholders                                    | Primary <sup>2</sup> | Secondary <sup>3</sup> | Stakeholders' Role or Interest                                                                                                             | Level of Influence |
|------|-------------------------------------------------|----------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 13.  | Unemployed Locals                               | ✓                    |                        | This group will be benefitted through the increased work opportunities related to construction works of the proposed project.              | Low                |
| 14.  | Local Vendors                                   | ✓                    |                        | This group will be affected by the pipe laying works for the distribution network of the proposed project at the core Ilam Bazaar area.    | Low                |
| 15.  | Schools & Hospitals                             | ✓                    |                        | This group will be benefitted by the provision of enhanced and improved continuous water supply service.                                   | Low                |
| 16.  | Commercial Establishments (Private Enterprises) | ✓                    |                        | This group is benefitted by enhancing their business by supplying items to the construction employees regarding their basic needs.         | Low                |
| 17.  | Scrap Vendors                                   | ✓                    |                        | This group will be benefitted by purchasing the recyclable wastes generated from the construction activities as well as from workers camp. | Low                |
| 18.  | Local Leaders                                   |                      | ✓                      | This group will facilitate to establish strong coordination between the local people and the project authority.                            | High               |

Source: IEE Field Study 2016 and DEDR & DDR, 2018

367. The consultations were carried out on various dates at various locations within the project town for the discussion of the anticipated environmental impacts that may result from the construction of the proposed project. The consultations were undertaken with key stakeholders that includes Local Bodies, Beneficiaries Households, CFUGs, TDF, PMO, RPMO & DRTAC in line with ADB's requirements pertaining to environment and social considerations. The key concerns of the people related to the project that includes Implementation of the safeguard policy framework in field level, Delivering the information regarding safeguard activities to local level, Willingness to pay, Upfront cash collection and People's participation in project implementation were discussed.

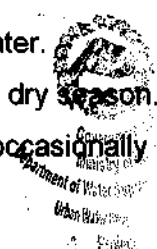
## 9.2 Major issues raised by the stakeholders

368. The major issues raised by the key stakeholders during stakeholder consultation are as follows:

- The project town is in need of safe, reliable and potable water.
- Water shortage problem is acute in the project town during dry season.
- People of the project town are relying on untreated but occasionally disinfected water.

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- iv. The operating system of the existing water supply system is good but the supply system is intermittent.
  - v. The project should give priority to local people while hiring for the construction activities.
  - vi. The project must consider solid waste management issues during construction period.
  - vii. The proposed project must address the socioeconomic problems that may be observed during the construction period at Ilam Bazaar area like Traffic Congestion, Disruption to Local Vendors, Discomfort to the passerby, Noise Pollution, Air Pollution, Damage to the existing facilities etc.
  - viii. The construction works within the community forest areas should not involve cutting trees as well as destruction of any kind of forest resources.
369. The assurance made by the study team regarding the issues raised by the stakeholders are as follows:
- i. The proposed project will address the water shortage problem faced by Ilam municipality.
  - ii. The proposed project has provision of water treatment system. This will resolve the problems of consumption of either occasional treated or untreated water.
  - iii. The proposed project has provision of continuous water supply system. This will end the irregular water supply service.
  - iv. The proposed project with water treatment facility and continuous water supply provision if effectively implemented will address the needs of Ilam municipality residents regarding safe, reliable and potable water.
  - v. The socioeconomic problems raised by the stakeholders has been considered in IEE study and this IEE study has proposed mitigation measures for these issues. Accordingly, for ensuring the effective implementation of the proposed mitigation measures, EMP will be prepared and the contractor will be enforced to consider, follow and implement the EMP during construction.
  - vi. The solid waste management plan will be prepared, followed and implemented during the construction phase of the project that includes Spoil Management & Disposal, Disposal of Dismantled Debris and Management of Construction Wastes & Solid Wastes.
  - vii. Local workers of Ilam municipality will be given priority for employment to the extent possible however, it requires strong coordination with the concerned contractor.
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370. The project envisages that stakeholder consultations will continue during the project period and concerned stakeholders will be invited and encouraged to participate. The PMO and ICG will maintain rapport with WUSC and the municipality. PMO, ICG, Contractors, and WUSC will be open to the public to discuss concerning the progress of the subprojects, adverse impacts, mitigation measures and environmental monitoring and grievances. The stakeholder consultations in future will be as follows.

- i. During construction, if change in design, alignment, and location, the PMO and ICG will hold at least one public consultation to solicit perceived impacts, issues, concerns and recommendations from affected communities;
- ii. Before construction, the PMO and ICG will conduct an information, education and communication (IEC) campaign among the affected communities about 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. Billboards about the subproject, implementation schedule and contact details of the executing agency, PMO-ES, ICG-ESA and Contractors will be set up at strategic locations. The grievance redresses procedure and details will be posted at the offices of the ICG, WUSC and VDC;
- iii. During construction, regular random interviews will be conducted by the ICG-ESA every month to monitor environmental concerns of subproject communities;
- iv. During operation, periodic random interviews will be conducted by the ICG and WUSC to monitor the environmental concerns of subproject communities;
- v. 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.

371. Several public consultations held at various locations on different dates with key stakeholders as mentioned above are tabulated below:



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Table 46: Summary of Major Public Consultations carried out by Study Team

| Date     | Location                                  | No. of Participants | Participants                                                                                                                                                                                                                                                                                                        | Topics Discussed                                                                                                                                                                                                                                                                                                  | Issues Raised                                                                                                                                                                      |
|----------|-------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2/7/2014 | Ilam Municipality Office                  | 4<br>All male       | Executive Officer, Engineers, Administrative staff                                                                                                                                                                                                                                                                  | Institutional set up for implementing the project under ADB assistance<br>Land availability for treatment plant and water tanks<br>Social safeguard issues<br>Socioeconomic survey of the beneficiary households                                                                                                  | Institutional set up; whether Municipality or WUSC shall implement the project<br>Land availability and ownership                                                                  |
| 3/7/2014 | District development Office, Meeting hall | 45<br>M=39<br>F=6   | Chief District Officer, Local Development Executive officer of Municipality, District Superintendent of Police, Divisional engineer, WSSDO, Deputy Project Director, DWSS, representatives from different political parties, Red cross, Lions Club, engineers from line agencies and municipality, PPTA Consultants | Need and existing provision of drinking water and demand from the municipality<br>Existing drinking water supply sources, quantity and quality<br>Affordability for the connection charge and monthly tariff<br>Institutional set up for implementing the project under ADB assistance<br>Social safeguard issues | New sources of water supply and the agreement with the community about new sources (Rate and MewaKhola)<br>Institutional set up; whether Municipality or WUSC will run the project |
| 7/9/2014 | Maimajuwā VDC                             | 6<br>M=4<br>F=2     | VDC secretary, VDC officials, local residents                                                                                                                                                                                                                                                                       | Demand of local residents of the water source of Rate and Mewakhola<br>Consultation and discussion is ongoing with the district authority and the community living around the water source<br>Social safeguard issues                                                                                             | Willingness to provide the source of water from the khola subject to fulfilment of demands                                                                                         |
| 9/9/2014 | District development Office, Meeting hall | 40<br>M=36<br>F=4   | Chief District Officer, District Superintendent of Police, Divisional engineer, WSSDO, Deputy Project Director, Ministry of Water, Department of Water Supply and Sewerage, Urban Development and Construction, Project Management Unit                                                                             | Need and existing provision of drinking water and demand from the municipality<br>Existing drinking water supply                                                                                                                                                                                                  | Upgrading of existing water tanks, treatment plant, meeting the demands of the water source communities                                                                            |

| Date       | Location                                 | No. of Participants       | Participants                                                                                                                                   | Topics Discussed                                                                                                                                                                                                                                                                                                                           | Issues Raised                                                                                                                                                                                                                                                                           |
|------------|------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                                          |                           | DWSS, representatives from different political parties, Red cross, Lions Club, engineers from line agencies and municipality, PPTA Consultants | sources, quantity and quality Affordability for the connection charge and monthly tariff Immediate decision for the Institutional set up for implementing the project under ADB assistance Social safeguard issues Compensation for land owner and house owner                                                                             | Institutional set up on whether Municipality or WUSC will run the project to be finalized by 16 September                                                                                                                                                                               |
| 8/2017     | Municipality, Ilam                       | 10                        | Mayor, User's Committee representative, Ward Chairman, Social Expert, engineers, surveyors                                                     | Land requirement for the proposed project, environment-related issues, manpower requirements for technical and social survey                                                                                                                                                                                                               | If land needs to be purchased, it should be done according to Social Protection Policy; construction works should be carried out ensuring environmental safety and protection; engagement of local human resources for the survey                                                       |
| 6/9/2017   | Municipality, Ilam                       | 25<br>Male=8<br>Female=17 | Mayor, Deputy Mayor, Wards Chairman, Water Supply In charge of Municipality, representative of WUSC executive body                             | Dissemination of project information -- approach, modality, role & responsibilities of various stakeholders The project service area delineation Social and technical survey works in ward no 6,7,8 and 9 of Ilam Municipality Land availability for project and discussion in the context of Social Safeguard Environmental consideration | Engagement of enumerators from local level including female for socio-economic survey<br><br>Reminder that if land has to be purchased, should be done following social safeguard norms<br><br>Environmental considerations during construction to avoid negative impact on environment |
| 7-9/9/2017 | Hall of Human Rights Association of Ilam | 23<br>Male=8<br>Female=17 | Social Safeguard Expert/ Sociologist/Design Engineer, Water Supply and Sanitation Engineer & Survey Team                                       | Orientation to staff and stakeholders for social survey                                                                                                                                                                                                                                                                                    | Engagement of 10-12 enumerators from local level including female for socio-economic survey                                                                                                                                                                                             |
| 14/9/2017  | DDC Hall, Ilam                           | 35                        | Sociologist/Design Engineer,                                                                                                                   | Dissemination of project                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                         |

| Date                                            | Location                        | No. of Participants | Participants                                                                                         | Topics Discussed                                                                                                                                                                                                       | Issues Raised                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------|---------------------------------|---------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 |                                 | M=24<br>F=11        | Water Supply, and Sanitation Engineer & Survey Team<br>-WUSC executive body and advisor team.        | information -- approach, modality, role & responsibilities of various stakeholders<br>Preparation of social and technical survey works                                                                                 |                                                                                                                                                                                                                                                                                                                                                                     |
| 14/12/2017                                      | Ilam Municipality               | 100<br>M=63<br>F=37 | Municipality Mayor, Deputy Mayor, WUSC body, Different Stakeholder<br>More than 80 number local user | Final Design Report<br>Presentation.<br>Use of source and issues<br>Upgrading of existing water tanks, water treatment plant                                                                                           | Meeting the demands of the community at the source area; concerns of indigenous peoples at the source area and weighing solutions; institutional set up                                                                                                                                                                                                             |
| 11/02/2018                                      | Municipality Meeting Hall, Ilam | 66                  | WUSC, stakeholders concerned                                                                         | Presentation of Final Study Report<br>Land requirements for the project<br>Registration of Source with the concerned authority<br>Upfront cash contribution<br>Month Water Tariff<br>Protection from potential impacts | Proposed source for IlamWS should be registered within 15 days if not yet so; monthly water tariff should be determined in discussion with the Town Development Fund                                                                                                                                                                                                |
| 9/5/2018                                        | Ilam Municipality, View Tower   | 11<br>M=9<br>F=3    | Vice Chair of Sandakpur Rural Municipality, WUSC members Sociologist, PMO Consultants, PMO           | Water diversion from Gitang, rate and Mewakhola<br>Social Safeguards issues<br>Indigenous Peoples Issues<br>Fund collected from consumers by WUSC                                                                      | Consensus and agreement between SandakpurRM and WUSC to divert 16lps from Gitang source and 10 lps each from Mewa and Rate source; municipalities will address the social safeguards issue in close coordination with stakeholders; Municipal level and District level coordination committee have been formed and will be responsible to assure IPP implementation |
| 9/5/2018<br><i>9/20/2018</i><br><i>Engineer</i> | Sandakpur ward no 2 office      | 25<br>M=23<br>F=2   | WUSC Member, local Stakeholder, and indigenous representatives, Expert from                          | Discussion over Source use in Rate, Gitang, and Mewa. Local Indigenous people their issue and demand from                                                                                                              | New sources of water supply and the agreement with the communities at the new sources (Rate and MewaKhola)                                                                                                                                                                                                                                                          |

| Date      | Location                               | No. of Participants | Participants                                                                                                            | Topics Discussed                                                                                         | Issues Raised                                                                                                                                                                                                                                                                                                         |
|-----------|----------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10/5/2018 | District Coordination Committee Office | 11<br>M=9<br>F=2    | DRTAC and Sociologist PMO.<br>Chair, DCC<br>WUSC members<br>Sociologist, PMO<br>Consultants                             | municipality against the source using<br>Benefit sharing Issues<br>Project environment<br>Implementation | Local governments will ensure benefit sharing; more than 90% of fund by users has already been collected so need to implement the project soon                                                                                                                                                                        |
| 10/5/2018 | DDC meeting hall, Ilam                 | 30<br>M=21<br>F=7   | WUSC members<br>All political representatives<br>Media persons<br>Advisors<br>Users,<br>Sociologist, PMO<br>Consultants | Status of Project<br>Benefit Sharing<br>Indigenous Peoples Issue                                         | Need to implement the project soon as consensus between all stakeholders has been established; benefit sharing will be assured by local governments; no indigenous peoples issues at present; local governments will ensure that indigenous peoples issues, if any, are addressed and that stakeholders are consulted |

Source: DEDR & DDR, 2018

372. The GoN-approved IEE Report (in English), will be available at the offices of PMO, ICG, and WUSC for the perusal of interested parties. Copies may be made available upon formal request. IEE and environmental monitoring reports will be disclosed on the ADB's and UWSSSP website. This will be also as a part of Information Disclosure.

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## 10. GRIEVANCE REDRESS MECHANISM

### 10.1 Purpose of the Grievance Redress Mechanism

373. A project-specific grievance redress mechanism (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. The mechanism, developed in consultation with key stakeholders, will ensure that: (i) the basic rights and interests of every person adversely affected by the social and environmental performance of a Project are protected; and (ii) their concerns are effectively and timely addressed.
374. 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, 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.
375. A municipal-level public awareness campaign will be conducted on a regular basis as shown in the Communication and Public Participation Plan (CAPP) of the project to ensure awareness on the project and its GRM. The social and environmental safeguards experts of the PMQAC and 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.

### 10.2 Proposed Set-Up

376. 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 (1) WUSC Secretary; (2) RPMO Engineer; (3) RPMO social/environmental (as relevant) officer; (4) representative of affected persons; (5) RDSMC's safeguards specialist

(social/environment as relevant), (6) a representative of reputable and relevant CBO/SHG/organization working in the project area as invitee<sup>4</sup>, and (7) 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 APs, civil society and eminent citizens can be invited as observers in GRC meetings.

377. 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 APs, 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.

378. The GRM procedure is depicted in **Figure 7**, 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:

- (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. If the complaint remains unresolved at the

<sup>4</sup> 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.

- 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 M 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 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.
- (iii) Third Level of GRM (PMO Level): Any unresolved or major issues at Municipality level will be referred to the PMO for final solution. The PMO's Project Director (PD) will have special meeting to find solutions. Decision has to be made within 15 days of receipt of complaint by WUA. The PD will sign off on all grievances received by the PMO. The concerned Deputy Project Director (DPD) and environmental and social safeguards officers (ESO & 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.
379. The complainant will have to fill up Grievance Redress Form as shown in **Annex 2C** to file the complaint. 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 APs by the RPMO's SSO.
380. 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.

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 (AM) 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 AM 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.

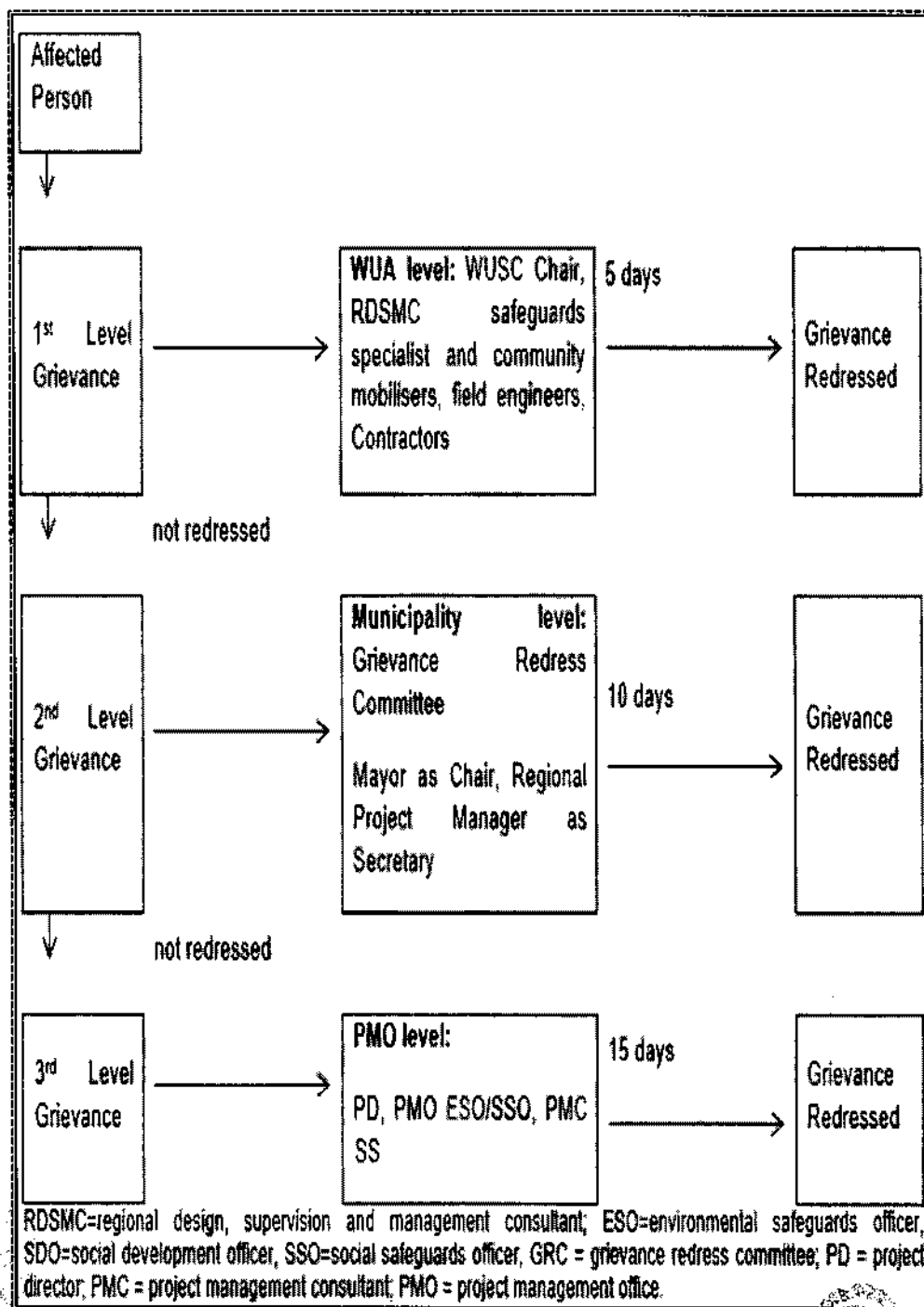


Figure 7:

Grievance Redress Mechanism (Formal Approach)

## 11. ENVIRONMENTAL MANAGEMENT PLAN

### 11.1 Introduction

381. The purpose of the environmental management plan (EMP): is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assignment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impacts of the project and in enhancing beneficial impacts; and (iv) ensuring that safety recommendations are complied with.
382. A copy of EMP must be kept on work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

### 11.2 Institutional Arrangement

#### 11.2.1 Executing and implementing agencies

383. The Ministry of Water Supply (MoWS) will be the executing agency with the responsibility of project execution delegated to the Department of Water Supply and Sewerage Management (DWSSM). Water User's and Sanitation Committees of the proposed towns are the implementing agencies.
384. The key responsibilities of the executing and implementing agencies are as follows:
- a) **Prior to construction:**

- MoWS will deputize a qualified staff to act as the Environmental Safeguard Officer of the Project management office (PMO).
- MoWS will establish the grievance redress mechanism, including setting up the Grievance Redress Committee.
- The Water Supply and Environmental Division of the MoWS will be responsible for reviewing and approval of the IEE Report.
- DWSSM will review the IEE Report prepared by the Design, Supervision and Management Consultant Team's Environmental Safeguard Expert (ESMC-ESE) before forwarding this to MoWS.

- DWSSM will prepare the ToRs for the Environmental Safeguard Specialist that will engage to support PMO and for the Environmental Safeguard Specialists of the two Design, Supervision and Management Consultants that will be appointed to prepare the projects.

## 11.2.2 Safeguard Implementation Arrangement

385. **Project Management Office (PMO):** 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/EMP prepared by DSMCs comply to exclusion criteria and project selection guidelines as stipulated in the 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/EMP in project locations and in a form accessible to the public;
- (xi) address any grievances brought about through the Grievance Redress Mechanism (GRM) in a timely manner as per the IEEs;
- (xii) undertake regular review of safeguards-related loan covenants, and the compliance during program implementation; and

- (xiii) organize periodic capacity building and training programs on safeguards for project stakeholders, PMO, RPMOs, and WUAs.

386. **Regional Project Management Offices (Eastern and Western RPMOs):**The environmental officer assigned by DWSSM to the RPMOs will receive support from (i) the PMO environmental officer, (ii) environmental specialist from PMOAC, 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; and

- (viii) address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.

387. **PMOAC:** The Project Management and Quality Assurance Consultants (PMOAC) will provide support to the PMO in the following areas:

- (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.

388. **Regional DSMCs:**The RDSMCs will provide support to the RPMOs in the following areas:

- (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

Engineer

- (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
- (v) ensure that poor and vulnerable groups will benefit equally from the project.

**389. Civil Works Contracts and Contractors:** EMPs are to be included in bidding and contract documents and verified by PMO and RPMOS. The contractor will be required to designate an environment 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 government will ensure that bidding and contract documents include specific provision requiring contractors to comply with all; (i) applicable labor laws and core labor standards on (a) prohibition of child labor as define in national legislation for construction and maintenance activities, (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste (c) elimination of forced labor; and (iii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project site.

**390. Capacity Building:** The PMOAC 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 in accordance with both ADB and government requirements as specified below:

(i) Environmental Safeguards

- (a) sensitization on ADB's policies and guidelines on environment;
- (b) introduction to environment and environmental considerations in water supply and wastewater projects;
- (c) review of IECs and integration into the project detailed design;
- (d) improved coordination within nodal departments; and
- (e) monitoring and reporting system. The contractors will be required to conduct environmental awareness programs and orientation to the workers prior to deployment to work sites.

(ii) Social Safeguards

- (a) sensitization on ADB's policies on Involuntary Resettlement and Indigenous People;

- (xiii) organize periodic capacity building and training programs on safeguards for project stakeholders, PMO, RPMOs, and WUAs.
386. **Regional Project Management Offices (Eastern and Western RPMOs):**The environmental officer assigned by DWSSM 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; and
  - (viii) address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.
387. **PMQAC:** The Project Management and Quality Assurance Consultants (PMQAC) will provide support to the PMO in the following areas:
- (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.
388. **Regional DSMCs:**The RDSMCs will provide support to the RPMOs in the following areas:
- (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
- (v) ensure that poor and vulnerable groups will benefit equally from the project.

389. **Civil Works Contracts and Contractors:** EMPs are to be included in bidding and contract documents and verified by PMO and RPMOS. The contractor will be required to designate an environment 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 government will ensure that bidding and contract documents include specific provision requiring contractors to comply with all; (i) applicable labor laws and core labor standards on (a) prohibition of child labor as define in national legislation for construction and maintenance activities, (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project site.

390. **Capacity Building:** The PMQAC 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 in accordance with both ADB and government requirements as specified below:

(i) Environmental Safeguards

- (a) sensitization on ADB's policies and guidelines on environment;
- (b) introduction to environment and environmental considerations in water supply and wastewater projects;
- (c) review of IEEs and integration into the project detailed design;
- (d) improved coordination within nodal departments; and
- (e) monitoring and reporting system. The contractors will be required to conduct environmental awareness programs and orientation to the workers prior to deployment to work sites.

(ii) Social Safeguards

- (a) sensitization on ADB's policies on Involuntary Resettlement and Indigenous People;

### 11.3 Environmental Management Plan (EMP) Matrix

394. The table given below gives brief details on the Environmental Management plan (EMP) matrix that is to be implemented for the project implementation.

Table 47: Environmental Management Plan Matrix

| Field                                     | Impacts                                                                                                                                                               | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Responsible for Implementation | Monitoring Indicator                                                                                                          | Frequency of Monitoring                                |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>A. Adverse Impacts</b>                 |                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                                                                               |                                                        |
| <b>1. Impacts on Physical Environment</b> |                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                                                                               |                                                        |
| <b>a) Design Phase</b>                    |                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                                                                               |                                                        |
| Topography/Geology                        | Soil Erosion & Slope Instability                                                                                                                                      | <ul style="list-style-type: none"> <li>Incorporate measures and sites for handling excessive spoil materials</li> <li>Incorporate drainage plan in final design</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               | PMO, RPMO & DSMC               | <ul style="list-style-type: none"> <li>Spoil Plan</li> <li>Final Design Documents</li> </ul>                                  | Before award of contract, During Detailed Design Phase |
| <b>b) Construction Phase</b>              |                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                                                                               |                                                        |
| Topography/Geology                        | Erosion & Land Surface Disturbance                                                                                                                                    | <ul style="list-style-type: none"> <li>Protecting the foundation from damage during backfilling</li> <li>Using the right backfill materials</li> <li>Compacting the backfill</li> <li>Final finishing the subgrade to ensure that water drains away from the foundation</li> <li>During construction of Internal Access Road, Soil Erosion &amp; Land Surface Disturbances will be mitigated through appropriate slope protection measures like Gabion Wall Construction, Retaining Wall Construction and Construction of Drainage Structures</li> </ul> | Contractor                     | <ul style="list-style-type: none"> <li>Contractor's Work Log Book</li> <li>Field Photographs</li> </ul>                       | Weekly Basis During Construction Phase                 |
| Spoil Management                          | Inappropriate disposal of spoils from the construction activities may result in gully and erosion when it is especially unmanaged combined with surface water runoff. | <ul style="list-style-type: none"> <li>Follow Spoil Management Plan as included in Annex 2E.</li> <li>Use of excess Spoil or Soil for filling depressed areas or borrow pits wherever possible.</li> <li>Appropriate disposal of Spoil at the designated places.</li> <li>Spoils should not be disposed on natural drainage paths, canals and other infrastructures.</li> <li>Provision of toe walls and retaining walls to protect the erosion of disposed spoils.</li> </ul>                                                                           | Contractor                     | <ul style="list-style-type: none"> <li>Spoil Plan</li> <li>Photographs of Spoil Disposal Site</li> <li>Photographs</li> </ul> | During Construction Phase                              |

- (b) introduction to social safeguards assessment and document requirements;
- (c) Consultation and participations requirements;
- (d) Project GRM and ADB's Accountability Mechanism (AM); and
- (e) monitoring and reporting system.

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

Before construction

- Facilitate public consultation and participation, information dissemination and social preparation.
- Provide available data to DSMC-ESS during the conduct of IEE
- Assist in securing the tree-cutting permit and/or registration of water source.
- Participate in the capacity development program.

During construction

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

During operation

- Implement EMP and the Water Safety Plan.
- If applicable, actively work with the engaged licensed and accredited laboratory in water quality monitoring.
- Prepare the environmental monitoring report as per IEE.
- Ensure observance of the grievance redress mechanism.

392. **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 the WUSC on the same. 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 the WUSC.

393. Environmental monitoring will be done during construction at three levels

| Field                | Impacts         | Mitigations /Enhancement Measures                                                                                                                                      | Responsible for Implementation | Monitoring Indicator                                                             | Frequency of Monitoring          |
|----------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------|----------------------------------|
| Air Quality          | Air Pollution   | <ul style="list-style-type: none"> <li>Provision of proper drainage, vegetation and adequate protection against erosion at the Spoil Disposal Site.</li> </ul>         |                                |                                                                                  |                                  |
|                      |                 | <ul style="list-style-type: none"> <li>Strict Prohibition of open burning of solid waste</li> </ul>                                                                    | Contractor                     | Written Notice/Code of Conduct                                                   | During award of contract         |
|                      |                 | <ul style="list-style-type: none"> <li>Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, as necessary;</li> </ul>                    | Contractor                     | Visible Emission                                                                 | Weekly Basis During Construction |
|                      |                 |                                                                                                                                                                        |                                | Number of complaints from sensitive receptors                                    |                                  |
| Air Quality          | Air Pollution   | <ul style="list-style-type: none"> <li>If re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces;</li> </ul> | Contractor                     | Number of water Tank/s                                                           | Weekly Basis During Construction |
|                      |                 |                                                                                                                                                                        |                                | Capacity of Water Tank/s                                                         |                                  |
|                      |                 |                                                                                                                                                                        |                                | Daily/Weekly Frequency/Timing of water spraying                                  |                                  |
|                      |                 |                                                                                                                                                                        |                                | Locations of water spraying                                                      |                                  |
| Air Quality          | Air Pollution   | <ul style="list-style-type: none"> <li>Use of Construction/ Transportation Vehicles complying with NVMES,2069</li> </ul>                                               | Contractor                     | Contractors' Materials Log Book of Materials to ensure the use of crushed gravel | Weekly Basis During Construction |
|                      |                 |                                                                                                                                                                        |                                | Photographs                                                                      |                                  |
|                      |                 |                                                                                                                                                                        |                                | Number and Types of vehicles in use                                              | Weekly Basis During Construction |
|                      |                 |                                                                                                                                                                        |                                | Certified documents for each vehicle used                                        |                                  |
| Acoustic Environment | Noise Pollution | <ul style="list-style-type: none"> <li>Regular inspection &amp; maintenance of construction/transportation vehicles</li> </ul>                                         | Consultant & Contractor        | Contractor's/Consultant's log book of vehicle inspection & maintenance           | Daily Basis/During Construction  |
|                      |                 | <ul style="list-style-type: none"> <li>Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking.</li> </ul>                        | Contractor                     | Written Notice/Code of Conduct                                                   | Prior to construction            |
|                      |                 | <ul style="list-style-type: none"> <li>Restricting noisy activities to daytime and overtime work to avoid using noisy equipment;</li> </ul>                            | Contractor                     | Type of fuel supplied to camps                                                   | Weekly Basis during construction |
|                      |                 |                                                                                                                                                                        |                                | Quantity of fuel supplied to camps                                               | Weekly Basis during construction |
| Acoustic Environment | Noise Pollution | <ul style="list-style-type: none"> <li>Prohibit the use of pressure horn by</li> </ul>                                                                                 | Contractor                     | Written Notice                                                                   | Prior to construction            |
|                      |                 |                                                                                                                                                                        |                                | Written Notice/Code of Conduct                                                   | Daily Basis                      |

| Field       | Impacts                      | Mitigations /Enhancement Measures                                                                                                                                                                                                     | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                          | Frequency of Monitoring |
|-------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Solid Waste | Haphazard Disposal of Wastes | transportation vehicles                                                                                                                                                                                                               |                                | Number of vehicles fitted with pressure horns<br>Maximum Sound Level of Pressure Horn                                                                                                         |                         |
|             |                              | <ul style="list-style-type: none"> <li>Regular inspection &amp; maintenance of construction/transportation vehicles to ensure the use of Vehicles complying with NVMES,2069 B.S.</li> </ul>                                           | Contractor                     | Contractor's/Consultant's log book of vehicle inspection & maintenance                                                                                                                        | Daily Basis             |
|             |                              | <ul style="list-style-type: none"> <li>Regular inspection &amp; maintenance to ensure the use of equipments/machinery that comply with applicable emission standards of GoN i.e., National Noise Standard Guidelines, 2012</li> </ul> | Contractor                     | Contractor's/Consultant's log book of equipment/machinery inspection & maintenance                                                                                                            | Daily Basis             |
|             |                              | <ul style="list-style-type: none"> <li>Regular inspection &amp; maintenance to ensure the use of Diesel Generators complying with National Diesel Generator Emission Standard,2012</li> </ul>                                         | Contractor                     | Contractor's/Consultant's log book of equipment/machinery inspection & maintenance                                                                                                            | Daily basis             |
|             |                              | a) Construction Wastes                                                                                                                                                                                                                |                                |                                                                                                                                                                                               |                         |
|             |                              | <ul style="list-style-type: none"> <li>Adopt 3R (Reduce, Reuse &amp; Recycle) concept</li> </ul>                                                                                                                                      | Contractor                     | Daily/Weekly quantity/volume of reusable/recyclable SW collected                                                                                                                              | Daily basis             |
|             |                              | <ul style="list-style-type: none"> <li>Ensure storage areas are secure, safe &amp; weatherproof.</li> </ul>                                                                                                                           | Contractor                     | Locations of stockpiling sites                                                                                                                                                                | Daily basis             |
|             |                              | <ul style="list-style-type: none"> <li>Management of reusable wastes</li> </ul>                                                                                                                                                       | Contractor                     | Number of cases of on site reuses                                                                                                                                                             | Daily basis             |
|             |                              | <ul style="list-style-type: none"> <li>Sale of Recyclable wastes to scrap dealer</li> </ul>                                                                                                                                           | Contractor                     | <ul style="list-style-type: none"> <li>Daily/Weekly quantity/volume of such wastes sold to or given to scrap vendors</li> <li>Frequency of sale to scrap vendors</li> </ul>                   | Daily basis             |
|             |                              | Final Disposal of Bio degradable solid wastes                                                                                                                                                                                         | Contractor                     | <ul style="list-style-type: none"> <li>Number/size of burial pits for final disposal of bio-degradable solid waste</li> <li>Location of burial sites</li> <li>Frequency of burials</li> </ul> | Daily basis             |
|             |                              | Avoid over ordering of construction materials to the extent possible. This will be challenging as it                                                                                                                                  | Contractor                     | Contractor's log book of construction                                                                                                                                                         | Daily basis             |

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| Field       | Impacts                      | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                                        | Frequency of Monitoring                     |
|-------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
|             |                              | <p>requires strong coordination with the concerned contractors as it cannot be made mandatory. However, it is not impossible too to coordinate with the contractors in this regard.</p> <ul style="list-style-type: none"> <li>Use standard size &amp; quantity of construction materials.</li> <li>Construct garland drains to reduce the runoff from the stockpiles.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                | materials                                                                                                                                                                                                   |                                             |
| Solid Waste | Haphazard Disposal of Wastes | <p>b) Solid Wastes, Wastewater and Sewage from labour camp</p> <ul style="list-style-type: none"> <li>Adopt Segregation of Solid Waste (3R Concept) on the basis of being biodegradable or non-biodegradable. It is because non-biodegradable wastes cannot be broken down by decomposers and their disposal poses a big problem.</li> <li>Management of biodegradable wastes that includes food waste, paper waste, biodegradable plastic, etc. by any suitable processes that include Composting &amp; Incineration. If these two processes are not possible then, the wastes shall be either managed by handing over these wastes to the municipality waste collectors who will finally dispose those wastes to the landfill sites of the project town or by disposing those wastes to the burial pits at suitable place.</li> <li>Non biodegradable wastes like glass, plastics &amp; metals shall be managed by reusing them for site use or selling them to scrap dealers instead of disposing them</li> <li>Strict Prohibition on open incineration of solid wastes &amp; use of plastic materials to minimize the quantity of plastic wastes.</li> </ul> | Contractor                     | <ul style="list-style-type: none"> <li>Location of construction sites</li> <li>Photographs</li> </ul>                                                                                                       | Daily basis                                 |
|             |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Contractor                     | <ul style="list-style-type: none"> <li>Number of Colored Bins to segregate wastes into biodegradable &amp; non biodegradable wastes</li> </ul>                                                              | Daily basis during construction             |
|             |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Contractor                     | <ul style="list-style-type: none"> <li>Daily/Weekly quantity/Volume of Biodegradable waste collected</li> <li>Site Photographs</li> <li>Contractor's Work Log Book</li> </ul>                               | Daily basis during construction             |
|             |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Contractor                     | <ul style="list-style-type: none"> <li>Daily/Weekly quantity/volume of such wastes sold to or given to scrap vendors</li> <li>Frequency of sale to scrap vendors/dealers</li> <li>Written Notice</li> </ul> | Daily basis during construction             |
|             |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Contractor                     | <ul style="list-style-type: none"> <li>Field Photographs</li> <li>Contractor's Monthly Progress Report</li> </ul>                                                                                           | Prior to Construction & During Construction |
|             |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Contractor                     | <ul style="list-style-type: none"> <li>Field Photographs</li> </ul>                                                                                                                                         | Daily basis                                 |
|             |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Contractor                     | <ul style="list-style-type: none"> <li>Field Photographs</li> </ul>                                                                                                                                         | Daily basis                                 |

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| Field                       | Impacts                                                 | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Responsible for Implementation | Monitoring Indicator                                                                                                          | Frequency of Monitoring          |
|-----------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|                             |                                                         | <ul style="list-style-type: none"> <li>for proper outlet of waste water generated from cooking practices adopted by the workers</li> <li>Employ local people from nearby villages to maximum extent possible. It will minimize the number of workers residing at worker's camp. Lesser the number of people, lesser will be the solid waste &amp; effluent generated. However, it cannot be made mandatory because availability of local people with required skills will not be ensured at the time of construction.</li> </ul> |                                | <ul style="list-style-type: none"> <li>Contractor's Monthly Progress Report</li> <li>Contractor's Workers Log Book</li> </ul> | Prior to the construction        |
|                             |                                                         | <ul style="list-style-type: none"> <li>Provision of well managed storage site</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                         | Contractor                     | <ul style="list-style-type: none"> <li>Location of storage site</li> </ul>                                                    | Weekly Basis during construction |
|                             |                                                         | <ul style="list-style-type: none"> <li>Organize awareness programs for the workers responsible for handling fuel/chemicals</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                            | DSMC & Contractor              | <ul style="list-style-type: none"> <li>Records of awareness programs in the form of minutes, photographs</li> </ul>           | Prior to the construction        |
|                             |                                                         | <ul style="list-style-type: none"> <li>Supervise workers to handle fuel/chemicals properly</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                            | DSMC & Supervisor Contractor   | <ul style="list-style-type: none"> <li>Records of any accidental spillage/leakage</li> </ul>                                  | Daily Basis During Construction  |
|                             |                                                         | <ul style="list-style-type: none"> <li>Use of spill kit materials to block flow and prevent discharge to nearby water bodies</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                          | Contractor                     | <ul style="list-style-type: none"> <li>Contractor's log book of materials procured for construction</li> </ul>                | Weekly Basis During Construction |
|                             |                                                         | <ul style="list-style-type: none"> <li>Scatter the Sawdust, sand or dry soil over the area of spill and leave for few minutes to soak up the fuel/chemical. So, availability of saw dust, sand or dry soil should be ensured in the store</li> </ul>                                                                                                                                                                                                                                                                             | Contractor                     | <ul style="list-style-type: none"> <li>Frequency of use of saw dust, sand or dry soil</li> </ul>                              | Weekly Basis During Construction |
|                             |                                                         | <ul style="list-style-type: none"> <li>Regular Inspection Visit to the storage site to inspect the leakage of the stored container of fuel/chemical</li> </ul>                                                                                                                                                                                                                                                                                                                                                                   | DSMC & Contractor              | <ul style="list-style-type: none"> <li>Number of Site Visits</li> <li>Complaints of Leakage</li> </ul>                        | Weekly Basis During Construction |
|                             |                                                         | <ul style="list-style-type: none"> <li>Selection of barren and public land only for the construction of project components</li> <li>Avoid the acquisition of private and agricultural land for the construction of project components.</li> </ul>                                                                                                                                                                                                                                                                                | PMO & DSMC                     | <ul style="list-style-type: none"> <li>Details of land ownership</li> <li>Monitoring Reports on Hapazard Land Use</li> </ul>  | During Detailed Design Phase     |
| Handling of Fuels/Chemicals | Accidental Leakage or Spillage of Stored Fuel/Chemicals |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                               |                                  |
| Land Use Pattern            | Change in land use pattern in haphazard manner          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                               |                                  |

| Field                                       | Impacts                                       | Mitigations /Enhancement Measures                                                                                                                                                                                                                                   | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                                                                                       | Frequency of Monitoring                                              |
|---------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|                                             |                                               | <ul style="list-style-type: none"> <li>Monitoring on the haphazard land use &amp; planning by the concerned authority.</li> </ul>                                                                                                                                   |                                |                                                                                                                                                                                                                                                            |                                                                      |
| Drainage                                    | Disruption to Natural Drainage                | <ul style="list-style-type: none"> <li>Avoid the natural drainage pathways for pipe laying works.</li> </ul>                                                                                                                                                        | DSMC Contractor                | Pipe Layout plan                                                                                                                                                                                                                                           | During Construction                                                  |
| Drainage                                    | Disruption to Natural Drainage                | <ul style="list-style-type: none"> <li>Stockpile the excavated materials at safe but nearby place.</li> <li>Restore natural drainage system if the drainage system during construction is blocked.</li> </ul>                                                       | DSMC Contractor                | Location of Spoil Disposal Sites<br>Photographs of before and after restoration                                                                                                                                                                            | Daily Basis During Construction                                      |
| Dismantled Debris                           | Haphazard Disposal of Dismantled Debris       | <ul style="list-style-type: none"> <li>Immediate Response on handling of dismantled debris</li> <li>Segregation of Dismantled Debris</li> <li>Adopt 3R (Reduce, Reuse &amp; Recycle) concept</li> <li>Sale of Recyclable Wastes to Scrap Vendors/Dealers</li> </ul> | Contractor                     | Number of complaints from the sensitive receptors<br>• Number of Colored Bins<br>• Contractor's Work Log Book                                                                                                                                              | Daily Basis After Construction and Prior to Operation<br>Daily Basis |
| <b>2. Impacts on Biological Environment</b> |                                               |                                                                                                                                                                                                                                                                     |                                |                                                                                                                                                                                                                                                            |                                                                      |
| <b>a) Construction Phase</b>                |                                               |                                                                                                                                                                                                                                                                     |                                |                                                                                                                                                                                                                                                            |                                                                      |
| Flora & Fauna                               | Loss of vegetation, Loss of habitat of faunas | <ul style="list-style-type: none"> <li>Replace the excavated top soil to its original position after the completion of pipe laying work</li> <li>Re-vegetating disturbed slopes and grounds, as applicable.</li> </ul>                                              | Contractor                     | <ul style="list-style-type: none"> <li>Photographs of before and after the replacement of top soil</li> <li>Contractor's Work Log Book</li> <li>Photographs of revegetation of disturbed slopes and grounds</li> <li>Contractor's Work Log Book</li> </ul> | Daily Basis During Construction<br>Weekly Basis During Construction  |

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| Field         | Impacts                                       | Mitigations /Enhancement Measures                                                                                                                                                                                                                           | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                                                           | Frequency of Monitoring          |
|---------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Flora & Fauna | Loss of vegetation, Loss of habitat of faunas | <ul style="list-style-type: none"> <li>Awareness programs regarding policy related to the conservation of existing flora &amp; fauna, to the workers prior to the construction and the community during various meetings and discussion programs</li> </ul> | PMO, DSMC & Contractor         | Minutes & Photographs of Awareness Programs                                                                                                                                                                                    | Prior to Construction            |
|               |                                               | <ul style="list-style-type: none"> <li>Adopt the suitable mitigation measures proposed to minimize noise pollution as mentioned earlier</li> </ul>                                                                                                          | Contractor                     | <ul style="list-style-type: none"> <li>Written Notice</li> <li>Contractor's Work Schedule</li> </ul>                                                                                                                           | As mentioned earlier             |
|               |                                               | <ul style="list-style-type: none"> <li>Regular Monitoring</li> </ul>                                                                                                                                                                                        | DSMC & RPMO                    | <ul style="list-style-type: none"> <li>Contractor's Log Book</li> <li>Number of Monitoring Visits</li> </ul>                                                                                                                   | Daily Basis During Construction  |
| Aquatic Life  | Loss of habitat of aquatic life               | <ul style="list-style-type: none"> <li>The forest area will be used as per Section 68 (1) of Forest Act 2049 (1993) which has also been mentioned in Section 2.4.14.</li> </ul>                                                                             | Contractor, DSMC & RPMO        | Forest Act, 2049 (1993)                                                                                                                                                                                                        | At the start of the construction |
|               |                                               | <ul style="list-style-type: none"> <li>Strict Monitoring on the daily activities of workers</li> </ul>                                                                                                                                                      | Contractor & DSMC              | <ul style="list-style-type: none"> <li>Location of Labor Camp Site</li> <li>Photographs</li> <li>Number of Complaints from the sensitive receptors</li> <li>Number of Monitoring Visits</li> <li>Monitoring Reports</li> </ul> | Weekly Basis                     |
|               |                                               | <ul style="list-style-type: none"> <li>Provision of temporary but well equipped toilets</li> </ul>                                                                                                                                                          | Contractor & DSMC              | <ul style="list-style-type: none"> <li>Location of these temporary facilities</li> <li>Photographs of toilets constructed</li> </ul>                                                                                           | Weekly Basis                     |
|               |                                               | <ul style="list-style-type: none"> <li>Restriction to workers from fishing</li> </ul>                                                                                                                                                                       | Contractor & DSMC              | <ul style="list-style-type: none"> <li>Written Notice</li> <li>Number of complaints from the sensitive receptor</li> </ul>                                                                                                     | Daily Basis During Construction  |
|               |                                               | <ul style="list-style-type: none"> <li>Adopt measures mentioned above for the solid waste management</li> </ul>                                                                                                                                             | Contractor & DSMC              | <ul style="list-style-type: none"> <li>Number of Colored Bins to segregate wastes Daily/Weekly</li> <li>Quantity/Volume of Biodegradable solid waste collected</li> </ul>                                                      | Daily Basis During Construction  |

| Field                                                                                 | Impacts                                                                                                                                                                     | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                                                                                                       | Responsible for Implementation | Monitoring Indicator                                                                                                                                                          | Frequency of Monitoring                              |
|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Forest Fire                                                                           | Impact on Flora & Fauna, Destruction of nutrients by the ashes, soil erosion                                                                                                | <ul style="list-style-type: none"><li>Prohibition on burning dry grass or debris</li><li>Prohibition on camp fires &amp; smoking within the forest area to the workers</li><li>Keeping fire fighting equipment stand by within the construction sites;</li><li>Provision of safety trainings regarding forest fire to the construction workers prior to construction</li></ul>                                                          | Contractor & DSMC              | <ul style="list-style-type: none"><li>Written Notice right before the construction</li><li>Contractor's Log Book</li><li>Photographs of Safety Trainings</li></ul>            | Daily Basis During Construction                      |
| Forest Encroachment                                                                   | Impact on Flora & Fauna                                                                                                                                                     | <ul style="list-style-type: none"><li>Strict &amp; Regular Monitoring during the entry of workers for the construction workers,</li><li>Mobilization of the concerned community forest groups,</li><li>Legal Provision along with imposing fines as punishment for those responsible for forest encroachment &amp;</li><li>Provision of trainings to the construction workers to provide support in controlling encroachment.</li></ul> | Contractor & DSMC              | <ul style="list-style-type: none"><li>Written Notice right before the construction</li><li>Contractor's Workers and Visitor's Log Book</li><li>Training Photographs</li></ul> | Daily Basis During Construction                      |
| b) Operation Phase                                                                    |                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                |                                                                                                                                                                               |                                                      |
| Aquatic Life                                                                          | Pollution of water bodies endangering aquatic lives                                                                                                                         | <ul style="list-style-type: none"><li>Strict monitoring to the operators involved to discourage Direct discharge of the effluent to the water bodies.</li></ul>                                                                                                                                                                                                                                                                         | WUSC                           | Number of complaints from the sensitive receptors                                                                                                                             | Weekly Basis                                         |
|                                                                                       |                                                                                                                                                                             | <ul style="list-style-type: none"><li>Proper Implementation of Water Safety Plan (WSP)</li></ul>                                                                                                                                                                                                                                                                                                                                        | WUSC, DSMC & PMO               | <ul style="list-style-type: none"><li>WUSC Monitoring Reports</li><li>Water Safety Plan</li></ul>                                                                             | Monthly Basis                                        |
| 3. Impacts on Chemical Environment                                                    |                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                |                                                                                                                                                                               |                                                      |
| a)Construction Stage                                                                  |                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                |                                                                                                                                                                               |                                                      |
| Water Quality                                                                         | Pollution on surface water sources by crossing of pipelines over water bodies, poorly managed construction sediments and other wastes, poor sanitation practices by workers | <ul style="list-style-type: none"><li>Appropriate Design of Septage Disposal through design of toilets with septic tanks</li></ul>                                                                                                                                                                                                                                                                                                      | Contractor, DSMC               | <ul style="list-style-type: none"><li>Semi Annual Environmental Monitoring Report</li><li>Photographs of toilets constructed</li></ul>                                        | Prior to Construction as well as During Construction |
|  |                                                                                                                                                                             | <ul style="list-style-type: none"><li>Disposing of spoils or excess soils as free filling materials as soon as possible</li></ul>                                                                                                                                                                                                                                                                                                       | Contractor                     | <ul style="list-style-type: none"><li>Spoil Management Plan</li><li>Location of Spoil Disposal Site</li></ul>                                                                 | During Construction                                  |

Engineer

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| Field              | Impacts                                                     | Mitigations/Enhancement Measures                                                                                                                                                                                                                                                                                                                                                     | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                                    | Frequency of Monitoring                                                                                                                                                               |
|--------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                                                             | <ul style="list-style-type: none"> <li>Locating temporary storage areas on flat grounds and away from main surface drainage routes;</li> <li>Shielding temporary storage areas with sandbags</li> <li>Adopt measures mentioned above for the solid waste management</li> </ul>                                                                                                       | Contractor                     | <ul style="list-style-type: none"> <li>Photographs of temporary storage areas</li> </ul>                                                                                                                | Monthly Basis                                                                                                                                                                         |
|                    |                                                             |                                                                                                                                                                                                                                                                                                                                                                                      | Contractor                     | <ul style="list-style-type: none"> <li>Number of Colored Bins to segregate wastes</li> <li>Daily/Weekly quantity/Volume of Biodegradable solid waste collected</li> </ul>                               | Daily Basis                                                                                                                                                                           |
|                    |                                                             | <ul style="list-style-type: none"> <li>providing adequate water supply and sanitation facilities at work sites.</li> </ul>                                                                                                                                                                                                                                                           | Contractor                     | <ul style="list-style-type: none"> <li>Number of Complaints received from the workers</li> <li>Number of Water Supplies to the workers</li> </ul>                                                       | Weekly Basis                                                                                                                                                                          |
|                    |                                                             | <ul style="list-style-type: none"> <li>Strict supervision on the behaviour of workers for the waste management as well as sanitation behaviour and monitoring the workers to manage the wastes properly.</li> </ul>                                                                                                                                                                  |                                | <ul style="list-style-type: none"> <li>Number of supervisions</li> <li>Reports on Supervision</li> </ul>                                                                                                | Weekly Basis                                                                                                                                                                          |
| b) Operation Stage |                                                             |                                                                                                                                                                                                                                                                                                                                                                                      |                                |                                                                                                                                                                                                         |                                                                                                                                                                                       |
| Water Quality      | Degradation of Quality of water stored within the reservoir | <ul style="list-style-type: none"> <li>Proper Implementation of Water Safety Plan (WSP).</li> <li>Removing of Algae grown within the reservoir at regular intervals by the O &amp; M team deployed by the WUSC.</li> <li>Disposal of raw sludge to the appropriate landfill or burial sites of the proposed project town</li> <li>Use of raw sludge for agricultural land</li> </ul> | WUSC O & M Team                | <ul style="list-style-type: none"> <li>Photographs</li> <li>WUSC Monthly Reports</li> </ul>                                                                                                             | Monthly Basis                                                                                                                                                                         |
| Water Quality      | Impact on Water Bodies                                      | <ul style="list-style-type: none"> <li>Avoid direct discharge of the raw sludge to the water bodies through strict monitoring to the operators involved</li> </ul>                                                                                                                                                                                                                   | WUSC O & M Team                | <ul style="list-style-type: none"> <li>Frequency of Burials</li> <li>Location of Burial Sites</li> <li>Quantity/Volume of Raw Sludge Scraped from sedimentation tank</li> <li>Written Notice</li> </ul> | <ul style="list-style-type: none"> <li>During Cleaning of sedimentation tank</li> <li>During Cleaning of sedimentation tank</li> <li>During Cleaning of sedimentation tank</li> </ul> |

| Field                                          | Impacts                                                                                                                                                                                                                                                                                                                          | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                                                                                                                               | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                                                    | Frequency of Monitoring                                |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
|                                                |                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>Proper Implementation of Water Safety Plan (WSP)</li> </ul>                                                                                                                                                                                                                                                                                                                                                              | WUSC O & M Team                | WUSC Monitoring Reports                                                                                                                                                                                                 | During entire operation phase, Monthly Basis           |
| <b>4. Impact on Socio-economic Environment</b> |                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                |                                                                                                                                                                                                                         |                                                        |
| <b>a) Design Phase</b>                         |                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                |                                                                                                                                                                                                                         |                                                        |
| Structural Instability                         | Cracking of structure leads to facility failure and public discomfort due to construction of water supply components in high earthquake zones                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Proper Design of each &amp; every component as per standard and code of practice.</li> </ul>                                                                                                                                                                                                                                                                                                                             | PMO, RPMO & DSMC               | Detailed Design Documents                                                                                                                                                                                               | During detailed design phase                           |
| Health & Safety of Community & Workers         | Lack of provision will have impact during construction                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>Training on Community Health &amp; Safety Hazards by DSMC by disseminating information in regard to this through training manuals, photographs &amp; documents related to safety.</li> </ul>                                                                                                                                                                                                                             | PMO, RPMO & DSMC               | Photographs & Minutes                                                                                                                                                                                                   | During detailed design phase and Prior to Construction |
| Existing facilities                            | Disruption of services & False Claims by the People                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>Coordinate with the concerned agencies to finalize the pipe network layout to avoid damage to the existing utilities.</li> <li>Design &amp; Locate pipelines away from existing utilities during design as far as possible.</li> <li>Provide budget for restoration/replacement of damaged utilities.</li> <li>Photographs of construction sites before and after the construction to avoid the false claims.</li> </ul> | DSMC, RPMO, PMO, Contractor    | <ul style="list-style-type: none"> <li>List of affected utilities and operators;</li> <li>Pipeline Layout Plan</li> <li>Bid document</li> <li>Photographs before and after the construction sites</li> </ul>            | During detailed design phase                           |
| <b>b) Construction Phase</b>                   |                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                |                                                                                                                                                                                                                         |                                                        |
| Community Health & Safety                      | <ul style="list-style-type: none"> <li>Cross-cutting threats from construction's impacts on air and water quality, ambient noise level; mobility of people/goods/services; accesses to properties/economic activities/social services; service disruptions, etc.</li> <li>Communicable and transmittable diseases may</li> </ul> | <ul style="list-style-type: none"> <li>Contractor's implementation of EMP</li> </ul>                                                                                                                                                                                                                                                                                                                                                                            | Contractor, RPMO, DSMC         | EMP                                                                                                                                                                                                                     | During Construction Phase, Weekly Basis                |
|                                                |                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>Adequate lighting, temporary fence, reflecting barriers and signage at active work sites;</li> </ul>                                                                                                                                                                                                                                                                                                                     | Contractor                     | <ul style="list-style-type: none"> <li>Photographs depicting temporary lighting, reflecting barriers and signage facilities.</li> <li>Quantity of lighting, fence, temporary reflecting barriers and signage</li> </ul> | During Construction Phase, Monthly Basis               |
|                                                |                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>Contractor's preparedness in emergency</li> </ul>                                                                                                                                                                                                                                                                                                                                                                        | Contractor                     | Emergency Response Plan                                                                                                                                                                                                 | During Construction, Weekly Basis                      |

| Field                   | Impacts                                                                                                                                                                                                                                         | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                                                                                                              | Frequency of Monitoring                                                                                                                                                          |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | potentially be brought into the community by construction workers.                                                                                                                                                                              | <p>response:</p> <ul style="list-style-type: none"><li>Adequate dissemination of GRM and Contractor's observance/implementation of GRM.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                  | Contractor                     | <ul style="list-style-type: none"><li>Monthly Reports of GRC</li><li>Number of Grievance Redress Form received</li></ul>                                                                                                                                                          | During Construction, Monthly Basis                                                                                                                                               |
| Workers Health & Safety | Risk to worker's health & safety                                                                                                                                                                                                                | <ul style="list-style-type: none"><li>Comply Labor Act (1992) of GoN</li><li>Train all site personnel regarding environmental health and safety as like in design phase by DSMC &amp; Contractors</li><li>Provide Personal Protective Equipment (PPEs) to workers that includes protective clothing, helmets, goggles and other equipments designed to protect the wearer's body from injury or infection and ensure their effective usage</li><li>Require workers to wear high visibility clothes</li><li>Exclude public from worksites</li></ul> | Contractor                     | <ul style="list-style-type: none"><li>Site -Specific H&amp;S plan</li><li>Record of H&amp;S orientation training like Photographs &amp; Minutes</li><li>Availability of personal protective equipment at construction site</li><li>Environmental Site Inspection Report</li></ul> | Visual inspection by RPMO (monthly) and DSMC-ESS on a weekly basis. Frequency and sampling sites to be finalized during detailed design and final location of project components |
|                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Contractor                     | Contractor's Visitors' Log Book                                                                                                                                                                                                                                                   | Weekly Basis during construction                                                                                                                                                 |
|                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Contractor                     | Number of accidents as per site records                                                                                                                                                                                                                                           | Weekly Basis during construction                                                                                                                                                 |
|                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Contractor                     | Contractor's Health & Safety Log Book                                                                                                                                                                                                                                             | Weekly Basis during construction                                                                                                                                                 |
| 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"><li>Maintain hygienic accommodation in work camps</li><li>Ensure uncontaminated water for drinking, cooking, and washing.</li><li>Assure clean eating areas</li><li>Make sure sanitation facilities are readily available</li><li>Provide adequate space and light to the camp site</li><li>Adequate supply of potable water to the camps and good sanitation within camps</li></ul>                                                                                                                             | Contractor                     | <ul style="list-style-type: none"><li>Location of Worker's Camp Site</li><li>Number of Monitoring Visits</li><li>Number of Complaints from the workers</li></ul>                                                                                                                  | Monthly Basis during construction                                                                                                                                                |
|                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Contractor                     | Number of water supplies                                                                                                                                                                                                                                                          | Weekly Basis during construction                                                                                                                                                 |
|                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Contractor                     | Number of complaints from the workers                                                                                                                                                                                                                                             | Weekly Basis during construction                                                                                                                                                 |
|                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Contractor                     | Medical Insurance                                                                                                                                                                                                                                                                 | Prior to the construction                                                                                                                                                        |
|                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Contractor                     | Provide medical insurance coverage for workers                                                                                                                                                                                                                                    |                                                                                                                                                                                  |

| Field                     | Impacts                                                                                        | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                                                                                                                                                         | Frequency of Monitoring                                                                                                   |
|---------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
|                           |                                                                                                | <ul style="list-style-type: none"> <li>Provide orientation for guest visitors</li> <li>Ensure that visitors do not enter hazard areas unescorted;</li> <li>Ensure moving equipment is outfitted with audible backup alarms;</li> <li>Hearing protection equipment enforced in noisy environment</li> <li>Chemical and Material storage areas need to be marked clearly</li> </ul>                                                                                                                     | Contractor                     | <p>Documents</p> <ul style="list-style-type: none"> <li>Record of Orientation training (Photographs &amp; Minutes)</li> <li>Contractor's Visitor's Log Book</li> <li>Contractor's Log Book of Machinery &amp; Equipment</li> <li>Signage Board to make aware regarding Chemical Storage and Material Storage Area</li> </ul> | <p>Monthly Basis during construction</p> <p>Weekly Basis during construction</p> <p>Monthly Basis during construction</p> |
| Traffic Congestion        | Interference in the daily activities of people                                                 | <ul style="list-style-type: none"> <li>The trench for pipeline should not be abandoned and the contractor should be recommended to backfill the trench immediately.</li> <li>The contractor will be accountable to provide signage at appropriate locations indicating available alternate access routes to minimize traffic disruptions.</li> <li>The contractor will have to ensure access to shops and residences using simple wooden walkways.</li> <li>Follow Traffic Management Plan</li> </ul> | Contractor                     | <ul style="list-style-type: none"> <li>Number of Site Visit and Photographs of Sites</li> <li>Traffic Management Plan</li> </ul>                                                                                                                                                                                             | Daily Basis                                                                                                               |
| Local Vendor's Business   | Discomfort to the customers to get access to the shops hampering the daily business activities | <ul style="list-style-type: none"> <li>Avoid delay in construction works and Prompt Backfilling right after completion of pipe laying works.</li> <li>Provision of temporary access to the shops through provision of planks</li> <li>Pre-notify the vendors regarding the construction works that may hinder their daily activities and Coordinate with them properly</li> </ul>                                                                                                                     | Contractor                     | <ul style="list-style-type: none"> <li>Field Visits</li> <li>Contractor's Work Schedule</li> <li>Photographs</li> </ul>                                                                                                                                                                                                      | <p>Weekly Basis</p> <p>Weekly Basis</p>                                                                                   |
| Deployment of Child Labor | Deprivation of Children's right to education, health,                                          | <ul style="list-style-type: none"> <li>As the Child Labor Prohibition Act, 2000 states that "No Child having not attained the age of 14 shall be employed in any manner in any industry or occupation or in any other work or service."</li> </ul>                                                                                                                                                                                                                                                    | Contractor & PMO               | <ul style="list-style-type: none"> <li>Written Notice or Miking (Verbal Notice)</li> <li>Citizenship Certificate of the workers</li> </ul>                                                                                                                                                                                   | <p>Prior to the construction</p> <p>Prior to Construction</p>                                                             |

| Field                        | Impacts                                                                                                                 | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                                | Responsible for Implementation | Monitoring Indicator                                                                                                                                                                                                                           | Frequency of Monitoring                  |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
|                              | safety and moral development is deprived                                                                                | years shall be engaged in works as a laborer" during mobilization, provision for the requirement of submission of the citizenship certificate of each labor, should be made.<br>• During contract agreement, the agreement by the contractor to follow Child Labor Prohibition Act, 2000 and Child Labour Prohibition Rules & Regulations, 2006, should be made. | Contractor & PMO               | Contract Document                                                                                                                                                                                                                              | During award of contract                 |
| Sustainability of Works      | Damage to unsettled/unfinished/uncompleted structures and affecting their structural integrity by seismic event if any. | • After every seismic event, the contractor must conduct engineering investigation of built structures and implement the necessary corrective actions immediately                                                                                                                                                                                                | Contractor                     | • Monthly Progress Report<br>• Contractor's Log Book                                                                                                                                                                                           | Construction Phase                       |
| Existing Facilities          | Damage to the existing utilities creating discomfort to the people                                                      | • Monitor construction workers to adopt carefulness and to strictly follow the layout drawings.                                                                                                                                                                                                                                                                  | Contractor, RPMO, DSMC         | • Number of Complaints received at GRC<br>• Pipeline Layout Plan<br>• Contractor's Bill of Quantities<br>• Photographs                                                                                                                         | During Construction Phase on Daily Basis |
| c) Operation Phase           |                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                                                                                                |                                          |
| Occupational Health & Safety | Worker's exposure to, and/or mishandling of chemicals and other hazardous substances pose health and safety hazards.    | • Installation of clear, visible signage in premises on safety measures<br>• Setting up a mechanism for the quick response to spills of chemical and hazardous substances.                                                                                                                                                                                       | WUSC                           | • Number of Site Visits<br>• Site Visit Reports<br>• Photographs of location where signage are installed<br>• Frequency of use of chemical & hazardous substances<br>• Quantity of chemical/hazardous substances used for the proposed project | Weekly Basis<br>Monthly Basis            |
|                              | Extraction of unsatisfactory raw water quality                                                                          | Ensure the correct operation of water treatment plant to meet satisfactory water quality                                                                                                                                                                                                                                                                         | PMO & RPMO                     | WUSC Monitoring Reports                                                                                                                                                                                                                        | Monthly Basis during operation           |

# IEE Report of Ham WSSP

| Field                                             | Impacts                                                                                                                                                                                                                                                                             | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                                                                            | Responsible for Implementation | Monitoring Indicator                                                                                                     | Frequency of Monitoring                                                                             |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|                                                   | <ul style="list-style-type: none"> <li>Delivery of unsafe water to the distribution system</li> <li>Inadequate protection of intake</li> <li>Health Hazards arising from inadequate design of facilities for receiving, storing and handling of Cl &amp; other chemicals</li> </ul> | <ul style="list-style-type: none"> <li>Provide Safe Storage for chemicals</li> <li>Ventilation of "Housed" dosing unit for chlorine</li> <li>Train operators for handling chlorine</li> </ul>                                                                                                                                                                | Contractor                     | Location of Chemical Storage<br><br>• Detailed Drawings<br>• Contractor Working & Photographs of Dosing Unit Constructed | Monthly Basis during operation                                                                      |
|                                                   | <ul style="list-style-type: none"> <li>Irregularity in the supervision of the operation of distribution system may lead to excessive algae growth in service reservoir which may produce toxins causing serious illness in humans consuming water.</li> </ul>                       | <ul style="list-style-type: none"> <li>Regular Monitoring by the WUSC</li> <li>Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC.</li> </ul>                                                                                                                                                      | RPMO, PMO & WUSC               | Minutes & Photographs of Training<br><br>WUSC Reports<br><br>Frequency of Algae Removal                                  | Prior to operation right after completion of construction<br><br>Monthly Basis<br><br>Monthly Basis |
| Consumer's Health                                 |                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Monitoring &amp; Proper Implementation of WSP.</li> </ul>                                                                                                                                                                                                                                                             | WUSC                           | WUSC Reports                                                                                                             | Monthly Basis                                                                                       |
|                                                   |                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>WUSC should monitor yield closely especially in the dry season and during a climate-change-induced drought.</li> </ul>                                                                                                                                                                                                | WUSC & the local body          | • Number of Human Resources Mobilized for monitoring<br>• Yield Monitoring Reports                                       | During Dry Season and Immediate action during climate-change-induced drought.                       |
| Non Sustainability of Services or Completed Works | Disruption in water supply service by sudden seismic events or climate change droughts                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>After every seismic event, WUSC should conduct engineering investigations of completed works and implement the necessary corrective actions without delay. This shall involve preparation of Emergency Preparedness &amp; Response Plan and Immediate Implementation of this plan after any seismic event.</li> </ul> | • WUSC                         | WUSC Monitoring Reports                                                                                                  | • Immediate after any seismic event                                                                 |

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 Government of Karnataka  
 Bangalore  
 Project Management Office

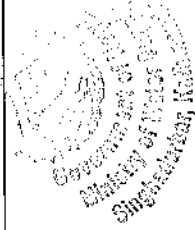
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| Field                                         | Impacts                                     | Mitigations/Enhancement Measures                                                                                                                                                                                                                                                                                          | Responsible for Implementation | Monitoring Indicator                                                                                                                                                       | Frequency of Monitoring                                                 |
|-----------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
|                                               |                                             | <ul style="list-style-type: none"> <li>Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs</li> </ul>                                                                                                                                                   | WUSC                           | <ul style="list-style-type: none"> <li>Photographs of capacity building programs</li> <li>Minutes of such programs</li> <li>WUSC Monitoring Report</li> </ul>              | During project construction and During initial stage of operation phase |
|                                               |                                             | <ul style="list-style-type: none"> <li>Carrying out regular O &amp; M with effectiveness through proper management of WUSC.</li> </ul>                                                                                                                                                                                    | WUSC                           | WUSC Monitoring Report                                                                                                                                                     | Right after the completion of project construction period               |
| <b>B. Beneficial Impacts</b>                  |                                             |                                                                                                                                                                                                                                                                                                                           |                                |                                                                                                                                                                            |                                                                         |
| <b>1. Impact on Socioeconomic Environment</b> |                                             |                                                                                                                                                                                                                                                                                                                           |                                |                                                                                                                                                                            |                                                                         |
| <b>a) Construction Phase</b>                  |                                             |                                                                                                                                                                                                                                                                                                                           |                                |                                                                                                                                                                            |                                                                         |
| Income                                        | Employment Generation                       | <ul style="list-style-type: none"> <li>Recommend contractor to employ local people by giving high priority to women and under privileged group as far as possible.</li> <li>Ensure equity in provision of wages to both male as well as female labors.</li> </ul>                                                         | DSMC, Contractor & WUSC        | <ul style="list-style-type: none"> <li>Contractors' Workers Log Book</li> <li>Number of local labours employed in project</li> <li>Consultant Monitoring Report</li> </ul> | During Project Construction                                             |
| Personal Skills                               | Skill Enhancement                           | <ul style="list-style-type: none"> <li>Making a proper work plan and code of conduct during the construction period.</li> <li>Provision of regular hands on training to the workers during the project construction period</li> </ul>                                                                                     | DSMC, Contractor & WUSC        | <ul style="list-style-type: none"> <li>Contractors Work Schedule</li> <li>Hands on training Photographs</li> <li>WUSC monitoring report</li> </ul>                         | During Project Construction                                             |
| Local trade & business opportunity            | Enhanced Local trade & business opportunity | <ul style="list-style-type: none"> <li>Recommend contractor to give priority to the local products during procurement of construction of materials.</li> <li>Priority also will be given to local services like grocery stores, tea shops, hotel &amp; restaurants etc. during the entire construction period.</li> </ul> | DSMC, Contractor & WUSC        | <ul style="list-style-type: none"> <li>Contractors' Materials Log Book</li> <li>WUSC monitoring report</li> </ul>                                                          | During Project Construction                                             |
| <b>b) Operation Phase</b>                     |                                             |                                                                                                                                                                                                                                                                                                                           |                                |                                                                                                                                                                            |                                                                         |
| Health & Hygiene                              | Improved health & hygiene                   | <ul style="list-style-type: none"> <li>Regular maintenance of the water supply</li> </ul>                                                                                                                                                                                                                                 | WUSC                           | <ul style="list-style-type: none"> <li>Number of Site</li> </ul>                                                                                                           | During O & M                                                            |

| Field         | Impacts                       | Mitigations /Enhancement Measures                                                                                                                                                                                                                                                                     | Responsible for Implementation                                                  | Monitoring Indicator                                                                                                                                        | Frequency of Monitoring |
|---------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|               |                               | components should be done so that the project operates smoothly and the benefits are intact                                                                                                                                                                                                           |                                                                                 | <ul style="list-style-type: none"> <li>Inspection Visits</li> <li>Photographs of Inspection Visits</li> <li>WUSC monitoring report</li> </ul>               |                         |
| Economy       | Increase Economic Opportunity | <ul style="list-style-type: none"> <li>Ensuring regular maintenance of the water supply components</li> <li>Promoting urbanization through proper land development activities in the area.</li> </ul>                                                                                                 | <ul style="list-style-type: none"> <li>WUSC</li> <li>Local Authority</li> </ul> | <ul style="list-style-type: none"> <li>Number of Site Inspection Visits</li> <li>State of property &amp; legally planned land use</li> </ul>                | During O & M            |
| Social Status | Social Empowerment            | <ul style="list-style-type: none"> <li>Priority will also be given to vulnerable groups in WUSC along with female groups.</li> <li>Involving underprivileged group of people especially women and poor people in various capacity building programs and project related community meetings</li> </ul> | <ul style="list-style-type: none"> <li>WUSC</li> </ul>                          | <ul style="list-style-type: none"> <li>Number of members of WUSC</li> <li>Photographs of capacity building programs</li> <li>Minutes of meetings</li> </ul> | O & M phase             |

Source: IEE Field Study 2017

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## 11.4 Environmental Monitoring Program

395. 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 PMO.

396. 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 46 presents the indicative environmental monitoring plan for the project which includes relevant environmental parameters, with a description of the sampling stations, the frequency of monitoring, applicable standards, and responsible agencies.

Table 48: Environmental Monitoring Program

|    | Field                      | Stage                                                                                                                     | Parameters                                                                                                                                                              | Location                                                                                                                                                                     | Frequency                                                                         | Standard                                        | Responsibility |
|----|----------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------|----------------|
| 1. | Air quality                | <ul style="list-style-type: none"> <li>Before construction to establish baseline</li> <li>Construction phase</li> </ul>   | PM10<br>SO2<br>NOx                                                                                                                                                      | <ul style="list-style-type: none"> <li>Worksite locations</li> <li>Along water transmission main 1-km interval from PTWs</li> <li>Construction campsite locations</li> </ul> | 24-hour monitoring once in a season (except monsoons) for the construction period | National Ambient Air Quality Standards, 2003    | Contractor     |
| 2. | Noise and vibration levels | <ul style="list-style-type: none"> <li>Prior to construction to establish baseline</li> <li>Construction phase</li> </ul> | Equivalent day and night time noise levels                                                                                                                              | <ul style="list-style-type: none"> <li>PTWs location</li> <li>Along water transmission main 1-km interval from PTWs</li> <li>Construction campsite locations</li> </ul>      | Once in a season (except monsoons) for the construction period                    | National Noise Standard Guidelines, 2012        | Contractor     |
| 3. | Water quality              | <ul style="list-style-type: none"> <li>Prior to construction to establish baseline</li> <li>Construction phase</li> </ul> | TDS, TSS, pH, hardness, BOD, fecal coliform, total nitrogen, total phosphorus, heavy metals, temperature, DO, hydrocarbons, mineral oils, phenols, cyanide, temperature | Adjacent to construction sites (to be identified by the (DRTAC or DSMC))                                                                                                     | Twice a year (pre-monsoon and post-monsoon) for the entire period of construction | National Drinking Water Quality Standards, 2006 | Contractor     |
| 4. | Survival rate of           | O&M phase                                                                                                                 | Survival rate                                                                                                                                                           | In the areas where re-                                                                                                                                                       | Twice a year for 2                                                                | None                                            | WUSC           |

|  | Field                                  | Stage | Parameters | • Location                             | Frequency | Standard<br>s | Responsibility |
|--|----------------------------------------|-------|------------|----------------------------------------|-----------|---------------|----------------|
|  | landscaping,<br>tree<br>plantati<br>on |       |            | plantation/<br>landscaping<br>proposed | years     |               |                |

Source: IEE Study 2018/019

### 11.5 Institutional Capacity Development Program

397. 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/seminars on relevant topics.
398. WUSC cannot monitor the quality of supplied water as prescribed in NDWQS and its Directives. Although monitoring kits and laboratory rooms will be provided, this would not guarantee WUSC can handle monitoring appropriately. DWSSM has five regional laboratories; however, some are not functioning fully due to lack of human resources. Considering that public health is a critical concern associated with water supply, it is recommended that a licensed and accredited laboratory be engaged to conduct water quality monitoring for at least the first 2-3 years of operation with WUSC actively participating in developing its capacity. Water quality monitoring should be carried out in such a way that WUSC will be "learning by doing." After the engagement period, there should be continuing periodic training of new persons to ensure that the capacity of WUSC is sustained. The cost for monitoring during operation is based on the assumption that a licensed laboratory will be engaged in both the monitoring requirements and to train WUSCs. A Water Safety Plan is included in the project design and will oblige the operator to carry out water quality monitoring accordingly. The amount of NRs. 500,000 will be provided annually to implement the Plan. There will be sufficient fund to include training by the licensed and accredited laboratory while monitoring water quality.
399. The contractors will be required to conduct environmental awareness programs and orientation to the workers before deployment to the work site. The proposed training project along with the frequency of sessions is presented in Table 49. The Environmental Safeguard specialist & EMP Field Monitoring Staff are responsible for organizing different training programs for Environmental Management.

Table 49: 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 GON and how the project will meet these requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | To build the capacity of the staff for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and GON                                                                                                                                                                  | To share the experiences and best practices aimed at learning lessons and improving implementation of EMP |
| Contents       | <b>Module 1: Orientation</b> <ul style="list-style-type: none"> <li>• ADB Safeguards Policy Statement</li> <li>• Government of Nepal Environmental Laws and Regulations</li> </ul> <b>Module 2: Environmental Assessment Process</b> <ul style="list-style-type: none"> <li>• ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements</li> <li>• Review of environmental assessment report to comply with ADB requirements</li> <li>• Incorporation of EMP into the project design and contracts</li> </ul> | <ul style="list-style-type: none"> <li>• Roles and responsibilities of officials/contractors/consultants towards protection of the environment</li> <li>• Environmental issues during construction</li> <li>• Implementation of EMP</li> <li>• Monitoring of EMP implementation</li> <li>• Reporting requirements</li> </ul> | Experiences on EMP implementation – issues and challenges<br>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<br>ICGs<br>Contractors                                                                                                                                                                                                                                                                                                   | PMO<br>ICGs<br>Contractors                                                                                |

Source: IEE Study 2018/019

## 11.6 Staffing Requirement and Budget

400. Staffing requirement will include the (i) deputizing a DWSSM or PMO staff as the PMO environmental safeguards officer; (ii) deputizing WSSDO staff as RPMOS

- environmental engineers in each subproject town; (iii) engagement of a PMO-environmental safeguards specialist to provide technical assistance and guidance to the PMO and partly to the RPMOS and capacity development/training; and (iv) a DSC environmental safeguards specialist to conduct the IEEs and prepare the IEE reports according to the provisions of this EARF.
401. The 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.
402. 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 PMO-ESS.
403. The cost of mitigation measures and surveys during the construction stage will be incorporated into the contractor's costs, which will be binding on him for implementation. The contractors will conduct the surveys.
404. The operation phase for mitigation measures are good operating practices to mitigate the environmental impacts of this phase & the responsibility remains to WUSC. WUSC will conduct all monitoring during the operation and maintenance phase. To ensure the delivery of safe drinking water from its catchment to the consumers, there is provision of Water Safety Plan (WSP) for the proposed project. If a licensed laboratory is engaged for the first 2-3 years of operation for training purposes, the cost can be accommodated under the Water Safety Plan. The cost of awareness program & WSP during the contract period is NPR 500,000.00 under provisional sum.
405. The indicative costs of EMP implementation are shown in **Table 50** given below:

  
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Table 50: Indicative Cost of EMP Implementation

| S. No.     | Local Level Monitoring & Mitigation Measures                                                          | Mitigation & Monitoring Costs                                              |
|------------|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <b>A.</b>  | <b>Local Level Monitoring Measures</b>                                                                |                                                                            |
| a)         | Air quality Monitoring                                                                                | 150,000.00                                                                 |
| b)         | Noise levels Monitoring                                                                               | 50,000.00                                                                  |
| c)         | Water Quality Monitoring                                                                              | 50,000.00                                                                  |
| <b>B.</b>  | <b>Mitigation Measures</b>                                                                            |                                                                            |
| a)         | <b>Impacts on Physical Environment</b>                                                                |                                                                            |
| <b>I.</b>  | <b>During Design Phase</b>                                                                            |                                                                            |
| i.         | Soil Erosion and Slope Instability                                                                    |                                                                            |
|            | Incorporate measures and sites for handling excessive spoil materials                                 | No Additional Cost Required                                                |
|            | Incorporate drainage plan in final design                                                             | No Additional Cost Required                                                |
| <b>II.</b> | <b>During Construction Phase</b>                                                                      |                                                                            |
| i.         | Soil Erosion and Land Surface Disturbance                                                             |                                                                            |
|            | Proper Backfilling                                                                                    | No additional cost required, Separately included under Miscellaneous Items |
|            | Slope Protection Measures (Gabion Wall Construction, Retaining Wall etc.)                             | No additional cost required, Separately included in Detailed Cost Estimate |
| ii.        | Spoil Disposal                                                                                        | 20,000.00                                                                  |
| iii.       | Air Pollution                                                                                         |                                                                            |
|            | Excavation Segmentation Plan                                                                          | No additional cost required                                                |
|            | Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily                    | 100,000.00                                                                 |
|            | Other mitigation measures as mentioned in section 8.1.1.2 c)                                          | No additional cost required                                                |
| iv.        | Noise Pollution                                                                                       | No additional cost required                                                |
| v.         | Generation of Construction Wastes & Solid Wastes                                                      |                                                                            |
|            | Waste Management                                                                                      | 160,000.00                                                                 |
| vi.        | Accidental Leakage or Spillage of Stored Fuel/Chemicals                                               | 50,000.00                                                                  |
| vii.       | Impact on Land Use Pattern                                                                            | No additional cost required                                                |
| viii.      | Disruption to Natural Drainage                                                                        | No additional cost required                                                |
| ix.        | Haphazard Disposal of Dismantled Debris                                                               |                                                                            |
|            | Segregation, 3R Concept, Sale to Scrap Dealers                                                        | No additional cost required as it has already been mentioned in v          |
| b)         | <b>Impacts on Biological Environment</b>                                                              |                                                                            |
| <b>I.</b>  | <b>Construction Phase</b>                                                                             |                                                                            |
| i.         | Impacts on Flora & Fauna                                                                              |                                                                            |
|            | Awareness programs to the construction workers                                                        | No additional cost required                                                |
|            | Revegetating disturbed slopes & grounds                                                               | 20,000.00                                                                  |
|            | Others as mentioned in Sub Section 8.1.2.1 a)                                                         | No additional cost required                                                |
| ii.        | Impacts on Aquatic Life                                                                               |                                                                            |
|            | Provision of temporary but well equipped toilets at worker's camp                                     | 200,000.00                                                                 |
|            | Solid Waste Management                                                                                | No additional cost required as it has already been mentioned above in v.   |
| iii.       | Forest Fire                                                                                           |                                                                            |
|            | Prohibition on burning dry grass or debris                                                            | No Additional Cost Required                                                |
|            | Keeping firefighting equipment stand by within the construction sites                                 | No Additional Cost Required                                                |
|            | Provision of safety trainings regarding forest fire to the construction workers prior to construction | No Additional Cost Required                                                |
| iv.        | Forest Encroachment                                                                                   |                                                                            |
|            | Strict & Regular Monitoring during the entry of workers for the construction workers                  | No Additional Cost Required                                                |
|            | Mobilization of the concerned community forest groups                                                 | No Additional Cost Required                                                |

| S. No. | Local Level Monitoring & Mitigation Measures                                                                                                                             | Mitigation & Monitoring Costs                                                |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|        | Legal Provision along with imposing fines as punishment for those responsible for forest encroachment                                                                    | No Additional Cost Required                                                  |
|        | Provision of trainings to the construction workers to provide support in controlling encroachment.                                                                       | No Additional Cost Required                                                  |
| II.    | Operation Phase                                                                                                                                                          |                                                                              |
| i.     | Impacts on Aquatic Life                                                                                                                                                  |                                                                              |
|        | Strict monitoring to the operators involved to discourage direct discharge of the effluent to the water bodies.                                                          | No additional cost required, It will be managed by WUSC itself               |
|        | Proper Implementation of Water Safety Plan (WSP).                                                                                                                        | No additional cost required, It will be covered by cost of Water Safety Plan |
| c)     | Impacts on Chemical Environment                                                                                                                                          |                                                                              |
| I.     | Construction Phase                                                                                                                                                       |                                                                              |
| i.     | Impacts on Water Quality of nearby rivers                                                                                                                                |                                                                              |
|        | Appropriate design of Septage Disposal with well-equipped temporary toilets                                                                                              | No Additional Cost Required as it has already been mentioned in              |
|        | Disposing of spoils or excess soils as free filling materials as soon as possible                                                                                        | No Additional Cost Required                                                  |
|        | Locating temporary storage areas on flat grounds and away from main surface drainage routes                                                                              | 50,000.00                                                                    |
|        | Shielding temporary storage areas with sandbags                                                                                                                          | No Additional Cost Required                                                  |
|        | Implementing eco-friendly solid and hazardous waste management, disposing them promptly                                                                                  | No Additional Cost Required as it has already been mentioned above in v.     |
|        | Providing adequate water supply and sanitation facilities at work sites.                                                                                                 | No Additional Cost Required. It has to be managed by the contractor itself.  |
|        | Strict supervision on the behaviour of workers for the waste management as well as sanitation behaviour and monitoring the workers to manage the wastes properly         | No Additional Cost Required                                                  |
|        | Strict & Regular Monitoring during pipe laying works                                                                                                                     | No Additional Cost Required                                                  |
| II.    | Operation Phase                                                                                                                                                          |                                                                              |
| i.     | Impacts on Quality of Water Stored in Reservoir                                                                                                                          |                                                                              |
|        | Proper Implementation of Water Safety Plan (WSP)                                                                                                                         | No Additional Cost Required                                                  |
|        | Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC.                                                            | No Additional Cost Required                                                  |
| ii.    | Impact on Water Bodies                                                                                                                                                   |                                                                              |
|        | Disposal of raw sludge to the appropriate landfill sites of the proposed project town                                                                                    | No Additional Cost Required                                                  |
|        | Use of raw sludge for agricultural land                                                                                                                                  | No Additional Cost Required                                                  |
|        | Avoid direct discharge of the raw sludge to the water bodies through strict monitoring to the operators involved.                                                        | No Additional Cost Required                                                  |
|        | Proper Implementation of Water Safety Plan (WSP)                                                                                                                         | No Additional Cost Required                                                  |
| d)     | Impacts on Socioeconomic Environment                                                                                                                                     |                                                                              |
| I.     | Design Phase                                                                                                                                                             |                                                                              |
| i.     | Structural Instability                                                                                                                                                   |                                                                              |
|        | Proper design of earthquake resistant structures as per standard and code of practice.                                                                                   | No additional cost required                                                  |
| ii.    | Health & Safety of Community & Workers                                                                                                                                   |                                                                              |
|        | Training on Community Health & Safety Hazards by DSMC by disseminating information in regard to this through training manuals, photographs & documents related to safety | No additional cost required                                                  |
| iii.   | Damage to the existing facilities                                                                                                                                        | No additional cost required                                                  |
| II.    | Construction Phase                                                                                                                                                       |                                                                              |
| i.     | Community Health & Safety Hazards                                                                                                                                        |                                                                              |
|        | Contractor's implementation of EMP                                                                                                                                       | No additional cost required                                                  |
|        | Adequate lighting, temporary fence, reflecting barriers and signage at active work sites                                                                                 | 100,000.00                                                                   |
|        | Contractor's preparedness in emergency response                                                                                                                          | 225,000.00                                                                   |
|        | Adequate dissemination of GRM and Contractor's                                                                                                                           | No additional cost required                                                  |

| S. No.                                                                | Local Level Monitoring & Mitigation Measures                                                                          | Mitigation & Monitoring Costs                                                  |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|                                                                       | observance/implementation of GRM                                                                                      |                                                                                |
| ii.                                                                   | Worker's Health & Safety Hazards                                                                                      |                                                                                |
|                                                                       | Provision of PPE to workers                                                                                           | 150,000.00                                                                     |
|                                                                       | Other Mitigation measures                                                                                             | No Additional Cost Required                                                    |
| iii.                                                                  | Traffic Congestion                                                                                                    | No Additional Cost Required                                                    |
| iv.                                                                   | Disruption to Local Vendor's Business                                                                                 |                                                                                |
|                                                                       | Prompt Backfilling                                                                                                    | No Additional Cost Required                                                    |
|                                                                       | Provision of Planks to provide access to shops & homes                                                                | 25,000                                                                         |
| v.                                                                    | Mobilization of Child Labor                                                                                           | No Additional Cost Required                                                    |
| vi.                                                                   | Impact on Sustainability of Works                                                                                     |                                                                                |
|                                                                       | Engineering Investigations after any seismic event, if any                                                            | 150,000.00                                                                     |
|                                                                       | Emergency Preparedness Response                                                                                       | No additional cost required as it has already been mentioned above in xii)     |
| vii.                                                                  | Damage to the existing facilities                                                                                     |                                                                                |
|                                                                       | Monitor construction workers to adopt carefulness and to strictly follow the layout drawings.                         | No Additional Cost Required                                                    |
|                                                                       | Reinstatement Works of the damaged existing paved roads if any                                                        | No Additional Cost Required. Its cost is separately included in Cost Estimate. |
| III.                                                                  | Operation Phase                                                                                                       |                                                                                |
| i.                                                                    | Occupational Health & Safety Hazards                                                                                  |                                                                                |
|                                                                       | Installation of clear, visible signage                                                                                | No additional cost required, It will be managed by WUSC itself                 |
|                                                                       | Setting up of mechanism for quick response to spills of chemical and hazardous substances.                            | No additional cost required, It will be managed by WUSC itself                 |
| ii.                                                                   | Delivery of Unsafe Water                                                                                              | No additional cost required, It will be managed by WUSC itself                 |
| iii.                                                                  | Impact on Consumer's Health                                                                                           | No additional cost required, It will be managed by WUSC itself                 |
| iv.                                                                   | Non-sustainability of Services or Completed works                                                                     |                                                                                |
|                                                                       | Yield Monitoring                                                                                                      | No additional cost required, It will be managed by WUSC itself                 |
|                                                                       | Engineering Investigations after every seismic event if any                                                           | No additional cost required, It will be managed by WUSC itself                 |
|                                                                       | Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs | No additional cost required, It will be managed by WUSC itself                 |
|                                                                       | Carrying out regular O & M with effectiveness through proper management of WUSC.                                      | No additional cost required, It will be managed by WUSC itself                 |
| <b>Total Cost of Local Level Monitoring &amp; Mitigation Measures</b> |                                                                                                                       | <b>1,500,000.00</b>                                                            |

Source: IEE Study 2018/019

Note: The breakdown cost is based on similar project experience however independent cost may later without altering the total cost.

Similarly, there is no requirement of additional cost for the proposed augmentation measures as this will be managed by either Contractor or WUSC or DSMC itself.



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406. The above given table shows that the total indicative cost for EMP implementation in NRs. 1,500,000.00. This has been included under provisional sum in BoQ and this total cost includes local level monitoring cost and mitigation costs that also includes necessary environmental mitigation measures for the anticipated impacts during the entire construction period.
407. The environmental management will be implemented during the detailed design phase that will continue through the procurement, construction, and operation phases. Table 51 & 52 given below presents the indicative timeframe of key EMP activities about project implementation schedule & the proposed topics for Capacity Building/Training respectively.

Table 51: Environmental Management Implementation Schedule

| Activity                                |                                                                                                            | Indicative Time Frame                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| <b>PROJECT IMPLEMENTATION</b>           |                                                                                                            |                                                       |
|                                         | Detailed Design & Bidding Documents                                                                        | Q2 Y0                                                 |
|                                         | Procurement                                                                                                | Q3 Y0                                                 |
|                                         | Construction                                                                                               | Q4 Y0 – Q4 Y2                                         |
|                                         | Contractor Operating Period                                                                                | Q3 Y2 – Q4 Y3                                         |
|                                         | Handover to WUSC for Operation                                                                             | Q3 Y3 – Q1 Y4                                         |
|                                         | Defects Liability Period                                                                                   | Q3 Y2 – Q4 Y4                                         |
| <b>ENVIRONMENTAL MANAGEMENT</b>         |                                                                                                            |                                                       |
|                                         | <b>Overall</b>                                                                                             |                                                       |
| 1.                                      | Design Review and Technical Audit Consultant (DRTAC )-Engagement of Environmental Specialist               | Starting Q4 Y0 (5 yrs of intermittent inputs)         |
| 2.                                      | PMO's submission of Environmental Monitoring Report (EMR)                                                  |                                                       |
|                                         | - Monthly EMR for project's Monthly Progress Report                                                        | - 8 <sup>th</sup> day after effective month           |
|                                         | - Semi-Annual EMR during construction for submission to ADB                                                | - 8 <sup>th</sup> day after effective 6-mo. period    |
|                                         | - Annual EMR for submission to ADB                                                                         | - 8 <sup>th</sup> day after an effective year         |
| <b>Before Construction Mobilization</b> |                                                                                                            |                                                       |
| 1.                                      | Finalization of EMP, (if applicable) revision of IEE                                                       | Q2 Y0                                                 |
| 2.                                      | ADB review & approval of revised IEE & EMP.                                                                | Q 2 Y0                                                |
| 3.                                      | Obtaining Government's approval of IEE Report                                                              | Q2 Y0 – Q3 Y0                                         |
| 4.                                      | Community preparation (including disclosure of Final IEE & its EMP)                                        | Q4 Y0                                                 |
| 5.                                      | Establishment of baseline data (as set out in the EMP)                                                     | Q4 Y0 (shall have been done before award of contract) |
| 6.                                      | Preparation of C-EMP by selected Contractor, review of C-EMP                                               | Q4 Y0, before Notice to Proceed is                    |
|                                         | Against SPS-compliant EMP.                                                                                 | given                                                 |
| <b>Construction Period</b>              |                                                                                                            |                                                       |
| <b>Mobilization to Demobilization</b>   |                                                                                                            |                                                       |
| 1.                                      | Implementation of mitigation measures and conduct of environmental effects monitoring following the C-EMP. | Q4 Y0 – Q4 Y2                                         |
| 2.                                      | Submission of Environmental Monitoring Report                                                              | Q4 Y0 – Q4 Y2                                         |

| Activity |                                                                                       | Indicative Time Frame                                            |
|----------|---------------------------------------------------------------------------------------|------------------------------------------------------------------|
|          | (EMR)                                                                                 |                                                                  |
|          | - Monthly, by Contractor                                                              | 5 <sup>th</sup> day of the month following the effective month   |
|          | - Quarterly, by Contractor or by Licensed Laboratory                                  | 3 <sup>rd</sup> day of the month following the effective quarter |
|          | Operation Period (potentially could start even before DLP is over)                    |                                                                  |
| 1.       | Implementation of mitigation measures & monitoring activities as specified in the EMP | Starting anytime between Q3 Y3 & Q1 Y4                           |
| 2.       | Submission of EMR                                                                     | anytime between Q3 Y3 & Q1 Y4                                    |
|          | - Monthly, by Operator                                                                | 5 <sup>th</sup> day of the month following the effective month   |
|          | - Quarterly, by Operator or (if applicable) by Licensed Laboratory                    | 3 <sup>rd</sup> day of the month following the effective quarter |

Source: IEE Study 2018/019

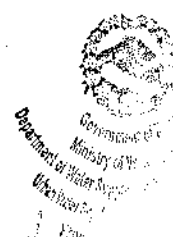
Table 52: Proposed Topics for Capacity Building/Training

| Topic |                                                                     | Target Participants | Timing      |
|-------|---------------------------------------------------------------------|---------------------|-------------|
| 1.    | By Environmental Specialists                                        |                     |             |
| 1.1   | Legal Framework                                                     | DWSSM, PMO,         | Early stage |
|       | ▪ Relevant national laws, regulations & standards on EA& management | WSSDO, ICG,         | of Output 2 |
|       | ▪ ADB SPS 2009                                                      | RMSO, WUSC (15-18)  |             |
|       | ▪ EA& review procedure under the Project                            |                     |             |
| 1.2   | Environmental Assessment                                            |                     |             |
|       | ▪ Rapid environmental assessment                                    |                     |             |
|       | ▪ Initial environmental examination                                 |                     |             |
| 1.3   | Some Aspects of EA Process & Environmental Management               |                     |             |
|       | ▪ Meaningful consultation & info disclosure                         |                     |             |
|       | ▪ Grievance redress mechanism                                       |                     |             |
|       | ▪ Environmentally responsible procurement                           |                     |             |
|       | ▪ Occupational & community health and safety                        |                     |             |
| 1.4   | EMP Implementation, part 1                                          | DWSSM, PMO,         | Early stage |
|       | ▪ Institution arrangements & responsibilities                       | WSSDO, ICG,         | of Output 2 |
|       | ▪ Environmental quality monitoring                                  | RMSO, WUSC,         |             |
|       | ▪ Emergency response                                                | (15-18)             |             |
| 1.5   | EMP Implementation, part 2                                          |                     |             |
|       | ▪ Performance monitoring & indicators                               |                     |             |
|       | ▪ Environmental monitoring report                                   |                     |             |

| Topic |                                                                                            | Target Participants   | Timing                 |
|-------|--------------------------------------------------------------------------------------------|-----------------------|------------------------|
| 2.    | By External Experts                                                                        |                       |                        |
| 2.1   | Other relevant topics, such as:                                                            | MoWS, DWSSM,          | 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 relevant topics that may be suggested by MoWS, DWSSM, PMO, ICG & WSSDO             |                       |                        |

Source: IEE Study 2018/019

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## 12. MONITORING AND REPORTING

408. RPMO is the main monitoring agency of the proposed project that will monitor and measure the progress of EMP implementation with assistance from DMSC. The monitoring activities will correspond with the project's risks and impacts, and will be identified in the IEEs for the subprojects. In addition to recording information on the work and deviation of work components from original scope, PMO, RPMOs & DSMC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. Along with this, Ministry of Water Supply (MoWS) as well as Ministry of Forests & Environment (MoFS) under Government of Nepal will also undertake monitoring process through random field visits to review the project performance.
409. RPMOs 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. This report will be based on the Sample Semi-Annual Monitoring Report Template given in **Annex 2F** and Sample Environmental Site Inspection Report given in **Annex 2G**. The subproject budgets will reflect the costs of monitoring and reporting requirements.
410. For subprojects likely to have significant adverse environmental impacts, PMO will retain qualified and experienced external experts to verify its monitoring information. PMO environmental safeguard specialist 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.
411. ADB will review project performance against the MoWS 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 PMO to ensure that adverse impacts and risks are mitigated, as planned and as agreed with ADB;
- (iv) work with PMO 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.



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### 13. CONCLUSION

412. The IEE study indicates that:

- The proposed project, its components, are not within or adjacent to environmentally sensitive areas.
- The proposed project will fulfill the increasing water demand of the project town regarding the reliable water supply system. It will definitely address the issues raised by the hardship that people of the project town are facing for safe, reliable & potable water for years.
- The proposed project will bring about: (i) the benefits of access to reliable supply of safe and potable water; (ii) promotion of good hygiene and sanitation practices and reduced health and safety risks as positive impacts; and (iii) enhanced community health, improved quality of life and safe communities as outcomes.
- Along with positive outcomes, the proposed project will also have negative impacts as discussed above in Chapter 7. As per our IEE study, four of the adverse impacts that includes *Air Pollution*, *Noise Pollution*, *Impacts on Water Quality of nearby rivers* and *Impact on Sustainability of Works* are evaluated as "Very Significant". However, these impacts would not be problematic for the project implementation if the activities that stimulate this impact to occur are properly controlled through the mitigation measures.
- Some of the adverse impacts are also evaluated as *Significant*. However, these will not be sufficient to threaten or weaken the surrounding resources. Mitigation measures, integral to socially and environmentally responsible construction practices, will be commonly used at construction sites and the contractors will be aware about it. Hence, mitigation measures would not be difficult to implement.
- Similarly, Insignificant impacts can either be avoided or simply mitigated through the proposed mitigation measures.
- The environmental management plan (EMP) as mentioned above in Chapter IX, if duly considered, followed and implemented during project construction activities, then the environmental issues will not be issues to be worried about.
- If the responsible body mentioned in the EMP matrix shown in the **Table 47** properly takes up the responsibility for the implementation of mitigation measures for the likely impacts resulting from the various activities of the

project, then, the environment of the project area will be safe and less affected from the project activities.

- Regular monitoring with good operation & maintenance service including prompt action on leaks and complying of the water supplied as prescribed in the National Drinking Water Quality Standards Directives will lessen the risks of the ineffective implementation of the proposed project and will sustain the system.
- Construction of 3 public toilets within the project town will improve the public behaviour regarding safe & civilized sanitation practices. It will help to maintain ODF status of the project town.
- None of the anticipated environmental impacts of the proposed project is significant enough to go for either detailed EIA study or further especial study.
- As per ADB Categorization, the proposed project falls under "Category B". As per EPR 1997 (Latest Amendments 2017) Schedule H, this IEE study fulfills the requirements of IEE criteria. This IEE thus fulfills the policy requirements of both the ADB and the GoN. This indicates that IEE study is sufficient for the effective implementation of Ilam Water Supply & Sanitation Project.
- According to the detailed engineering design report, the overall exercise for financial and economic returns for the sub-project indicates that the FIRR is positive and the EIRR is higher than EOCC. It also shows that the cumulative cash flow is positive after repaying the debt. The tariff rate per month of the household is within the affordability limit of the household income under different strata, which is less than 5 percent of the household income of low and middle-income groups.
- The project is considered as risk free in response to sensitivity analysis as the results of FIRR are positive in all the cases. This indicates the viability in terms of financial and economical aspects and it is worthy of investment by the concerned agencies.
- The IEE study shows that project benefits outweigh the risks and these potential risks can be overcome through proper planning and management.

413. Based on the above findings, the classification of the Ilam Water Supply and Sanitation Project as "Category B" is confirmed, no further special study or detailed EIA needs to be undertaken and people of Ilam Municipality will get rid of the hardship of safe, reliable & potable water they have been experiencing for decades.

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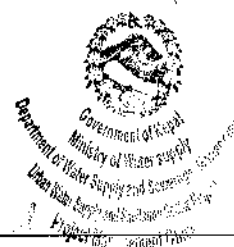
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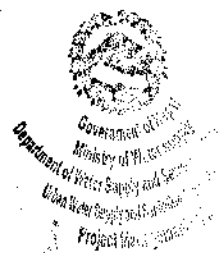
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## ANNEXES

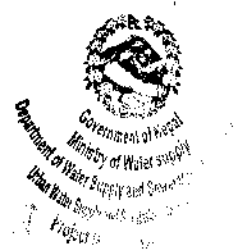
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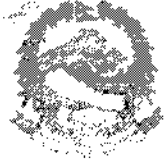


**ANNEX 1**  
**APPROVED TERMS OF REFERENCE (ToR)**



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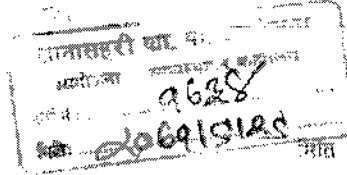




नेपाल सरकार  
शहरी विकास मन्त्रालय  
। खानेपानी तथा वातावरण मन्त्रालय ।

फोन : ४४१३६२१  
४४१३६४३  
४४११६७३  
फ्याक्स नं. ९७७-१-४४१९८७३  
सुदूरपश्चिम प्रदेश, काठमाण्डौ, नेपाल

पत्र संख्या :- ०७०/७१  
काठमाण्डौ नं :- ९८५



विश्वक प्राविधान वातावरणीय परिक्षण (IIE) का कार्यको स्वीकृत पत्रको सम्बन्धमा ।

श्री खानेपानी तथा डल विकास विभाग,  
पानीपोखरी, काठमाण्डौ ।

वर्तमान समयमा तेस्रो मान्य शहरी खानेपानी तथा सरसफाइ आयोजना आयोजना तपशिलका आयोजनाहरूको वार्षिक वातावरणीय परिक्षण (IIE) को कार्यभर नेपाल सरकार (सचिवस्तर) को निर्णय २०६९/९/९८ को निर्णयानुसार कार्यसूचीमा उल्लेख गरीएका Issue/Impacts का अभावमा प्रतिवेदन तयारीका समयमा अन्य Issue/Impacts देखा परेमा सो पनि समावेश गर्नेपनि शहरी स्वीकृत पत्रको व्यहोरा प्रयोग गर्न नसकिने र आयोजनाको स्वीकृत कार्यसूची यही साथ सलम छन् ।

तपशिल:

१. इलाम बजार खानेपानी तथा सरसफाइ आयोजना, इलाम
२. टिकारपुर खानेपानी तथा सरसफाइ आयोजना, कैलाली
३. निर्मलपोखरी खानेपानी तथा सरसफाइ आयोजना, कर्णाली
४. विदुर खानेपानी तथा सरसफाइ आयोजना, सुदूरपश्चिम
५. हुम्ले तल्लो नदीका खानेपानी तथा सरसफाइ आयोजना, जनकपुर
६. विदैया खानेपानी तथा सरसफाइ आयोजना, सिराहा

(केदारमान प्रजापति)  
सि. डि. ड

बोधार्थ:

श्री तेस्रो मान्य शहरी खानेपानी तथा सरसफाइ आयोजना  
आयोजना वातावरणीय परिक्षण, पानीपोखरी, काठमाण्डौ ।



**Government of Nepal**

**Ministry of Physical Planning and Works**

**Department of Water Supply and Sewerage**  
**Third Small Towns Water Supply & Sanitation Sector Project**  
**Project Management Office**  
**Panipokhari, Maharamuni, Kathmandu**



**Terms of Reference (ToR) for**  
**Initial Environmental Examination (IEE)**  
  
**Ilam Water Supply and Sanitation Project**

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## ABBREVIATIONS

|            |                                                                |
|------------|----------------------------------------------------------------|
| ADB        | Asian Development Bank                                         |
| DWSS       | Department of Water Supply and Sewerage                        |
| EIA        | Environmental impact assessment                                |
| EMP        | Environmental management plan                                  |
| EPA        | Environment Protection Act                                     |
| EPR        | Environment Protection Rules                                   |
| msl        | Above Mean Sea Level                                           |
| DI         | Ductile Iron                                                   |
| GI         | Galvanized Iron                                                |
| HDPE       | High Density Polyethylene Pipe                                 |
| IET        | Initial environmental examination                              |
| GoN        | Government of Nepal                                            |
| GRM        | Grievance redress mechanism                                    |
| PMO        | Project Management Office                                      |
| SPS        | Safeguard Policy Statement                                     |
| lps        | Litre per second                                               |
| HU         | Households                                                     |
| NGO        | Non-government Office                                          |
| NDWQS      | National Drinking Water Quality Standard                       |
| VAT        | Value Added Tax                                                |
| STWSSSP    | Small Towns' Water Supply and Sanitation Sector Project        |
| TSTWSSSP   | Third Small Towns' Water Supply and Sanitation Sector Project  |
| 2ndSTWSSSP | Second Small Towns' Water Supply and Sanitation Sector Project |
| ToR        | terms of reference                                             |
| VDC        | Village Development Committee                                  |



|       |                                               |
|-------|-----------------------------------------------|
| WSSDO | Water Supply and Sanitation Divisional Office |
| WUSC  | Water Users' and Sanitation Committee         |
| NPR   | Nepalese Rupees                               |
| CBS   | Central Bureau of Statistics                  |
| O&M   | Operation and Maintenance                     |
| OR    | Operating Ratio                               |



## **CHAPTER 1**

### **NAME AND ADDRESS OF THE PROPONENT**

This ToR is prepared to carry out an Initial Environmental Examination (IEE) of Ilam Town Water Supply and Sanitation Project. TOR for IEE study of this Project is needed as a reference to EPR 1997 (amendment 2007). The project proponent, Third Small Town Water Supply and Sanitation Sector Project (TSTWSSSP) of Government of Nepal, Department of Water Supply and Sewerage (DWSS), Ministry of Urban Development (MoUD), is responsible for the preparation of IEE report.

**Name of Proponent:**

Project Management Office

Third Small Towns Water Supply and Sanitation Sector Project

Department of Water Supply and Sewerage Ministry of Urban Development Government of Nepal

**Address of the Proponent:**

Panipokari, Kathmandu

Tel: 977 1 442388, 977 1 4413348

Fax: 977 1 4413280

E-mail: [info@tstwssp.gov.np](mailto:info@tstwssp.gov.np)

Website: [www.tstwssp.gov.np](http://www.tstwssp.gov.np)



## CHAPTER II

### BACKGROUND AND DESCRIPTION OF THE PROJECT

#### 2.1 Project Background

In 2000, the Government of Nepal (GoN) endorsed the 15-year Development Plan for Small Towns' Water Supply and Sanitation in order to improve health and economic and environmental living conditions of people in small towns in Nepal. The Plan adopts a community managed demand responsive approach, where the community is involved in all aspects of planning and implementation of its town's project. In support of GoN's endeavor, the Asian Development Bank (ADB) funded the Small Towns' Water Supply and Sanitation Sector Project (STWSSSP) in 2001-2008. Twenty-nine (29) small towns of about 570,000 people benefited from the improved water supply and sanitation services delivered under the Project. The positive impacts of the STWSSSP led the GoN to embark on the Second Small Towns' Water Supply and Sanitation Sector Project (2ndSTWSSSP), also financed by the ADB and which benefited another twenty-one (21) small towns. Following these two projects, the Third Small Towns' Water Supply and Sanitation Sector Project is currently being prepared to further support GoN's continuing efforts to improve water supply and sanitation service delivery in small towns in Nepal. The Project will follow the government's 15-year Development Plan, as updated in 2009, to develop the water and sanitation sector for small towns.

#### 2.2 Project Description

The proposal is to provide water supply facility to all the settlements of Ilam Municipality.

##### Location and Access

The Project is located in Ilam Municipality, which is situated in Ilam district in the Mechi Zone of the Eastern Development Region of Nepal. Ilam is a hilly small town which became a Municipality in 1958 AD (2015 BS). Geographically, it is located at 26° 54' N latitude and 83° 56' 23" E longitude. The terrain of the municipal area rises from an elevation of 401 m above mean sea level (amsl) at the river bed to 1497 m amsl at the top of Ilam hill. The main Ilam Bazar lies at an altitude of 1228 m amsl.

Ilam Municipality is bordered by the Man Khola (river) to the east, Puwa Khola (river) to the west, Sarai and Cheli Rivers (Barbote VDC) to the north and Puwanra River to the south. The total area of the Municipality is 27sq km, which is about 0.02% of total area of Nepal.

The Municipality is about 210 km from Kathmandu and 76km north of Charauli, Jhapa. It lies on the Mechi Highway on the way to Fidin, Panchthar district. The nearest operating airport is Bhadrapur in Jhapa district, about 90 kms distant, where daily flights are available. Since Ilam is located in the middle mountain region, its climate is essentially warm temperate or sub-tropical. The temperature ranges from 6° to 31.5° Celsius. The average annual rainfall is 1545 mm. The huge difference in altitude influences the variation in climate within the

#### **Municipality**

The location map of project area is given in ANNEX 1

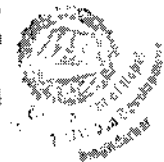
#### **Proposed Service Area**

The WSSDO of Ilam Water Supply and WUSC have proposed all Wards 1 to 9 of Ilam Municipality and improve the public sanitation facility of Ilam Municipality for the improvement of water supply and sanitation services under TSFWSSP.

#### **Population and Urbanization**

According to CBS (2011), the total population of Ilam was 296,824 in 2011 with 66,458 households. The male is 144,123(48.72%) and female population is 151,699(51.28%). The average household size is 4.45.

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 47 % of the total households. The service sector (government or private sector) is the second largest occupation (30%) followed by trade and business (15%). There are only two hotels/restaurants in the project area. But there is scope for development of hotels and resorts in the area.



Ilam Municipality has a beautiful landscape of sloping mountains, tea gardens, mountain streams, natural forests and holy sites. Agriculture land is still dominant in the municipal area. However, due to urbanization, the composition in land use pattern is changing fast. Ilam has most of the modern urban amenities, which includes water supply service though not covering all areas, electricity supply connected to the national grid, internationally connected telephone network, postal services and road networks.

#### **Health and Sanitation Services**

There are various health institutions such as health posts, government hospitals, and private clinics near the project towns which provide health services. There is one district hospital, one family planning clinic, one community hospital, three immunization centers and private clinics/pharmacies.

Almost all houses have constructed private toilet in Ilam. The socio-economic survey (2014) reported that only 0.2% still practice open defecation. Table 1 shows that 99.2% have one or other type of toilet.

- Borehole Platform
- Electrical Facilities
- Ground water Reservoir
- House (Private) Connection
- System Appurtenances
- Generator/ Pump Houses
- Water Quality Testing Laboratory
- Guard Quarter/Office Building
- Boundary Wall

The sanitation component of the project consists of construction of public toilets at the project Municipality. There is also procurement of one solid waste collecting vehicle and one septage carrying vehicle. It also has a provision for construction of sludge drying bed to treat the septage.

## 2.5 Resettlement, Relocation and Compensation Issues

The proposed water supply project does not have any issues related with resettlement, relocation and compensation. The distribution pipelines will be constructed throughout the road, agricultural field, community forest and national forest. The community forest committees have no objection for the construction of pipelines.

## 2.6 Salient Features

|                                                     |                        |                                                                                                                          |
|-----------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------|
| 1                                                   | Sub-Project Name:      | Ilam Small Town Water Supply and Sanitation                                                                              |
| 2                                                   | Location:              | Ilam Municipality, Ilam District, Mechi Zone, Eastern Development Region, Nepal                                          |
| 3                                                   | Existing Water Supply: | Intermittent Supply of about 1.5 hours in a day from main system in core city area. Other areas served by local systems. |
| <b><u>Proposed Project (Preferred Option 2)</u></b> |                        |                                                                                                                          |
| 4                                                   | Service Area:          | All wards of Municipality (Wards 1-9)                                                                                    |
|                                                     |                        | <b><u>Base year 2015</u></b> <b><u>Design year 2035</u></b>                                                              |
| 5                                                   | Population Served:     | 14,987      24,510                                                                                                       |

|                                        |  |                                                                                  |
|----------------------------------------|--|----------------------------------------------------------------------------------|
| <b>Annual Tariff Increase</b>          |  | <b>2</b>                                                                         |
| <b>19 TURR</b>                         |  | <b>38.30%</b>                                                                    |
| <b>20 Capital Cost per person</b>      |  |                                                                                  |
| Base Year                              |  | NPR 24,061                                                                       |
| Design year                            |  | NPR 17,110                                                                       |
| <b>21 Environment</b>                  |  |                                                                                  |
| ADB Category                           |  | Category B                                                                       |
| IEE finding                            |  | No adverse effect, IEE required                                                  |
| <b>22 Social</b>                       |  |                                                                                  |
| Land Acquisition                       |  |                                                                                  |
| Proposed initiatives                   |  |                                                                                  |
| <b>23 Sanitation Component</b>         |  | 3 Public Toilets, one seepage collection vehicle and one seepage treatment plant |
| <b>24 Cost of Sanitation Component</b> |  | NPR 15,594,000 including 15% Contingency and 13% VAT                             |
| <b>25 Estimated Total Capital Cost</b> |  | NPR 590,580,820 including 15% Contingency and 13% VAT                            |

## 2.7 Baseline Information

### Physical Environment

#### Landforms and Topography

Ilam district lies in the mid-hill ecological belt with its elevation varying from 140 to 3636m. Resembling a square shape, it has an area of 1703 Sq. Km. Spread over the latitude of 26°40'N to 27°08' and longitude of 87°40' to 88°10'E, this district is surrounded by Darjeeling, India in the east; Panchthar in the north; Morang and Panchthar in the west; and Bhojpur in the south.

#### Geology and Soils

The project area comprises rocks such as quartzite and feldspathic mica schist. There are fragile landslides prone sensitive areas formed after the natural calamity of 2045 B.S. at

Rangapam along the alignment, but some minor sized landslides are also present in the entire alignment. In general, soil types found in the entire project site are mixed soil.

#### **Climate**

The climate of the sub-project area is sub-tropical. Generally, rainy season starts from June and ends in September. The meteorological record shows unevenly distributed monsoon rain with the total annual average rainfall of 1545 mm. The maximum temperature is 27°C during the summer and minimum of 5°C in the winter. Snowfall is not observed but some days the hills experience occasional snowfall in the winter. Summers are humid and mild, most precipitation occurs during the monsoon season (July- September). Winter and spring skies are generally clear and sunny.

#### **Air, Noise and Water quality**

There are some industries in project VDCs. Air pollution is caused by fugitive dust from vehicle movements particularly over unpaved roads and other unpaved grounds, construction activities, and wind action on unpaved exposed surfaces and due to some small industrial emissions. Gas emissions come from household cooking, open burning, and moving vehicles. Emissions from these sources are scattered/spread apart both in terms of locations and timing. From field observation, the ambient air quality of the area is considered to be within the National Air Quality Standard of Nepal.

The sources of noise in Project VDCs are the construction activities and vehicle movements and industrial activities. The anthropogenic noise is confined in few clustered settlements and in market places only in the daytime from field observation; noise level in Project VDCs is within the national and international permissible standards at daytime and night time.

The physical and chemical quality of water of existing sources is generally good. The physical and chemical parameters of water source are generally within the NDWQS standards. However the microbial quality does not always meet the NDWQS standards. There is no provision of disinfection in any of the systems. The water quality of some existing sources is presented in Table 3.

Table 3 Water Quality of Potential Water Sources

| Parameters                          | Unit       | Samples            |                    |                             |                             |                   | NDWQS      |
|-------------------------------------|------------|--------------------|--------------------|-----------------------------|-----------------------------|-------------------|------------|
|                                     |            | Rato Khola         | Mewa Khola         | Gilang Khola<br>(16.5.2014) | Girang Khola<br>(02.6.2014) | Shadi Khola       |            |
| Temperature                         | °C         | 26.62              | 27.21              | 28.37                       | 26                          | 26                |            |
| pH                                  | -          | 6.95               | 7.15               | 7.07                        | 8.2                         | 7.1               | 6.5-8.5    |
| Turbidity                           | NTU        | 3.46               | 4.15               | 3.5                         | 2                           | ND<br>( $<1$ )    | 5<br>(10)  |
| Total Hardness as CaCO <sub>3</sub> | mg/L       | 39                 | 40                 | 16                          | 12                          | 56                | 300        |
| Chloride                            | mg/L       | ND<br>( $<1$ )     | ND<br>( $<1$ )     | ND<br>( $<1$ )              | ND<br>( $<1$ )              | ND<br>( $<1$ )    | 250        |
| Ammonia                             | mg/L       | 0.06               | 0.08               | 0.06                        | 0.1                         | 0.2               | 1.5        |
| Nitrate                             | mg/L       | ND<br>( $<0.2$ )   | ND<br>( $<0.2$ )   | ND<br>( $<0.2$ )            | ND<br>( $<0.2$ )            | 3.0               | 50         |
| Iron (Fe)                           | mg/L       | 0.06               | ND<br>( $<0.1$ )   | 0.1                         | ND<br>( $<0.05$ )           | ND<br>( $<0.05$ ) | 0.3<br>(3) |
| Manganese (Mn)                      | mg/L       | ND<br>( $<0.05$ )  | 0.06               | 0.07                        | ND<br>( $<0.05$ )           | ND<br>( $<0.05$ ) | 0.2        |
| Arsenic (As)                        | mg/L       | ND<br>( $<0.005$ ) | ND<br>( $<0.005$ ) | ND<br>( $<0.005$ )          | ND<br>( $<0.05$ )           | ND<br>( $<0.05$ ) | 0.05       |
| Total Coliform                      | CFU/100 ml | NTC                | NTC                | NTC                         | NTC                         | NTC               | 0          |
| E. coli                             | CFU/100 ml | 400                | 200                | 127                         | 26                          | 13                |            |

### Biological Environment

The Sub-Project will not encroach into or be in close proximity to any protected area. The main species found within ZOI of the sub-project are: Bans (*Dendrobium striatum*), Simat (*Bombax ceiba*), Katus (*Castanopsis indica*), Mauwa (*Engelhardtia spicata*), Nebaru (*Ficus auriculata*), Kumiro (*Litsea monopetala*), Khaniya (*Ficus semicordata*), Siris (*Albizia julibrissis*), Dhavalo (*Baccharis frutescens*), Chaur (*Strychnos cuneata*), Tooni (*Toona ciliata*), Thaki (*Bauhinia papyrifera*), Bakauro (*Alnus azederachi*), Uttis (*Alnus nepalensis*), Gayelo (*Callicarpa macrophylla*), Chakrasi, Sindhure (*Mallotus philippensis*), Kavra (*Ficus linczi*), Lampate (*Uapaca grandifolia*), Hadihar (*Artocarpus lakoocha*), Chyuri (*Azandra indica*), Fipahi (*Acer oblongum*), Lapae (*Cassia tora*), Hatadi (*Citronoma angustifolia*), Mahajiri (*Fraxinus munimularia*) etc.

Jackal (*Canis aureus*), Itaco Bandar (*Macaca mulatta*), Jungle Cat (*Felis chaus*), Leopard (*Panthera pardus*), Barking Deer (*Mosiacus mosiacus*), Wild boar (*Sus scrofa*), Bussing (*Buteo buteo*), Bandel (*Sus scrofa*), Lokharke (*Ratufa* spp.), Solak (*Momys crassicauda*), Syarif Stua (*Uaptes Montana*) are the wild animals reported in the forests of proposed road area. Similarly, birds are Kaliy penceim (*Lophura leucocomelana*), Dhukur (*Streptopelia* spp.), Pigeon (*Columba livia*), Jungle owl (*Chelidon gallus*), Kog (*Corvus splendens*), Bhangeru (*Passer domesticus*), Fista (*Chloroceryle* spp.), Jureli (*Psaltriparus* spp.)

Mahul, Dadlung, Hile, Kalle, Binge, Karve, Gardi, Bam, Raja Bam and Bhandi fish are found in Chitang Khola, Bhandi Khola, Kote Khola, Mewa Khola and Puwa Khola.

### Socio-economic Environment

The population status of Ilam was 295,824 in 2011. There are 66,453 households in the project area. The male population is 144,125 (48.72%) and female population is 151,699 (51.28%). The average household size is 4.45.

Ilam district has diverse ethnic distribution. However, Ilam district has a predominant ethnic Rai and Limbu population, making up about 38% of the total population. After this there are Thakuri-Barmali ethnic groups including Magars and Gurungs who make up about 17%. The Rais and Limbus reside mainly in the lower hills and valleys while the Magars and Gurungs predominantly inhabit the higher hills. Language wise, approximately 87% of the population of Ilam speaks Nepali, 11% speak Rai and Limbu languages and 1% speak Newari and other local languages are present in small numbers.

The 2001 CBS census listed the literacy rate of population of Ilam 6 years and above at 66.23 percent. The 2010 projection predicts the literacy rate to reach 80 percent. The literacy rate of the adult population (15-24 years) is 61.5 percent while the net enrolment ratio of children is 87.8 percent.

Most households in the project area have more than one source of income. However, the socio-economic survey shows that main occupation of the people is still agriculture which accounts for 47 % of the total households. The service sector (government or private sector) is the second largest occupation (30%) followed by trade and business (13%). There are only two hotels/restaurants in the project area. But there is scope for development of hotels and resorts in the area.

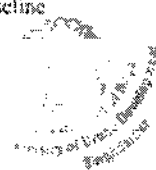
There are various health institutions such as health posts, government hospitals and private clinics near the project towns which provide health services. There is one district hospital, one family planning clinic, one community hospital, 3 immunization centres and private clinics/pharmacies.

Detailed baseline information on the physical, biological, socio-economic and cultural environment should be provided in the IEB report.

## 2.8 Objectives of TOR and IEE study

The main objectives of the TOR is to guide the subsequent IEE study, to produce a comprehensive and a formal IEE Report as per the Environmental Protection Act, 1997 and Environmental Protection Rules, 1997 (with amendments). The specific objectives of the proposed IEE study are to:

- Identify the major issues that may arise as a result of construction and implementation of this water supply scheme on the bio-physical, chemical, socio-economic and cultural environment of the project area,
- Recommend practical and site specific environmental mitigation and enhancement measures and prepare and implement an environmental monitoring plan for the project,
- Provide information on the general environmental setting of the project area as baseline data, and
- Make sure that IEE is sufficient for the proposed project.



## 2.9 Relevancy of the Project

The Project needs to be studied from the environmental point of view as per EPA 1997 and EPR 1997 (Amendments 1999 and 2007). The Proposed Water Supply and Sanitation Project is intended to serve entire wards (1-9) of Ilam Municipality. It is expected that on implementation of the project the users of the area will be able to avail from adequate amount of safe drinking water and need not resort to the use of tube wells to fulfil their water needs. The project needs to go through the IEE process.

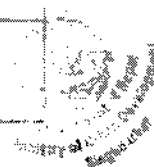
As the proposed project falls within the definitions provided in the EPR 1997 (Amendments 1999 and 2007) Annex 1(G) for drinking water projects; only an IEE shall be necessary. The regulation stated in Annex 1 (E) shall only be applicable, if the proposal does not fall under categories (A) through (H) of Annex 3. Table 3 compares the status of the project point by point against the conditions defined by EPA 1997 and EPR 1997 (and its amendments 2007).

**Table 4 Criteria for Requirement of IEE and/or EIA for Drinking Water Supply Projects as per Annex 1 and Schedule G and Annex 3 Schedule H of Environment Protection Regulation 1997**

Amendment 2007 Compared with the Situation of the Project

| S.N. | Condition described in the Act and Regulations | IEE Required as per the Regulation Annex 1 G | EIA Required as per the Regulation | Conditions in the Project |
|------|------------------------------------------------|----------------------------------------------|------------------------------------|---------------------------|
| 1    | River Control (Training)                       | Up to 1 Kilometre                            | Over 1 Kilometre                   | Within the Limit          |

|    |                                                                                                  |                                                                 |                                                              |                                                                                               |
|----|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 2  | Channelling water from one watershed to                                                          | Applicable                                                      | Applicable                                                   | NA                                                                                            |
| 3  | Rain water collection and use of spewing wetland                                                 | Up to 200 hectares                                              | More than 200 hectares                                       | NA                                                                                            |
| 4  | Supply of water in dry season from surface water with a safe yield of                            | Up to 3 cusec and utilizing up to 50% of the available quantity | More than 3 cusec and utilizing the total available quantity | Within the Limit                                                                              |
| 5  | Ground water Recharge                                                                            | Up to 50% of total aquifer                                      | More than 50% of aquifer                                     | NA                                                                                            |
| 6  | Water Treatment                                                                                  | Up to 25 litre per second                                       | More than 25 litre per sec                                   | Within the Limit                                                                              |
| 7  | Construction of tunnel for Channelling drinking water                                            | Tunnel constructed                                              |                                                              | Not constructed                                                                               |
| 8  | Water Resource Development which displaces people                                                | 25 to 100 people                                                | Over 100 people                                              | Not done                                                                                      |
| 9  | Settlement of people upstream of water source                                                    | Settlement of up to 500 people                                  | Settlement of above 500 people                               | Not done                                                                                      |
| 10 | Supply of water to a population of                                                               | 5,000 to 50,000                                                 | Over 50,000                                                  | The water supply system is designed for distribution of water to a total of 35,672 population |
| 11 | Connection of New Source to supply water to existing water supply system for a population        | 10,000 – 100,000                                                | More than 100,000                                            | The current population of the project is 13,748 and the design population is 35,672           |
| 12 | Operation of a drinking water supply system with inclusion of sewage disposal system with sewage | Installed                                                       | Installed                                                    | On site sanitation with sludge drying bed is proposed to install within the VDC itself.       |



|    |                                                                                                                                                         |              |          |                                                                                               |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|-----------------------------------------------------------------------------------------------|
| 13 | Extraction of ground water from sources which are located at point and non-point sources of biological and chemical pollution and/or their              | Not done     | Done     | No non-point and point sources of pollution is present in the vicinity of the water relative. |
| 14 | Operation of water supply project included in a multipurpose project utilizing a source of 25 liter per sec water.<br>(Construction of Multiple Purpose | Not operated | Operated | This is not a multipurpose project and is solely for water supply.                            |

## **CHAPTER III**

### **PROCEDURES TO BE ADOPTED FOR THE STUDY**

The IEE approach, methodology and procedure adopted to prepare a comprehensive IEE report will generally follow the provisions of the EPA & EPR and related national and sectoral guidelines. The procedures are summarized below.

#### **Desk Study/Literature Review**

- Published and unpublished readily available relevant information will be reviewed along with IEE reports of similar projects. The potential sources of information include, but are not limited to: topographical maps; publications of DDC, District Forest Office, District Soil Conservation Office, District Agriculture Office, District Irrigation Office, District Water Supply Office, District Livestock Services Office, and NGOs. Moreover, the reports related to the scheme (e.g. Feasibility Study Report, consultation report and any other relevant report) will be considered in preparing the IEE report. The Acts, Policies, Regulations and Guidelines, as listed in this Table, will also be reviewed and will be taken into account carefully.
- Initial interaction and consultation with the local community and district/VDC level stakeholders.
- Delineation of geographical boundary of the influence area on the topographical map.
- Preparation of project specific checklist and questionnaires for focus group discussion/public consultations and data collection on physical, biological, and socio-economic and cultural baseline environment of the project.

#### **Public consultation**

The role of public consultation and participation is to ensure the quality, comprehensiveness, effectiveness of IEE as well as to ensure that public views are adequately taken into consideration in the decision making process. It is done during the preparation of an IEE. In order to ensure public involvement, the following procedures will be followed during the IEE report preparation:

- Publication of notice- a 15 day's public notice will be published in a national level daily newspaper seeking written opinion from concerned VDCs, DDC, schools, health posts and related local organizations. A copy of the public notice will be affixed in the above mentioned organizations and deed of enquiry (murchhaka) will be collected.
- Recommendation letter from concerned VDCs and organizations will also be obtained.

- IET team will also carry out interactions with local communities and related stakeholders and will also collect public comments and suggestions.

#### **Field Survey**

The I E team will walk through along the river alignment visiting the significant environmental features in the probable influence corridor, and make necessary measurements, inspect/ observe and discuss with the local stakeholders. The team will complete the Rapid Assessment Checklist for the project covering water supply, sewerage, solid waste and urban development. The field visit will be conducted to collect baseline information on socio-economic, cultural & physical, and biological environment of the project area. Comprehensive database on the corridor of influence on the physical, biological and socio-economic environment will be prepared.

The Consultant will provide a description of relevant parts of the Project, using maps with appropriate scales and photographs and aerial photos where necessary, including the following information: location, alignment and alternatives, design standards, pre-construction activities, construction activities, post-construction activities, work schedule, staffing and support facilities and services.

**Social and Economic Environment:** Information on socio-economics of the Sub-Project area including population, ethnicity, employment facilities, educational status, and health and sanitary conditions will be collected. Report of settlement patterns, migration, religion, and religious land holdings and crop production will also be noted. Existing infrastructure and development activities in the project area and documentation of the families likely to be directly affected by the project will be collected. An estimation of the approximate area disturbed/acquired for the project will be made.

**Cultural and Physical Environment:** Description of cultural sites and issues will be studied. Meteorological (climate, temperature) data of the nearest weather station, land use and utilization pattern data of the project area and the VDC will be collected.

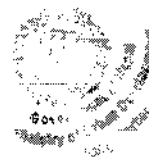
**Chemical Environment:** The use of various chemicals including fuels, lubricants, oils, acids, cement etc. during construction works may adversely affect the local environment through leakage, fumes etc. Thus, this aspect will be addressed by documenting existing sensitive areas where such chemical related activities can have adverse impacts.

**Biological Environment:** Vegetation type in the project area, distribution as well as occurrence of threatened species and nationally protected plant species, plants with medicinal values will be recorded. The study will count and document plant species likely to be disturbed by the project implementation. The habitat of wildlife will be studied and lists of wild mammals and endangered species will be observed and documented in the project

area 3

**Report Preparation**

An IEE report as per the revised format combining formats of both GoN and ADB shall be prepared in accordance with the contents given in Chapter X of this TOR. The draft report shall be presented to MoUD and after receiving the comments and suggestion from MoUD the final report will be prepared after incorporating the comments on the draft report.



## CHAPTER IV

### REVIEW OF RELEVANT ACTS, REGULATIONS AND GUIDELINES

Different national and international documents, legal provisions, conventions, plans and policies will be reviewed.

The Government of Nepal has adopted various laws, regulations and guidelines to ensure the integration of development and conservation of the environment. Similarly ADB has also developed different environmental and social guidelines and frameworks. The following acts, rules and guidelines are to guide the environmental study of the project and hence will be reviewed.

#### Law

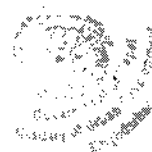
- Interim Constitution of Nepal 2063 B.S. (2007 A.D.)

#### Policies

- Urban Water Supply and Sanitation Policy 2066 B.S. (2009 A.D.)
- ADB's "Safeguard Policy Statement (SPS)" 2066 B.S. (2009 A.D.)

#### Acts and Regulations

- Land Acquisition Act 2034 B.S. (1978 A.D.)
- Solid Waste Management Act 2011 (2068 BS)
- Water Resources Act 2049 B.S. (1992 A.D.) and Regulations 2050 B.S. (1993)
- Water Tax Act 2023 (1966)
- Labor Act 2048 B.S. (1992 A.D.)
- Forest Act 2049 (1992 A.D.) and Regulations 2050 (1993 A.D.)
- Environmental Protection Act 2053 B.S. (1997 A.D.) and Regulations 2054 (1997 A.D.) with Amendment
- Local Self Governance Act 2055 B.S. (1999 A.D.) and Regulations 2056 B.S. (2000 A.D.)
- Drinking Water Regulations 2053 B.S. (1998 A.D.)
- Child Labor Prohibition and Regulation Act 2056 B.S. (2001 A.D.)
- Town Development Act 2045 (1985 A.D.)
- Nepal Water Supply Corporation Act, 1982 (and amendments) & Water Supply Management
- Board Act, 2006 & Water Supply Tariff Fixation Commission Act, 2006



## CHAPTER V

### REQUIRED TIME, BUDGET AND STUDY TEAM FOR PREPARING THE REPORT

This includes the time schedule, estimated budget and appropriate human resources for conducting the IEE study.

#### 5.1 Time Schedule

Considering the time limitations, the study has to be completed within about 9 weeks. The work schedule is presented in the following table:

| Activities                      | Weeks |   |   |   |   |   |   |   |   |
|---------------------------------|-------|---|---|---|---|---|---|---|---|
|                                 | 1     | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Desk Study                      | ■     |   |   |   |   |   |   |   |   |
| Preparation and Approval of ToR |       | ■ | ■ |   |   |   |   |   |   |
| Field Study                     |       |   | ■ | ■ | ■ | ■ |   |   |   |
| Data Compilation                |       |   |   |   |   | ■ | ■ | ■ |   |
| Preparation of Draft IEE Report |       |   |   |   |   |   |   | ■ | ■ |
| Approval of Final IEE Report    |       |   |   |   |   |   |   |   | ■ |

Though the time schedule is estimated for 9 weeks, the time may increase or decrease as per the approval time of MoUD.

#### 5.2 Estimated Budget

A budget of approximately Rs. 500,000.00 will be required to complete the IEE for the Project.

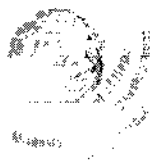
#### 5.3 Human Resource Required

The IEE study requires a multidisciplinary team of specialists/experts for the bio-physical and socio-economic and cultural assessments. The following team is proposed:

- Environmental specialist
- Hydrologist
- Sociologist

- **Water Supply and Sanitary Engineer**

Three to four enumerators will also be required to help the team. The IEE team will also benefit from the inputs provided by the design team.



## CHAPTER VI

### ANTICIPATED IMPACTS OF THE PROPOSED PROJECT ON THE ENVIRONMENT

The impacts will be identified mainly for the two activities i.e. project construction and post construction (O&M) phase on the existing physical, biological and socio-economic resources. A distinction will be made between potentially significant positive & adverse impacts, direct & indirect impacts. The impacts will be characterized as i) low, high & medium in terms of magnitude, ii) long term, short term & medium term in terms of duration and iii) site specific, local & regional/national in terms of extent. As a part of the study, enhancement of the positive impacts will also be carried out. The potential physical, biological and socio-economic impacts will be considered but not necessarily limited to the following:

#### 6.1 Pre-Construction Phase (Design Phase)

- Damage to utility lines, community services and infrastructure
- Increased Production of Wastewater
- Inadequate disposal of sludge from reservoirs and treatment plant
- Source dispute and water use conflicts

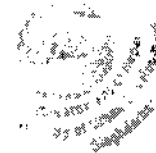
#### 6.2 Construction Phase

##### 6.2.1 Physical Environment

- Air, water and noise pollution
- Impacts on quarry and spoil disposal sites
- Erosion and land surface disturbance

##### 6.2.2 Biological Environment

- Loss of vegetation
- Possible firewood extraction and NTFP/timber exploitation



- Hunting and poaching of wildlife by localities

### **6.2.3 Socio-Economic and Cultural Environment**

- Generation of employment
- Disturbance to community
- Activities social disputes and dissatisfaction
- Occupational health and safety
- Community health and safety

### **6.3 Operation and Maintenance Phase**

- Improvement in health and sanitation
- Women empowerment
- Increment in local economy and commercial activities
- Risk of contaminated water in the distribution system
- Toxic chemical hazards



### **6.4 Any other seen/arisen issues during the study**

Beside these issues/impacts, if other issues/impacts are also noticed/identified during the IEE study, they will also be included in the IEE report.

## CHAPTER VII

### ALTERNATIVE ANALYSIS

Alternative analysis will be considered as an integral part of the IEE study, which involves alternative ways of achieving the objectives of the proposed project. The aim of alternative analysis will be to arrive at a development option which maximizes the benefits while minimizing the unwanted impacts.

The study team will conduct alternative analysis considering the following issues:

- No action option
- Alternative design
- Alternative location
- Alternative schedule and process
- Alternative resources, and
- Any other alternatives



## CHAPTER VIII

### MATTERS CONCERNING THE PREVENTION OF THE IMPACTS OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT (MITIGATION MEASURES)

Impacts from the proposed project can be both beneficial as well as adverse. An effective implementation of benefit maximization measures and adverse impacts mitigation measures would optimize the benefits expected from the project and avoid/minimize the adverse impact from the project. Based on the predicted and evaluated impacts, appropriate mitigation measures will be developed to reduce or avoid potential environmental impacts as well as maximize beneficial impacts. The mitigation measures will mainly include compensatory, corrective and preventive measures. Similarly, the benefit enhancement measures will also be designed and suggested. Guidance from similar studies and inputs from the local people, and concerned authorities will be followed while preparing mitigation and enhancement measures. Mitigation measures will also be presented in a matrix format. Suggested mitigation measures will be pragmatic and proven in the past.

Mitigation measures will be incorporated from the planning stage onwards. In general the following areas will be covered while preparing mitigation measures:

Project design phase

Project construction phase

Project operation and maintenance phase

Concerned agencies like NTWSSSP, DWSS, WUSC and local agencies, local administration and the police office will be consulted during the implementation of mitigation measures. The proponent is required to prepare Environmental Management Plan (EMP) and these measures will be outlined in the EMP in order to implement the proposed measures during the project implementation.



## CHAPTER IX

### MATTERS TO BE MONITORED DURING IMPLEMENTATION OF THE PROJECT (ENVIRONMENTAL MONITORING PLAN)

#### 9.1 Environmental Management Plan

The project proponent will develop an Environmental Management Plan (EMP) to systematically manage all the perceived environmental impacts of the project. It will be therefore based on the mitigation measures for the project induced impacts. An Environmental Management Plan (EMP) has a dual purpose. It is designed to monitor the contractor's work during project implementation. It helps to check contractual compliance with specified mitigation measures. It also helps in making periodic checks on the actual environmental impacts of the Project over the years following completion of the works, and compares these with those impacts anticipated at the time of project appraisal. The EMP therefore provides the necessary feedback required for correcting potentially serious project deficiencies, and for planning of other projects.

The EMP will include the responsibilities of different stakeholders based on preliminary plans and schedules. This program will include measures required during the project design, construction and operational phases and will include recommendations on allocation of components of the EMP to the various parties involved. Feasible and cost-effective measures to prevent/mitigate/reduce significant negative impacts should be recommended in an Environmental Management Plan. The impacts and costs associated with implementing the measures will be detailed. The EMP will include proposed work programs, budget estimates, schedules, staffing and training requirements and other support services to implement the mitigating measures.

#### 9.2 Environmental Monitoring Plan

The project will develop an Environmental Monitoring Program for the pre-construction, construction and post construction activities of the project. The program will evaluate: (i) the extent and severity of the adverse environmental impacts as compared to what was predicted, (ii) how effective the mitigating measures were and non-compliance with the regulations and the (iii) overall effectiveness of the EMP.

The environmental monitoring of the project includes field supervision and reporting of project activities prior to and during the project construction and operation in order to ensure that the works are being carried out in accordance to the approved design and that the environmental mitigation measures are fully implemented in accordance with the EMP. A monitoring system will be developed involving i) front end monitoring and ii) monitoring

i) the government and agencies, or independent monitors and iii) auditing through the involvement of government agencies, donor agencies, and independent monitors.

### **9.3 Information disclosure, public consultation and participation**

Public consultation is the process of exchanging information with those persons and organizations with a legitimate interest in a project and/or who are likely to be affected by the project (stakeholders). It is a two-way process that informs and involves the community in developing a project, and informs the proponent about issues and concerns, which can then be addressed in project design. Information disclosure involves stakeholders in monitoring the development and implementation of a project and fosters openness in decision-making by providing documents and other project materials for public scrutiny.

The consultation and disclosure involves consultation with stakeholders at an early stage of project preparation and throughout project implementation. As a minimum, stakeholders will be consulted regarding the scope of the environmental study before work has commenced in earnest, and will then be informed about the likely impacts of the project and proposed mitigation once the draft IEE report is under preparation. The report will record the views of stakeholders and indicate how these have been taken into account in project development.

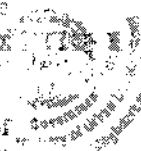
Information will be disclosed through public consultation and more formally by making documents and other materials available in a form and at a location in which they can be easily accessed by stakeholders. This normally involves making draft reports available (in the local language) at public locations in the community and providing a mechanism for the receipt of comments and making documents available more widely.

Public consultation and involvement will be given highest priority in the implementation of mitigation measures. Public consultation will take place and on the basis of decision of the consultation meeting, implementation of mitigation measures will be prioritized and will be carried out with the involvement of the local people.

Monitoring is one of the components of EMP. The results of monitoring will also be disclosed in the form of demonstration, charts, figures, graphs, and samples, etc., to the local people, school students and other interested stakeholders. In the process of compliance monitoring of the project construction, local people and construction workers will be consulted.

### **9.4 Grievance redress mechanism**

The Water Supply and Sanitation Division Office (WSSDO) will be responsible to address the issues and problems raised by the local communities regarding the loss of assets, water and sanitation etc. during the implementation of the project. The Division Office shall ask the Environment Specialist of the EDC to assist in the handling of grievances and the community.



level stakeholders should be encouraged to help in the handling of grievances at the project sites

The affected person / community will submit grievances / complaints to the WSSDO. The WSSDO will try to solve the grievance at the project level. If the grievance cannot be solved at the project level, WSSDO will forward it to the Director General (DG)'s Office at Kathmandu



## **CHAPTER X**

### **REPORT**

The IEE report will be prepared as per this ToR. The IEE report, wherever applicable, will contain maps, graphs, photographs, tables and matrix. The format of report will be in accordance with the format provided by PMO, TSTWSSP. The format is as follows:



Executive Summaries in Nepali and English

Table of Contents

List of Tables

List of Figures

Annexes

#### **A. INTRODUCTION**

1. Name and address of the individual institution preparing the report a. Name of the proposal
- b. Name and address of the proponent
- c. Consultant preparing the report
2. Basis and extent of the IEE study
  - a. ADB Policy
  - b. National Laws, Policies, Acts, Regulations, Standards and Guidelines
  - c. Objectives and Scope of the Environmental Study
  - d. Relevancy of the Project
  - e. Approach and Methodology

#### **B. DESCRIPTION OF THE PROJECT**

1. Existing Water Supply, Sanitation and Drainage Infrastructure
  - a. Water Supply
  - b. Sanitation
  - c. Drainage
2. Type, category and need of the Sub-Projects
3. Size or magnitude of operation
4. Proposed schedule for implementation
5. Description of the Sub-Projects

#### **C. DESCRIPTION OF THE ENVIRONMENT**

1. Physical Resources
  - a. Topography
  - b. Geology and soil/seismology
  - c. Climate and air quality
  - d. Water Resources
  - e. Surface water and quality

Control water and quality

## 2. Ecological Resources

National Parks and protected areas

Forests (including rare or endangered species)

Flora

Fauna

Fisheries/ aquatic biology

## 3. Social and Cultural Resources Population and Communities Health Facilities

Educational Facilities

Socio-economic Conditions

Physical or Cultural Heritage

Employment

Slums and Squatter Settlement

## 4. Economic Development and Prospects of Growth

Land Use

Infrastructure

Transportation

Drinking Water Supply

Surface Drainage, Sanitation and Sewerage

Electricity

Communications

Economic Characteristics

Industries

Agricultural Development

Mineral Development

Tourism Development

Development Organizations

Major Environmental Problems

Health and Sanitation

## D. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

### 1. Pre-Construction Phase

Environmental Impacts due to Project Design

### 2. Construction Phase

Environmental Impacts due to Project Construction

I. Physical Environment

II. Biological Environment

III. Socio-economic and Cultural Environment

### 3. Operational Phase

## E. ANALYSIS OF ALTERNATIVES WITH AND WITHOUT PROJECT SITUATIONS

## F. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

## G. GRIEVANCE REDRESS MECHANISM

## H. MATERS TO BE MONITORED WHILE IMPLEMENTING THE PROJECT



**ENVIRONMENTAL MANAGEMENT PLAN (EMP)**

1. **Adaptation and Monitoring**
  - a. Construction Phase
  - b. Operation Phase
2. **Environmental Procedures and Institutions**
3. **Projects' Environmental Enhancement Measures**
4. **Reporting Procedures**
5. **Procurement Plan and Cost Estimates**
6. **Work Plan**

**1. REFERENCES CONCLUSIONS AND RECOMMENDATIONS**



## CHAPTER XI

### OTHER NECESSARY MATTERS

The other necessary matters to be included in the IEE report will be the relevant information, reference lists, annexes, maps, photographs, tables and charts and questionnaires to be used at the time of carrying out the baseline survey. The report will clearly recommend whether an Environmental Impact Assessment is required or whether an Initial Environmental Examination is sufficient for the proposed project.

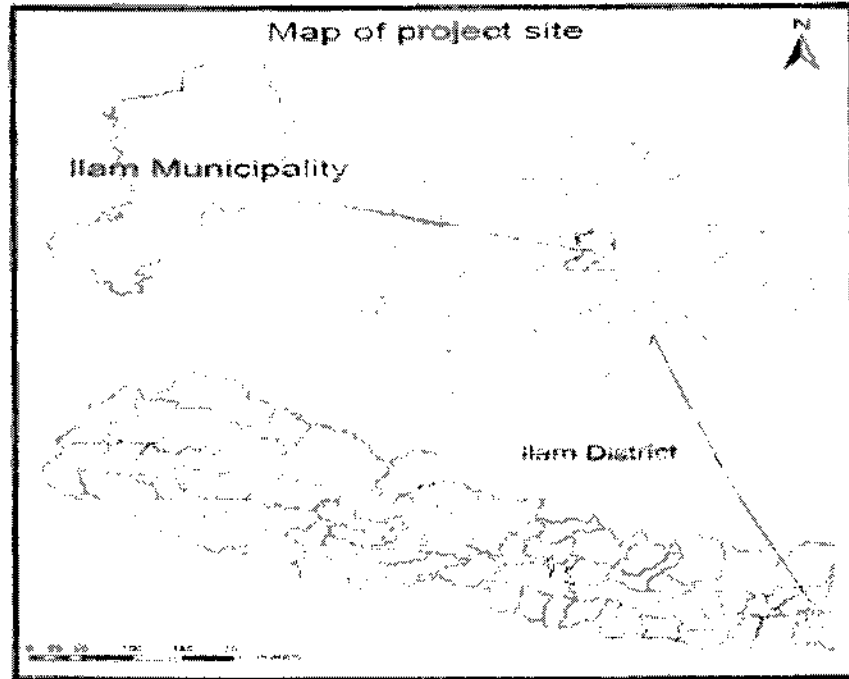


### **Literature Reviewed**

1. GoN, MOEnv, 1997: Environment Protection Act
2. GoN, MOEnv, 1997: Environment Protection Regulation
3. National EIA Guideline 2050 B.S
4. Uprety, B. K. 2003: Environmental Impact Assessment: Process and Practice
5. [www.lawcommission.gov.np](http://www.lawcommission.gov.np)



ANNEX 1 LOCATION MAP OF PROJECT AREA



*K. P. Jee*  
Engineer



## **ANNEX 2: SAMPLE FORMS, FORMATS AND REPORT TEMPLATE**

*Copy for*  
**Engineer**

**Government of India**  
**Ministry of Water Supply**  
**Department of Water Supply and Sanitation**  
**Urban Water Supply and Sanitation, Sector Group**  
**Project Management Office**

**ANNEX 2A: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST FOR ILAM PROJECT AND PRELIMINARY CLIMATE RISK SCREENING CHECKLIST FOR SAMPLE PROJECT TOWNS**

**Instructions:**

This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

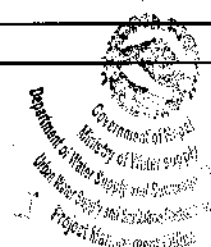
Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

**Country/Project Title:** NEP: Urban Water Supply and Sanitation (Sector) Project

**Project:** Ilam Water Supply and Sanitation project

| 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                                                        |     | √  |                                                                                                                                                              |

*[Signature]*  
Engineer



| Screening Questions                                                                                                                | Yes | No | Remarks                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B. Potential Environmental Impacts<br>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 ?                                                                        |     | √  |                                                                                                                                                                                                  |
| Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?             |     | √  |                                                                                                                                                                                                  |
| 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 |
| 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 the capabilities of community facilities?                                                  |     | √  | EMP provides mitigation measures.                                                                                                                                                                |
| 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? |     | √  |                                                                                                                                                                                                  |

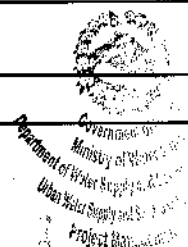
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Engineer

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Government of Nepal  
Ministry of Water Supply  
Department of Water Supply and Sewerage  
Kathmandu  
Project Management Office

| Screening Questions                                                                                                                                                                                                  | Yes | No | Remarks                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|---------------------------------------------------------------------------------------------------------------------------------------------|
| 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?              |     | √  | EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.         |
| 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 mud 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 the 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?                                                                                                                                                                                             |     | √  |                                                                                                                                             |

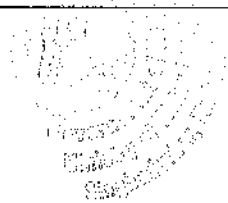
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Engineer



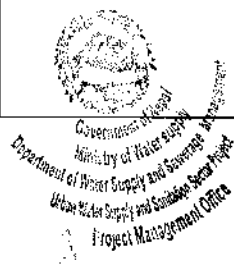
| Screening Questions                                                                                                                                                                                                                                                                                                          | Yes | No | Remarks                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|-----------------------------------------------------------------------------------------|
| Increased sewage flow due to increased water supply                                                                                                                                                                                                                                                                          |     | √  |                                                                                         |
| 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 an 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 area accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? | √   |    | EMP provides mitigation measures                                                        |

**Preliminary Climate Risk Screening Checklist for Sample Project Towns**

| 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                                                                                                                                              | 0     | Investments in the sample project will not likely be affected by climate change and extreme weather events due to the siting of project. For example all pipes will be constructed underground no investments will be sited in flood plains etc. |
|                                | 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 likely. There are various sources that will be used for the proposed project. Further source water protection will be carried out.                                                                                                           |
| 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 meteorological parameters ) affect the selection of project inputs over the life of project outputs (i.e. construction materials) | 0     |                                                                                                                                                                                                                                                  |



*K. B. Jha*  
Engineer



| Screening Questions            |                                                                                                                                 | Score | Remarks                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Performance of Project Outputs | Would climate/weather conditions and related extreme events likely to affect the performance throughout their design life time? | 0     | Climate conditions will unlikely affect water quantity and quality of water supply system. The water supply schemes will be designed to meet the current and future demand. Further water supply system will be operated and maintained efficiently to reduce system losses. Water safety plans will be implemented to ensure water supplied is safe and potable at all times. |

Options for answers and corresponding scores are given below.

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

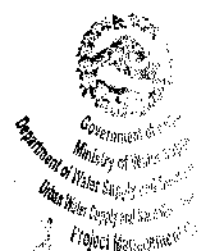
Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned as medium risk category. A total score of 5 or more (which include providing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

Result of Initial Screening (Low, Medium, High): Low

Other comments: None



*[Signature]*  
Engineer



## ANNEX 2B:RELEVANT ENVIRONMENTAL QUALITY STANDARDS

### B.1 Ambient Air Quality Standards

| Parameter         | Averaging Period | Nepal's<br>Ambient Air Quality<br>Standard ( $\mu\text{g}/\text{m}^3$ ) * | WHO Air Quality Guidelines ( $\mu\text{g}/\text{m}^3$ ) ** |                          |
|-------------------|------------------|---------------------------------------------------------------------------|------------------------------------------------------------|--------------------------|
|                   |                  |                                                                           | Global Update<br>2005                                      | Second Edition ^<br>2000 |
| TSP               | Annual           | -                                                                         | -                                                          | -                        |
|                   | 24-hour          | 230                                                                       | -                                                          | -                        |
| PM <sub>10</sub>  | Annual           | -                                                                         | 20                                                         | -                        |
|                   | 24-hour          | 120                                                                       | 50                                                         | -                        |
| PM <sub>2.5</sub> | 1-year           | -                                                                         | 10                                                         | -                        |
|                   | 24-hour          | -                                                                         | 25                                                         | -                        |
| SO <sub>2</sub>   | Annual           | 50                                                                        | -                                                          | -                        |
|                   | 24-hour          | 70                                                                        | 20                                                         | -                        |
|                   | 10-minute        | -                                                                         | 500                                                        | -                        |
| NO <sub>2</sub>   | 1-year           | 40                                                                        | 40                                                         | -                        |
|                   | 24-hour          | 80                                                                        | -                                                          | -                        |
|                   | 1-hour           | -                                                                         | 200                                                        | -                        |
| CO                | 8-hour           | 10,000                                                                    | -                                                          | 10,000                   |
|                   | 15-minute        | 100,000                                                                   | -                                                          | 100,000                  |
| Pb                | 1-year           | 0.5                                                                       | -                                                          | 0.5                      |
| Benzene           | 1-year           | 20                                                                        | -                                                          | -                        |

\* National Ambient Air Quality Standards for Nepal, 2003. Obtained from Environment Statistics of Nepal 2011, Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal.

\*\* Environmental, Health and Safety General Guidelines, 2007. International Finance Corporation, World Bank Group.

^ Air Quality Guidelines for Europe, Second Edition, 2000. WHO Regional Office for Europe, Copenhagen.

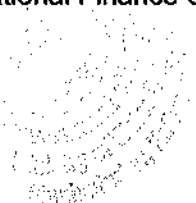
Parameter that either has no national standard value for 24-hour observation or with WHO guideline value for 24-hour observation as more stringent than that specified in the national standards.

### B.2 Noise Level Standards

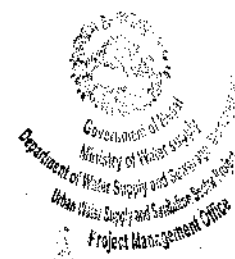
| Receptor / Source      | National Noise Standard Guidelines, 2012<br>(dB) |       | WHO Guideline Values<br>for Noise Levels Measured Out of Doors * |               |
|------------------------|--------------------------------------------------|-------|------------------------------------------------------------------|---------------|
|                        |                                                  |       | (One Hour L <sub>Aeq</sub> in dBA)                               |               |
|                        | Day                                              | Night | 07:00 - 22:00                                                    | 22:00 - 07:00 |
| Industrial area        | 75                                               | 70    | 70                                                               | 70            |
| Commercial area        | 65                                               | 55    |                                                                  |               |
| Rural residential area | 45                                               | 40    | 55                                                               | 45            |
| Urban residential area | 55                                               | 50    |                                                                  |               |
| Mixed residential area | 63                                               | 55    |                                                                  |               |
| Quiet area             | 50                                               | 40    | -                                                                | -             |
| Water pump             | 65                                               |       | -                                                                |               |
| Diesel generator       | 90                                               |       | -                                                                |               |

\* Guidelines for Community Noise, WHO, 1999.

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



*Signature*  
Engineer



**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.

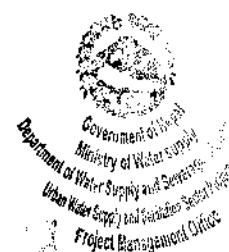
^^ From WHO (2003) Chlorine in Drinking-water, which states that this value is conservative.

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.



*K. P. P. P.*  
Engineer



## ANNEX 2C: SAMPLE GRIEVANCE REDRESS FORM

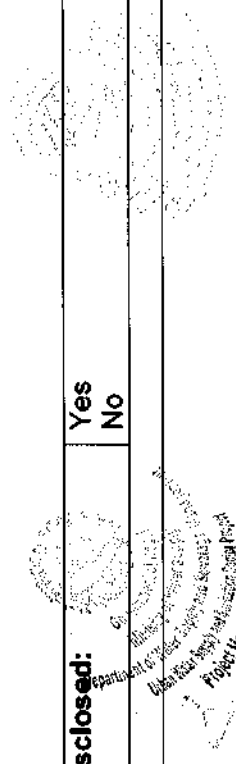
(To be available in Nepalese and English)

The \_\_\_\_\_ Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enables 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<br>*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:<br>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:<br>Note/Letter<br>E-mail<br>Verbal/Telephonic |           |
| Reviewed by: (Names/positions of official(s) reviewing grievance)    |           |
| Action Taken:<br>8/1/20                                              |           |
| Whether Action Taken Disclosed:                                      | Yes<br>No |
| Means of Disclosure:                                                 |           |

  
 Department of Water Supply and Sanitation  
 Ilam District, Nepal  
 Project Management Office

## ANNEX 2D: SAMPLE TRAFFIC MANAGEMENT PLAN

### SAMPLE: TRAFFIC MANAGEMENT PLAN (TMP)

#### A. Principles

One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

- (i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
- (ii) protection of work crews from hazards associated with moving traffic;
- (iii) mitigation of the adverse impact on road capacity and delays to the road users;
- (iv) maintenance of access to adjoining properties
- (v) Avoid hazards in
- (vi) Addressing issues that may delay the project.

#### B. Operating Policies for TMP

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.

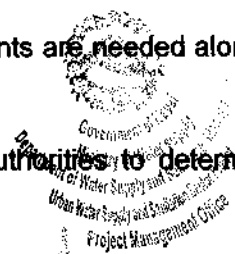
- (i) Make traffic safety and temporary traffic control an integral and high-priority element of every project from planning through design, construction, and maintenance.
- (ii) Inhibit traffic movement as little as possible.
- (iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
- (iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
- (v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
- (vi) Train all persons that select, place, and maintain temporary traffic control devices.
- (vii) Keep the public well informed.
- (viii) 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

Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

- (i) approval from the ICG, local administration to use the local streets as detours;
- (ii) 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;
- (iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
- (iv) determining if additional traffic control or temporary improvements are needed along the detour route;
- (v) considering how access will be provided to the worksite;
- (vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations, and

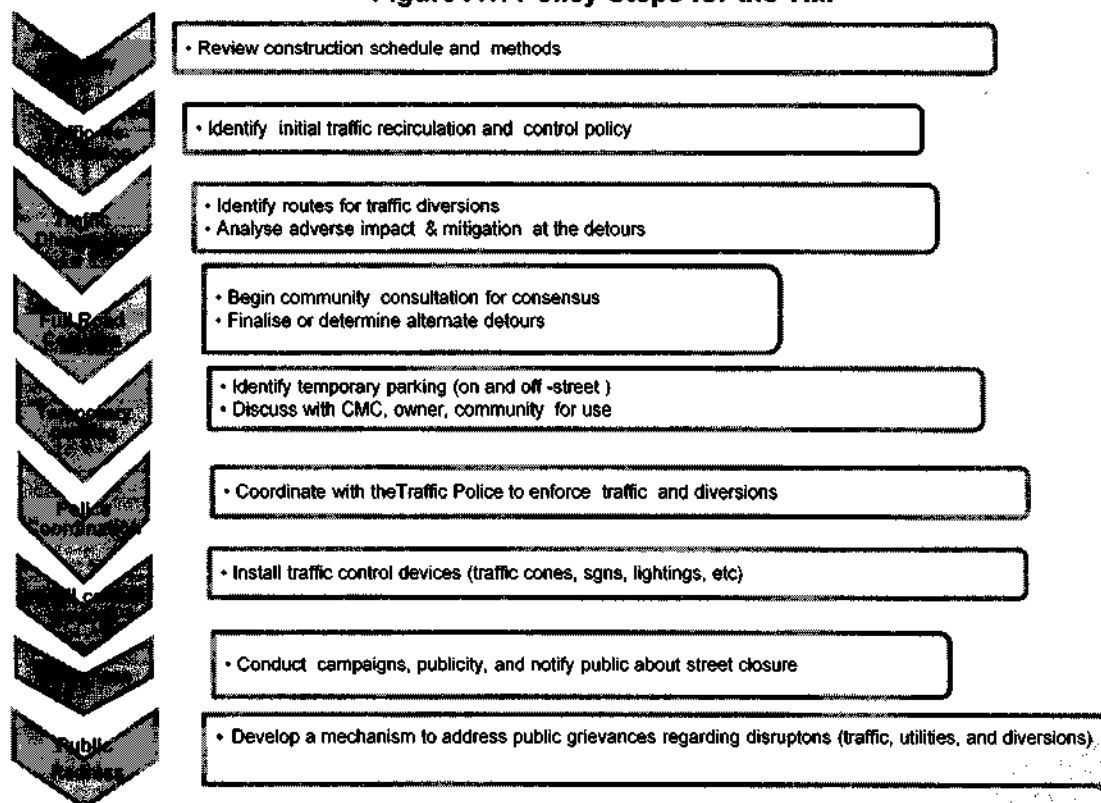
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- (vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

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 A1: Policy Steps for the TMP**



#### D. Public awareness and notifications

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.

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.

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

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

- (iii) reduced speeds enforced at the work zones and traffic diversions.

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

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:

- (i) Explain why the brochure was prepared, along with a brief description of the project;
- (ii) Advise the public to expect the unexpected;
- (iii) Educate the public about the various traffic control devices and safety measures adopted at the work zones;
- (iv) Educate the public about the safe road user behavior to emulate at the work zones;
- (v) 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
- (vi) Indicate the office hours of relevant offices.

#### **E. Vehicle Maintenance and Safety**

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 pre state 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**

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

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").



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Ministry of Water Supply and Sewerage  
Department of Water Supply and Sewerage  
Urban Water Supply and Sanitation Project  
Project Management Office

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.

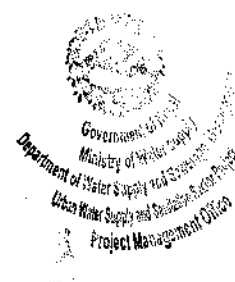
Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type)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

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.

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.



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Engineer



## ANNEX 2E:SPOIL MANAGEMENT PLAN

### Spoil Management Plan (SMP)

**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.

**Objectives of SMP:** 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

### 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

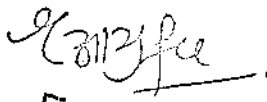
Section 8: Spoil transportation methodology

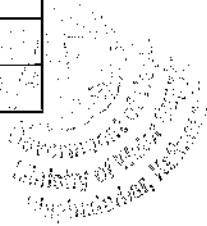
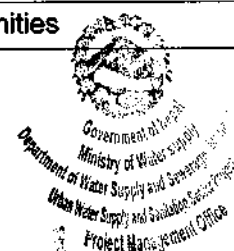
Section 9: Monitoring, Reporting, Review, and improvements

### Aspects and Potential Impacts

The key aspects of potential impacts in relation to SMP are listed in table below

| 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                                                                         |

  
 Engineer



## Spoil volumes, Characteristics and Minimization

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

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

### 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
- 

**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 client 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.

### Storage and stock piling

### 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.

## SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

### Appendixes

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection Report
- Others



*[Signature]*  
Engineer



## ANNEX 2F: SAMPLE SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

*This template must be included as an appendix in the EIA/IEE that will be prepared for the project. It can be adapted to the specific project as necessary.*

### INTRODUCTION

- Overall project description and objectives
- Description of projects
- Environmental category of the projects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and project progress and status

| No. | Project Name | Status of Project        |                          |                          |                          | List of Works | Progress of Works |
|-----|--------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------|-------------------|
|     |              | Design                   | Pre-Construction         | Construction             | Operational              |               |                   |
|     |              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |               |                   |
|     |              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |               |                   |
|     |              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |               |                   |

### COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS

| No. | Project Name | Statutory Environmental Requirements | Status of Compliance | Action Required |
|-----|--------------|--------------------------------------|----------------------|-----------------|
|     |              |                                      |                      |                 |
|     |              |                                      |                      |                 |
|     |              |                                      |                      |                 |

### COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

| No. (List schedule and paragraph number of Loan Agreement) | Covenant | Status of Compliance | Action Required |
|------------------------------------------------------------|----------|----------------------|-----------------|
|                                                            |          |                      |                 |

### COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- There should be Reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual Report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:
  - What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
  - If MWSS water was escaping site boundaries or MWSS tracks were seen on adjacent roads;
  - adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
  - Are their designated areas for concrete works, and refueling;
  - Are their spill kits on site and if there are site procedure for handling emergencies

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Project Manager

**IEE for Ilam WSSP**

- Is there any chemical stored on site and what is the storage condition?
- Is there any dewatering activities if yes, where is the water being discharged;
- How are the stockpiles being managed;
- How is solid and liquid waste being handled on site;
- Review of the complaint management system;
- Checking if there are any activities being under taken out of working hours and how that is being managed.

**Summary Monitoring Table**

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

**Overall Compliance with CEMP/EMP**

| No. | Project<br>Name | EMP/CEMP<br>Part of Contract<br>Documents<br>(Y/N) | CEMP/EMP<br>Being<br>Implemented<br>(Y/N) | Status of<br>Implementation<br>(Excellent/ Satisfactory/<br>Partially Satisfactory/<br>Below Satisfactory) | Action Proposed<br>& Additional<br>Measures<br>Required |
|-----|-----------------|----------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|     |                 |                                                    |                                           |                                                                                                            |                                                         |
|     |                 |                                                    |                                           |                                                                                                            |                                                         |

**APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT**

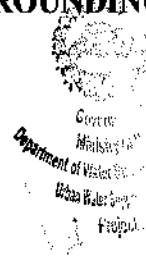
- Brief description on the approach and methodology used for environmental monitoring of each project

**MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (AMBIENT AIR, WATER QUALITY AND NOISE LEVELS)**

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used



Engl...



- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

#### Air Quality Results

| Site No. | Date of Testing | Site Location | Parameters (Government Standards)    |                                     |                                     |
|----------|-----------------|---------------|--------------------------------------|-------------------------------------|-------------------------------------|
|          |                 |               | PM10<br>( $\mu\text{g}/\text{m}^3$ ) | SO2<br>( $\mu\text{g}/\text{m}^3$ ) | NO2<br>( $\mu\text{g}/\text{m}^3$ ) |
|          |                 |               |                                      |                                     |                                     |
|          |                 |               |                                      |                                     |                                     |

| Site No. | Date of Testing | Site Location | Parameters (Monitoring Results)      |                                     |                                     |
|----------|-----------------|---------------|--------------------------------------|-------------------------------------|-------------------------------------|
|          |                 |               | PM10<br>( $\mu\text{g}/\text{m}^3$ ) | SO2<br>( $\mu\text{g}/\text{m}^3$ ) | NO2<br>( $\mu\text{g}/\text{m}^3$ ) |
|          |                 |               |                                      |                                     |                                     |
|          |                 |               |                                      |                                     |                                     |

#### Water Quality Results

| Site No. | Date of Sampling | Site Location | Parameters (Government Standards) |                                             |                                 |                                 |                                |                                |
|----------|------------------|---------------|-----------------------------------|---------------------------------------------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|
|          |                  |               | pH                                | Conductivity<br>( $\mu\text{S}/\text{cm}$ ) | BOD<br>( $\text{mg}/\text{L}$ ) | TSS<br>( $\text{mg}/\text{L}$ ) | TN<br>( $\text{mg}/\text{L}$ ) | TP<br>( $\text{mg}/\text{L}$ ) |
|          |                  |               |                                   |                                             |                                 |                                 |                                |                                |
|          |                  |               |                                   |                                             |                                 |                                 |                                |                                |

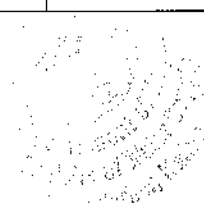
| Site No. | Date of Sampling | Site Location | Parameters (Government Standards) |                                             |                                 |                                 |                                |                                |
|----------|------------------|---------------|-----------------------------------|---------------------------------------------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|
|          |                  |               | pH                                | Conductivity<br>( $\mu\text{S}/\text{cm}$ ) | BOD<br>( $\text{mg}/\text{L}$ ) | TSS<br>( $\text{mg}/\text{L}$ ) | TN<br>( $\text{mg}/\text{L}$ ) | TP<br>( $\text{mg}/\text{L}$ ) |
|          |                  |               |                                   |                                             |                                 |                                 |                                |                                |
|          |                  |               |                                   |                                             |                                 |                                 |                                |                                |

#### Noise Quality Results

| Site No. | Date of Testing | Site Location | LA <sub>eq</sub> (dBA) (Government Standard) |            |
|----------|-----------------|---------------|----------------------------------------------|------------|
|          |                 |               | Day Time                                     | Night Time |
|          |                 |               |                                              |            |
|          |                 |               |                                              |            |

| Site No. | Date of Testing | Site Location | LA <sub>eq</sub> (dBA) (Government Standard) |            |
|----------|-----------------|---------------|----------------------------------------------|------------|
|          |                 |               | Day Time                                     | Night Time |
|          |                 |               |                                              |            |
|          |                 |               |                                              |            |

*Copy fee*  
Engineer



**ANNEX 2G: 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<br>Activity<br>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                     | <input type="checkbox"/> | No <input type="checkbox"/> |

Signature \_\_\_\_\_

**Sign off**

Name \_\_\_\_\_

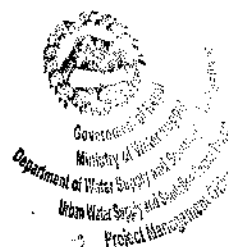
Position \_\_\_\_\_



Engineer

Name \_\_\_\_\_

Position \_\_\_\_\_



**ANNEX 3:**  
**PUBLIC NOTICE, MUCHULKA, RECOMMENDATION LETTERS & MINUTES OF**  
**MEETINGS**



*[Handwritten signature]*  
Engineer



# PUBLIC NOTICE

पृष्ठ 12 : अक्षर : वादवादी : वादवादी : पृष्ठ 12 : Sunday, 16 December 2018 : पृष्ठ 12 : वादवादी : पृष्ठ 12

## अधिक

**THE UNIVERSITY OF CHICAGO PRESS**

# अधिक

**Abstract**

## Abstract

આને પાછો જાવો અને સરકારને મળવો

॥ श्रीगणेशाय नमः ॥












**विशेष ध्यान: कर्मकाण्डे कथा कथयति कथयामास**

ਪ੍ਰਾਚੀਨਤਮ ਅਨਾਭਰਵੀਂ ਪੜ੍ਹ੍ਹਤਾਪਾਠ ਲਈ ਸਭ ਸਮਝਾਓ ਓਹੋ ਭਲੇ ਸੰਪਰਦਾ

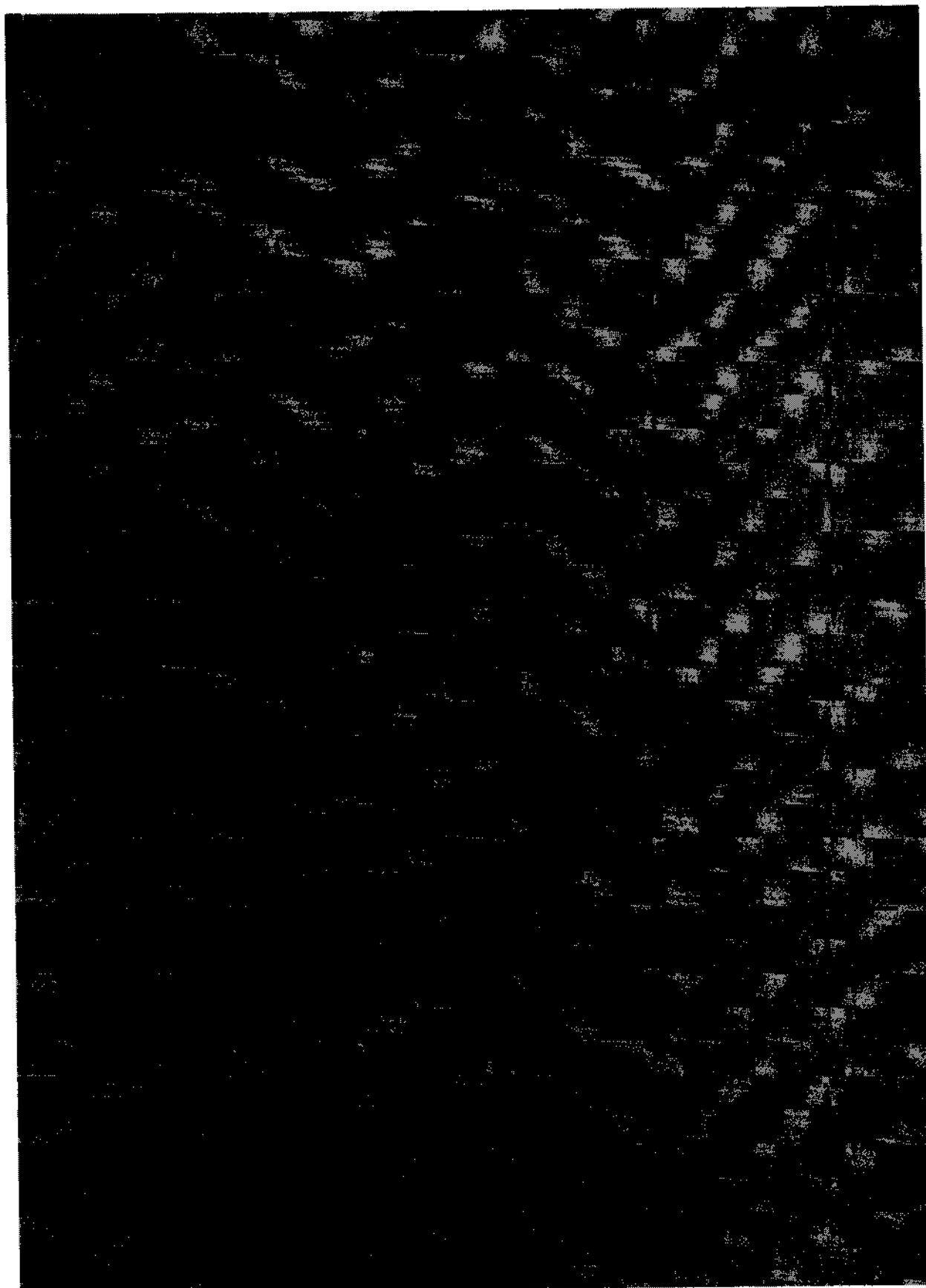
१०५२४ दिनांक २०-०६-७९

[illegible]

**२०००**

[illegible]

## MUCHULKA (DEED OF INQUIRY)



**RECOMMENDATION LETTER FROM ILAM MUNICIPALITY**



## इलाम नगरपालिका कार्यालय

सचिवालय, इलाम नगरपालिका

इलाम

२०७३

का.ज./लेखा १२००१०  
योजना/प्रशासन १२००१५  
दमकल/खानेपानी १२००३०  
फ्याक्स नं. १२००३१

प.स. : प्र.शा. ( १०७२१०७३ )

च.नं. २६९१

मिति: २०७२/१२/१५

विषय : खानेपानी आयोजना यथाशीघ्र सञ्चालन सम्बन्धमा ।

श्री खानेपानी तथा ढल निकास विभाग  
तेस्रो तेस्रो साना सहर खानेपानी तथा सरसफाइ आयोजना  
आयोजना व्यवस्थापन कार्यालय  
मन्नीमोहरी, काठमाडौं ।

इलामबजार तेस्रो साना सहर खानेपानी आयोजना खारेज भएको, ए.डी.बी. को मन्त्रालयमा नजुरा परेको, इलामको खानेपानी आयोजना सञ्चालन हुन नसक्ने जस्ता बजार हल्लाका सम्बन्धमा इलाम नगरपालिका, इलामबजार तेस्रो साना सहर खानेपानी तथा सरसफाइ उपभोक्ता संस्था र नेपाल आदिवासी जनजाति महासंघका प्रतिनिधिहरू बिच मिति २०७२/१२/१३ गतेका दिन यस कार्यालयमा आयोजित छलफलकै क्रममा त्यस आयोजनाका उपनिर्देशक श्री केशव विष्टज्यूसँग भएको टेलिफोन वार्ताबाट सो आयोजना खारेज नभएको जानकारी प्राप्त भए पनि आयोजना सञ्चालन कार्यमा भइरहेको ढिलाइले यस क्षेत्रमा अत्युत्पन्न गरिरहेको हुँदा खानेपानी जस्तो संवेदनशील विषयमा ढिलासुस्ती हुँदा अनेकौं समस्या उत्पन्न जाने हुनाले इलाम नगरलाई खानेपानी अभावबाट मुक्त गर्नका लागि उल्लिखित आयोजना चाँडो भन्दा चाँडो सञ्चालनमा ल्याउनु अत्यावश्यक भएको र मिति २०७२/१२/१३ मा आयोजित नगरपालिका, इलामबजार तेस्रो साना सहर खानेपानी तथा सरसफाइ उपभोक्ता संस्था र नेपाल आदिवासी जनजाति महासंघका प्रतिनिधिहरूको संयुक्त बैठकले उक्त आयोजना अबिलम्ब सञ्चालन गर्ने व्यवस्थाका लागि सम्बद्ध निकाय, विभाग र ए.डी.बी. मा अनुरोध गर्ने निर्णय गरेको व्यहोरा जानकारी गराउँदै उल्लिखित आयोजना यथाशीघ्र सञ्चालनको व्यवस्था मिलाई दिन हुन अनुरोध गर्दछु ।

लेखार्थ :-

- श्री सचिवीय मामिला तथा स्थानीय विकास मन्त्रालय,
- नगरपालिका व्यवस्था शाखा, सिंहदरबार काठमाडौं ।
- श्री खानेपानी तथा ढल निकास विभाग
- तेस्रो तेस्रो साना सहर खानेपानी तथा सरसफाइ आयोजना
- पूर्व क्षेत्रीय खानेपानी आयोजना इटहरी सुनसरी ।
- श्री जिल्ला प्रशासन कार्यालय, इलाम ।
- श्री जिल्ला विकास समितिको कार्यालय, इलाम ।
- श्री खानेपानी तथा सरसफाइ डिभिजन कार्यालय इलाम ।
- श्री खानेपानी तथा सरसफाइ उपभोक्ता महासंघ इलाम ।
- श्री नेपाल आदिवासी जनजाति महासंघ इलाम ।
- श्री इलामबजार खानेपानी तथा सरसफाइ उपभोक्ता संस्था इलाम ।
- श्री नगर सूचना केन्द्र, इ.न.पा.का. ।
- श्री लेखा शाखा, इ.न.पा.का. ।
- श्री सभै राजनीतिक दलहरू, इलाम ।

०८२५  
(महेन्द्रकुमार खाँडा)  
कार्यकारी अधिकृत



# इलाम नगरपालिका कार्यालय



जा.व. / लेखा १२००६०  
योजना / प्रशासन १२००६२  
दमकल / खानेपानी १२००६०  
पयावस नं. १२००६१

प.सं. : प्र.शा. ( १०७१०७३

च.नं. ३२११

मिति: २०७३/११/२५

विषय : खानेपानी आयोजना यथाशीघ्र सञ्चालन सम्बन्धमा ।

श्रीमान निर्देशकजी

खानेपानी तथा ढल विकास विभाग

तेस्रो साना सहरी खानेपानी तथा सरसफाइ आयोजना

आयोजना व्यवस्थापन कार्यालय

पानीपोखरी, काठमाडौं ।

इलाम नगरमा खानेपानीको अभाव तथा समस्या भएको कारणले यस क्षेत्रको खानेपानीलाई व्यवस्थित गर्न लागि तेस्रो साना सहरी खानेपानी तथा सरसफाइ आयोजना अन्तर्गत इलामबजार तेस्रो साना सहरी तथा सरसफाइ आयोजना समेत छनौट भई प्रारम्भिक समीक्षणका कार्यहरू सम्पन्न भइसकेको, स्थानीय मुहान क्षेत्रमा कुनै किसिमको बाधा अवरोध र समस्या नरहेको, आयोजना शीघ्र सञ्चालनका लागि सबै सरोकारवालाहरू सकरात्मक प्रतिक्रिया रहेको विद्यमान अवस्था हुँदाहुँदै पनि उक्त आयोजना सञ्चालन कार्यमा भइरहेको छिलाइले यस तथा खानेपानी अभावको समस्या भन्नु जटिल बन्दै गइरहेको हुँदा इलाम नगरलाई खानेपानी अभावबाट मुक्त गर्नका लागि इलामबजार तेस्रो साना सहरी खानेपानी तथा सरसफाइ आयोजना यथाशीघ्र सञ्चालनको व्यवस्था मिलाई सहयोग दिन हुन अनुरोध छ ।

कोषाय :-

१. सहयोगी मामिला तथा स्थानीय विकास मन्त्रालय,

नगरपालिका व्यवस्था शाखा, सिंहदरबार काठमाडौं ।

२. खानेपानी तथा ढल विकास विभाग

तेस्रो साना सहरी खानेपानी तथा सरसफाइ आयोजना

तथा यथीय खानेपानी आयोजना इटहरी सुनसरी ।

३. जिल्ला प्रशासन कार्यालय, इलाम ।

४. जिल्ला विकास समितिको कार्यालय, इलाम ।

५. खानेपानी तथा सरसफाइ डिभिजन कार्यालय इलाम ।

(महेन्द्रकुमार खामुङ)  
कार्यकारी अधिकृत

# DOCUMENT REGARDING CONSENT FROM THE COMMUNITY & THE CONCERNED AUTHORITY FOR USING WATER SOURCES

प्रस्तावित :

नगरपालिकाको तर्फबाट

सही

नामधर

पद : कार्यकारी अधिकृत

मिति : २०७३.०३.०५

मानेपानी तथा सरसफाइ विभिन्न कार्यालयको तर्फबाट

सही

नामधर

पद : कार्यकारी अधिकृत

मिठाई मूलान क्षेत्रका स्थानीय बासिन्दाहरूको तर्फबाट (मिठाई स्थानीय विकास योजना निर्माण उपभोक्ता समूह माइमुवा ४/५)

| क्र.सं. | नामधर                 | ठेगाना    | फोन नं.    | सही |
|---------|-----------------------|-----------|------------|-----|
| १       | इन्द्रजीत राई         | माइमुवा ४ | ९७४२६०४०६३ |     |
| २       | पुष्पराज राई          | माइमुवा ४ | ९७४२६३१४७१ |     |
| ३       | सोमबहादुर राई         |           | ९७४२६२६९४३ |     |
| ४       | दशरथ राई              | माइमुवा ४ | ९७४२६३४०७४ |     |
| ५       | उदय गुरुङ             | माइमुवा ४ | ९७४२६३०९४४ |     |
| ६       | सन्तोष राई            | माइमुवा ४ | ९७४२६४८४९३ |     |
| ७       | लेखबहादुर राई         | माइमुवा ४ |            |     |
| ८       | रुद्रा राई            | माइमुवा ४ |            |     |
| ९       | मनकमारी राई           | माइमुवा ४ |            |     |
| १०      | सुभद्रा राई           | माइमुवा ४ | ९७४२६१२९४६ |     |
| ११      | अम्बिका राई           | माइमुवा ४ | ९८४४६३९६९४ |     |
| १२      | सोमबहादुर राई         | माइमुवा ४ | ९८१३९४४६७७ |     |
| १३      | धिरज राई              | माइमुवा ४ |            |     |
| १४      | धिरज राई              | माइमुवा ४ | ९७४२६४६८०८ |     |
| १५      | सोमबहादुर गुरुङ, प.अ. | माइमुवा ४ | ९७४२६०६४०८ |     |
|         | नामधर : ग.वि. माइमुवा |           |            |     |

रोहबर :

माइमुवा गाविस अध्यक्ष/सचिव श्री सुब्बाबहादुर गुरुङ



## संक्षेप

लिखितम हामी तलमन्त्रमा गरीछाप गर्ने पत्रहरू आगो माननीय संस्था तथा मायगाभार्त सजोपरी गरी  
मिताइकोला तथा आसपासका खानेपानी मुहान क्षेत्र इलाहा नगरपालिकामा लागि निर्देश, निरन्तर र  
नियमित रूपमा उपलब्ध गराउने सम्बन्धमा निम्न प्रमुखिमाको सारमा मन्त्र भई आज मिति  
२०६९/११/१५ मा यो सम्झौतामा हस्ताक्षर गरी सम्झौताको एक एक प्रत लिई दिई।

निम्न :-

१. इलाहा नगरपालिका र मायगाभार्त गा.वि.स. मायगाभार्त ५ इलाहा बीच मिति २०६७/११/१५ मा मायगाभार्त  
सम्झौतामा निरन्तरता दिने र आ.स. ०६९/१०/३० देखि सो विधानमा यस १ शिखरको व्यवस्थापनमा  
सहयोग गर्ने एवम् सो प्रावि.को भवन तथा खेलमैदान एवम् विभासय आल विकास केन्द्रको संरक्ष मैदान  
निर्माणमा सहयोगको लागि जि.मि.का इलाहा लगायत दातु विकासमा पढ्न गर्ने । साथै हिमालय आल  
विकास केन्द्रको मायगाभार्त मासिक रु २४००००० का दरले २०६९ आवसदेखि सहयोग उपलब्ध  
गराउने ।
२. आलको सम्झौतामा यस भन्दा अगाडिको सम्झौता समेतलाई ध्यान राखी अगाडिको १ लाख २ हजार र  
आ.स. ०६९/१०/३० को १ लाख १० हजार, आ.स. ०६९/१०/३० को १ लाख १० हजार समेत यस सार  
परी आ.स. र सम्झौता गरी धाता खोल सगाई न.पा. बाट विकास दिने । यसमा उल्लिखित रु १  
लाख १० हजार वार्षिक दिने रकमका सम्बन्धमा न.पा.ले खानेपानी सेवा शुल्कमा पुनरावलोकन गरी वृद्धि  
गरेको अवस्थामा आपसी सम्झौता गरी यस रकममा समेत वृद्धि गरे लैजाने ।
३. मिताइ मुहानबाट भर्नेको पाइपलाइनलाई सम्झौतामा राखी यस ६ इलाहा पाइपलाइन इलाहा  
नगरपालिकाको लागि पानी सफाई गर्ने ।
४. मिताइ मुहान र आसपासका खानेपानी मुहान क्षेत्रको प्राकृतिक स्रोत तथा पर्यावरण सुरक्षाका लागि गरी  
क्षेत्रको दमन विनको भवन अमिनिस्ट्रि तथा वृक्षारोपणको कार्यक्रम र सो क्षेत्रको वनको सुरक्षाका  
साथि हेरात व्यवस्थापनमा न.पा. बाट वार्षिक रु १० हजार रकम आ.स. ०६९/१०/३० देखि लागू गरी  
सहयोग गर्ने ।
५. मिताइ मुहान र आसपासका खानेपानी मुहान क्षेत्रका नागरिकहरूको लागि वार्षिक रूपमा  
नगरपालिकाबाट स्वास्थ्य शिविर आयोजना गर्ने ।
६. मिताइ मुहान र आसपासका खानेपानी मुहान क्षेत्रमा खानेपानीको सम्बन्धमागन्धी काम हुदा स्थानीय  
वास्तव्यलाई प्राथमिकता दिने ।
७. मिताइ मुहान र आसपासका खानेपानी मुहान क्षेत्रका वास्तव्यलाई खानेपानीको सुविधाका लागि खानेपानी  
तथा सफाई डिभिजन कार्यालय इलाहाले खानेपानी योजना सम्झौता गरि दिने ।
८. खानेपानी मुहान क्षेत्रका वास्तव्यको धरमा शुल्क सौचालय निर्माणका लागि जम्मा ७० वटामा वार्षिक  
१० वटाका दरले प्यान सेट खानेपानी तथा सफाई डिभिजन कार्यालय इलाहाले उपलब्ध गराउने र  
यस कार्यमा नगरपालिकाले प्रति सौचालय रु १०००००० का दरले सहयोग गर्ने ।
९. मिताइ मुहान र आसपासका खानेपानी मुहान क्षेत्रको सुरक्षाका लागि हाल १ जना चौकीदार कार्यरत  
रहनेमा अरु यस बाई न. ४ को आसपास माथेबाट १ जना चौकीदार २०६९ आवसदेखि नगरपालिकाले  
कार्यरत गर्ने ।
१०. मायगाभार्त गा.वि.स. बाई न. ४, ५ र ६ न. बाइमा वस्तुतीकरणको सेवा उपलब्ध गराई सहयोग गर्नका  
साथि नेशन विद्वत प्राधिकरण लगायत अन्य दातु विकासमा पढ्न गर्ने ।
११. प्रभावित क्षेत्रमा प्रत्येक वर्ष १ वटा सिप विकासगन्धी साक्षिम सम्झौता गरिनेछ यसका साथ  
सम्झौताहरूको सशर्तकरण तथा आर्थिक समुद्धि हुने गरीका कार्यक्रमलाई प्राथमिकता दिनेछ ।
१२. देउराई खानेपानी गोराबाई सन्दकपर बाइको लागि प्रत्येक वर्ष विभिन्न विकासमा सडक निर्माणको  
साथि आवसक रकम निविद्योन्नत गर्ने पढ्न गर्ने ।



नेपाल सरकार  
सङ्घीय मामिला तथा स्थानीय विकास मन्त्रालय  
जिल्ला विकास समितिको कार्यालय



प.स. प्रशासन शाखा ( ) ०७१/०७२

च.नं. २०४९



मिति :- २०७२/०२/२२

श्री खानेपानी विभाग  
खानेपानी आयोजना व्यवस्थापन कार्यालय  
तेस्रो खाना शहरी खानेपानी आयोजना  
पानीपोखरी, काठमाडौं।

विषय :- निर्णय जानकारी एवं कार्यान्वयन गर्ने सम्बन्धमा।

प्रस्तुत विषयमा इलाम जिल्ला जलस्रोत समितिको मिति २०७२ जेठ २१ गते बसेको बैठकबाट देहायको निर्णय भएकोले आवश्यक जानकारी एवं कार्यान्वयनका लागि अनुरोध छ।

तपसवित्र :-

निर्णय नं. ११११

यस इलाम जिल्ला जलस्रोत समितिको मिति २०७१ माघ १८ गतेको बैठकबाट दर्ता नं. २०६ मा कायम भएको इलाम बजार तेस्रो शहरी खानेपानी तथा सरसफाई उपभोक्ता संस्था इलामको च.नं. ४ मिति २०७२/२/१८ को सिफारिस माग पत्र र इलाम नगरपालिका कार्यालय इलामको च.नं. ४८१८ मिति २०७२/२/१८ बाट सिफारिस माग भए बमोजिम इलाम तेस्रो खाना शहरी खानेपानी तथा सरसफाई आयोजना अन्तर्गत भाडीखोला, गिताङ खोला, मेवा खोला, रास्तेखोला भुटान गरी इलाम नगरपालिकामा खानेपानीको व्यवस्थापन गर्ने गाविस साईसभुवा इलामका गाविस स्तरीय समन्वय समितिसँग खोजना कार्यान्वयनका लागि सम्झौता समेत भई सकेको हुँदा भुटानको पानी ल्याउने विषयमा कुनै पनि किसिमको विवाद तथा बाधा अवरोध हुने नदेखाएकोले सो आयोजनाको सर्वेक्षण तथा कार्यान्वयनका लागि तेस्रो खाना शहरी खानेपानी आयोजना व्यवस्थापन कार्यालय, काठमाडौंमा सिफारिस गर्ने निर्णय गरियो।

होवाथ :-

श्री इलाम नगरपालिका कार्यालय

इलाम।

श्री इलाम बजार तेस्रो खाना शहरी खानेपानी तथा सरसफाई उपभोक्ता संस्था  
इलाम।

(मदन कोइराला)

स्थानीय विकास अधिकारी

सरसफाईको पहिलो आवश्यकता  
शुद्ध दिवा मुक्त अदरवा

०२४-५२०५१०, ५२०५१५, ५२०५२२ फ्याक्स ५२०५२५ website: ddcilam.gov.np



GOV. OF NEPAL

OFFICE OF THE VILLAGE DEVELOPMENT COMMITTEE

ILAM

संस्था प्रशासक(विभागा)

ब.नं. ४२  
सं. ०६९/०६२

मिति ०६९/०८/११

विषय: सिफारिस गरिएको !

श्री इलाम नगरपालिका नैसर्गिक स्रोत शहरी एकोपनी तथा सरसफाई उपमोक्षा समिति, इलाम !

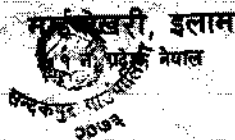
प्रस्तुत विषयमा इलाम नगरपालिका नैसर्गिक स्रोत शहरी एकोपनी तथा सरसफाई उपमोक्षा समिति र माईमकुवा गाविस को स्थानीय कार्य विम वृहत् कलफुल र अन्तर्गतको वार्ड माईमकुवा स्थित जीलाङ्ग रकोपानीकोटि १६ लिटर, रातकोट १० लिटर र गैलाकोट १० लिटर प्रति सैकडको दिहाकले जम्मा ३६ लिटर रकोपानी स्रोत उपलब्ध गराउने सहमति भए अनुसार उक्त स्रोतकोटि इलाम रकोपानी आपूर्ति गराउनुका निमित्त इलाम बजार रकोपानी तथा सरसफाई उपमोक्षा समिति लाई यो सिफारिस पत्र दिइएको हो।

(सिफारिसकर्ता)  
अध्यक्ष



प.स. ०६४१६५  
च.नं. ६६६

## सन्दकपुर गाउँपालिका गाउँ कार्यपालिकाको कार्यालय



मिति: २०७२/०१/२३

विषय: सिफारिस गरिएको सम्बन्धमा।

श्री इलाम बजार तेस्रो साना शहरी खानेपानी तथा सरसफाई उपभोक्ता संस्था  
इलाम,।

प्रस्तुत विषयमा खानेपानी विभाग, खानेपानी आयोजना व्यवस्थापन कार्यालय तेस्रो साना शहरी खानेपानी आयोजना, पानीपोखरी काठमाण्डौबाट नेपालमा संचालन भइरहेको तेस्रो साना शहरी खानेपानी आयोजनाले साविक इलाम नगरपालिका हालका ६, ७, ८, ९ वडाहरूमा हाल वितरण भइरहेको खानेपानी र थप सेवा क्षेत्र समेत विस्तार गरि खानेपानी आयोजना संचालन गर्ने भएको र उक्त आयोजना संचालन गर्नको निमित्त खानेपानीको क्षमता अभिवृद्धि गर्न पर्ने हुदा साविक माइमभुवा गाविस हाल सन्दकपुर गाउँपालिका वडा नं. २ माइमभुवामा रहेको पानीको मुहानहरू गीताड खोलाबाट प्रतिसेकेण्ड १६ लिटर, गनेखोलाबाट प्रतिसेकेण्ड १० लि. मेवाखोलाबाट प्रतिसेकेण्ड १० लि. गरि जम्मा ३६ लि. प्रतिसेकेण्ड खानेपानी इलाम बजार तेस्रो साना शहरी खानेपानी तथा सरसफाई उपभोक्ता संस्थालाई उपलब्ध गराउन विगतमा स्थानिय स्तरमा सहमति भई प्रतिवदना समेत जनाई सकेको हुदा हालको बदलिदो परिस्थितीमा स्थानिय सरकार सन्दकपुर गाउँपालिको तर्फबाट विगतको सहमति अनुसार उक्त खानेपानी आयोजना संचालन गर्नको लागि माथि उल्लेखित परिमाणको खानेपानी उक्त संस्थालाई उपलब्ध गराउन सहमतिका साथ सिफारिस गरिएको व्यहोरा अनुरोध छ।

उदय बहादुर राई  
भा.प्र.स. अध्यक्ष

CONSENT LETTER FROM SHREE GUMBADANDA COMMUNITY FOREST WOMEN USER'S GROUP



सर्व श्रेय का योगदान  
श्री गुम्पाडोंडा सामुदायिक वन  
महिला उपयोगकर्ता समूह

फोन नंबर : 068/068  
फैसल नंबर : 96



वेब साइट (वेबसाइट)  
मिति : 06/08/06

विषय : भोजपुरी नद्या दिवार (समस्या)

इलाहाबाद नद्या दिवार (समस्या) के संबंध में हमें  
श्री गौरी आना भदरी खानेपानी आयोग के विषय  
इलाहाबाद नद्या दिवार (समस्या) के संबंध में हमें  
बना हुआ आयोग के संबंध में हमें  
आयोग के संबंध में हमें  
के निमित्त आयोग के संबंध में हमें  
आना भदरी खानेपानी आयोग के संबंध में हमें  
हमारे अधिकार के संबंध में हमें  
निमित्त दिनें हमें  
के निमित्त हमें

सचिव  
श्रीका

श्रीका ठकुर  
श्रीका ठकुर  
सचिव श्रीका ठकुर

अध्यक्ष  
श्रीका

निरुद्धा ठकुर  
श्रीका ठकुर  
सचिव श्रीका ठकुर

# CONSENT LETTER FROM MR. GYANENDRA KUMAR SHIWAKOTI

## पञ्जरीनामा

१०/१०/२०७३

लिखितम इलाम जिल्ला इलाम नगरपालिका वार्ड नं. ९ बस्ने स्व. यामबहादुर शिवाकोटीको छोरा ज्ञानेन्द्रकुमार शिवाकोटी आगरे मेरो नाममा रहेको इलाम नगरपालिका वार्ड नं. ९ साविक इलाम नगरपालिका वार्ड नं. ३ख कि.नं. १०८७ क्षेत्रफल ८१।०।१ भएको जग्गा मध्येबाट ०।८।०।० भएको जग्गा इलाम बजार तेस्रो साना सहरी खानेपानी आयोजनाको पानी टंकी निर्माणको लागि हालको चलतचस्तीको दरमाजमा पछि राजीनामा पास गरि दिने शर्तमा उपलब्ध गराएको छु । भविष्यमा कुनै प्रकारले उत्सेख भए अनुसार जग्गा राजीनामा पास गरि दिने कार्यमा अवरोध गर्ने छुइन भनी निम्न ध्याक्कहरूको रोहवरमा यो कबुलियत कागजमा सहीछाप गरी इलाम नगरपालिका, इलामबजार तेस्रो साना सहरी खानेपानी उपभोक्ता संस्थालाई दिएको छु । पछि कुनै पनि प्रकारले किचोला गर्ने छुइन गरे यसै कबुलियत कागजले बदर गरि दिनु भनी यो कागजमा सहीछाप गरेको छु ।

रोहवर :

१) राजेन्द्र पौड्याल

२) एम.ए.ए. ५ खि. ३ नं. ६

३) विमेश लामा

१०/१०/२०७३

दा.

जा.

## **MINUTES OF MEETING**

आम मित्रि २०६३।४।२१ गुरुका दिन शुभम् । नार पति  
का लो नगर प्रमुख जे अहंदा करलेत थु दे-अन्धानकमा  
निम्न तालीफाको धर्ता शरीमा होइ, तस्य निम्न अनुसर  
हुनाउर तात लिखत गरियो ।

संस्कृत-संज्ञा-सूची

- [illegible]

संकेतों को विस्तृत स्वरों तथा संकेतों द्वारा निबंध प्रारंभ ।

निर्माण २०११ : आरोग्यता क्षेत्र में आरम्भिक योजना  
 १२ निर्माण क्षेत्र में आरम्भिक योजना। निर्माण क्षेत्र में आरम्भिक  
 योजना आरम्भिक योजना में आरम्भिक योजना में आरम्भिक  
 निर्माण क्षेत्र में आरम्भिक योजना में आरम्भिक योजना में  
 निर्माण क्षेत्र में आरम्भिक योजना में आरम्भिक योजना में  
 निर्माण क्षेत्र में आरम्भिक योजना में आरम्भिक योजना में  
 निर्माण क्षेत्र में आरम्भिक योजना में आरम्भिक योजना में  
 निर्माण क्षेत्र में आरम्भिक योजना में आरम्भिक योजना में

निर्देश नं. ४ :- देवकीकृत तथा स्वयंप्रियु सौते जन्मका लागी  
जन्मकाळ जन्मकालि (पापुने सौते जन्मका लागी)  
१० देखी १२ महिना स्थिति तद्विना तथा पुढील  
जन्मकालि तैदी दिनाका लागी स्थानिय स्वाभाव  
अप्रत्याप्य जन्मजन्म निर्माण गरिमा ।

निष्कर्ष :- ५।- अधिक उपलब्धता से जमीन का उपयोग और जल-  
जन्य विनाश को रोकना बाजार में लब्ध धन  
से राज्य को वापस लेना और प्रत्येक जमीन  
उपयोग के लिए जमीन का उपयोग करने में निष्पक्ष  
उत्तरदायित्व।

31/12/11  
 [Signature] [Signature] [Signature]

आम गिति २०६४/२।४९ जतेका दिने कुलामि अथा पति  
ता का अपर प्रमत्त मो मरेम कर देव ता केका पतिसा  
मिहम करि कट के अपरि मणि। देव नमो मिहम अनुमा  
हलकत ममा दिने अ मणि।

- |                  |                 |      |
|------------------|-----------------|------|
| १. गणेश प्रभु    | श्री गणेश प्रभु | १००० |
| २. लक्ष्मी       | श्री लक्ष्मी    | १००० |
| ३. श्री गणेश     | श्री गणेश       | १००० |
| ४. श्री लक्ष्मी  | श्री लक्ष्मी    | १००० |
| ५. श्री गणेश     | श्री गणेश       | १००० |
| ६. श्री लक्ष्मी  | श्री लक्ष्मी    | १००० |
| ७. श्री गणेश     | श्री गणेश       | १००० |
| ८. श्री लक्ष्मी  | श्री लक्ष्मी    | १००० |
| ९. श्री गणेश     | श्री गणेश       | १००० |
| १०. श्री लक्ष्मी | श्री लक्ष्मी    | १००० |

उत्तराखण्ड सं. ११, तहसील खाना जाड़ा आवासीय समूह

प्रश्न सं. २ : आधोपना देऊ निर्धारित स्थान पर

उत्तरा. ३. : आभोजनार्थं फलस्यैव प्रजा अभितक्षत-  
-पि । सापानिह सुखेन सख्यभावा दृष्टव्यम् ।

उत्तरां नं. ४ :- टैंगीकित्तु तथा सोताजित्तु सौं गनिका लागी  
लावकात्तु जकात्ति स्थानिय स्या तार प्राप्त  
गती सावधना ।

১২- আলাল হোসেন - সহকারী

निर्णय सं. 9 :- आयोजना को लागी ठिकैल डिप्लोमन को लागी  
नोटि आइको टेक आइकन कसलेन बाट  
संयोजन कपील को नैतृत्वमा नोटि आइको ठिकैले  
आयोजना समन्धी हलचल गरी आयोजनाको -  
विस्तार जात करी गराई सामाजिक न्याय विधिक  
सबै गर्ने निर्णय गरियो ।

निर्णय २ :- आपीजनार्थक सार्विक इलाहा आग कालिदा  
तथा हल्लो आग अ. ६, ७, ८, ९, १० को सार कमुक  
५५

03/11/20

सोफ्टवेयर विस्तार गर्ने काम सम्पन्न गर्ने निर्णय गरियो ।

निर्णय नं. १ :- कार्यक्रमको क्षेत्र भित्र आवश्यक भौतिक संरचनाहरू  
र निर्माण गर्नका लागि आवश्यक पर्ने उपकरणहरूको आवश्यकता  
को आधारमा आवश्यक पर्ने कामहरूको अनुमानित रकम  
निकासीको माध्यमबाट गर्ने गरी कामहरूको अनुमानित  
रकम निर्धारण गर्ने गरी निर्णय गरियो ।

निर्णय नं. २ :- टेक्नीकल कार्य सम्पन्न गर्ने  
कार्यहरूको अनुमानित रकम (सामग्रीको रकमको लागि)  
१० देखि १२ लाख सम्म निर्धारण गर्ने गरी  
अनुमानित रकम निर्धारण गर्ने गरी निर्णय गरियो ।

निर्णय नं. ३ :- माथि उल्लेखित कार्यहरूको रकमको  
अनुमानित रकमको निर्धारण गर्ने गरी निर्णय गरियो ।



सं. १५१

आपने प्रिंटिड २०१४/१५ के इलाख बालार तेलों  
आपने आदरी खोजीपानि तथा आदलफाई अपायेका सीमितका  
आदलका जी केदार आपा को आदलफाई तथा इलाख बालार तेलों  
आदल कापिपानिका का अनुकूल जी महेरा वल्लेजाली को अनुकूल  
आदलफाई का दोसरे बालार आदरी खोजीपानि तथा खोजीपानि  
आदलफाई को विरुद्ध दिलाइल महेरा वल्लेजाली उक्तकी  
रहा करीकत निम्न आदलफाई का निम्न मा इलाख बालार  
आदलफाई का दोसरे निम्न अनुकूलकी निम्न आदलफाई।

### इपिपानिका

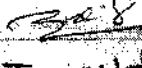
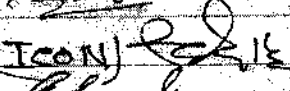
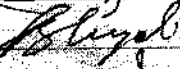
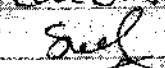
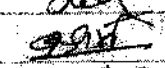
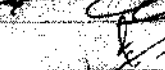
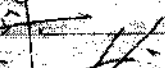
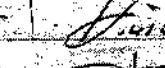
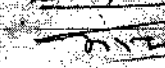
१. आदलफाई : जी केदार आपा (१५)
२. आदलफाई : जी आदलफाई (१५)
३. आदलफाई : जी निम्न आदलफाई (१५)
४. आदलफाई : जी निम्न आदलफाई (१५)
५. आदलफाई : जी निम्न आदलफाई (१५)
६. आदलफाई : जी निम्न आदलफाई (१५)
७. आदलफाई : जी निम्न आदलफाई (१५)
८. आदलफाई : जी निम्न आदलफाई (१५)

### आदलफाई

१. आदलफाई : जी महेरा वल्लेजाली (१५)
२. आदलफाई : जी आदलफाई (१५)
३. आदलफाई : जी
४. आदलफाई : जी
५. आदलफाई : जी
६. आदलफाई : जी
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८. आदलफाई : जी
९. आदलफाई : जी
१०. आदलफाई : जी
११. आदलफाई : जी
१२. आदलफाई : जी
१३. आदलफाई : जी
१४. आदलफाई : जी
१५. आदलफाई : जी



18/11/83

४४. म.प.न.३. भुवनेश्वर - म.प.न.३. भुवनेश्वर
४५. दोग दुलाल - उल्लिखी न.का. 
४६. आनन्द मल्ल - 
४७. केदार शर्मा - इ.न.पा.८ 
४८. सुभाष चandra चिप्ल - इ.न.पा.६ 
४९. धिरेन्द्र चन्द्र - 
५०. धिरेन्द्र चन्द्र - इ.न.पा.६ 
५१. सुवि सपकोरा - इ.न.पा.६ 
५२. सुभाष चन्द्र - इ.न.पा.६ 
५३. राजु राई - इ.न.पा.६ 
५४. त्रिभुवन मल्ल - गौरीवा. (ICON) 
५५. जगन्नाथ मल्ल - इ.न.पा.६ 
५६. सुवि चन्द्र - इ.न.पा.६ 
५७. सुवि चन्द्र - इ.न.पा.६ 
५८. सुवि चन्द्र - इ.न.पा.६ 
५९. सुवि चन्द्र - इ.न.पा.६ 
६०. सुवि चन्द्र - इ.न.पा.६ 
६१. सुवि चन्द्र - इ.न.पा.६ 
६२. सुवि चन्द्र - इ.न.पा.६ 
६३. सुवि चन्द्र - इ.न.पा.६ 
६४. सुवि चन्द्र - इ.न.पा.६ 
६५. सुवि चन्द्र - इ.न.पा.६ 
६६. सुवि चन्द्र - इ.न.पा.६ 
६७. सुवि चन्द्र - इ.न.पा.६ 
६८. सुवि चन्द्र - इ.न.पा.६ 
६९. सुवि चन्द्र - इ.न.पा.६ 
७०. सुवि चन्द्र - इ.न.पा.६ 
७१. सुवि चन्द्र - इ.न.पा.६ 
७२. सुवि चन्द्र - इ.न.पा.६ 
७३. सुवि चन्द्र - इ.न.पा.६ 





प्रस्तावित 2065 बैसाख 34 गते, इलाम नगर तेह्रो  
 नगरपालिका क्षेत्रको वडा सारसुपडा उपमहानगर विकास क्षेत्रको  
 विकास क्षेत्रको उपमहानगर विकास क्षेत्रको विकास क्षेत्रको  
 श्री प्रदीप प्रधान, PMO को सोसियल र्कस र्कस  
 र्कस र्कस DRMC को सामाजिक सुरक्षा विकास र्कस र्कस  
 र्कस र्कस परामर्शदाता र्कस र्कस सुरक्षा विकास र्कस र्कस  
 विकास क्षेत्रको विकास क्षेत्रको विकास क्षेत्रको विकास क्षेत्रको  
 विकास क्षेत्रको विकास क्षेत्रको विकास क्षेत्रको विकास क्षेत्रको  
 विकास क्षेत्रको विकास क्षेत्रको विकास क्षेत्रको विकास क्षेत्रको

उपस्थिति:

उपस्थित श्री विकास क्षेत्रको विकास क्षेत्रको

उपस्थित - श्री विकास क्षेत्रको विकास क्षेत्रको

उपस्थित - श्री विकास क्षेत्रको विकास क्षेत्रको

उपस्थित - श्री विकास क्षेत्रको विकास क्षेत्रको

उपस्थित - श्री विकास क्षेत्रको विकास क्षेत्रको

उपस्थित - श्री विकास क्षेत्रको विकास क्षेत्रको

उपस्थित - श्री विकास क्षेत्रको विकास क्षेत्रको

उपस्थित - श्री विकास क्षेत्रको विकास क्षेत्रको

ADB को प्रतिनिधि श्री विकास क्षेत्रको विकास क्षेत्रको

PMO को विकास क्षेत्रको विकास क्षेत्रको

DRMC को विकास क्षेत्रको विकास क्षेत्रको

परामर्शदाता विकास क्षेत्रको विकास क्षेत्रको

विकास क्षेत्रको विकास क्षेत्रको विकास क्षेत्रको

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[illegible]

10/10/1944





[illegible]

*DATE*



**ANNEX 4:**  
**SAMPLE SURVEY QUESTIONNAIRE AND CHECKLISTS**

**तेश्रो साना शहरी खानेपानी तथा सरसफाइ आयोजना  
घरधुरी सर्वेक्षण वस्तुतः प्रस्तावली  
(आयोजना प्रयोजनको लागि मात्र तथ्यांकको प्रयोग गरिनेछ)**

|                                                |                                    |
|------------------------------------------------|------------------------------------|
| नगर आयोजना <u>इलाम खानेपानी योजना</u>          | घर नं. <u>८</u>                    |
| जिल्ला <u>इलाम</u>                             | नगरपालिका/गा.वि.स. <u>इलाम</u>     |
| अन्तरवार्ता लिनेको नाम <u>दिपेन्द्र कुँजेल</u> | वडा नं. <u>६</u>                   |
| सपरिवेक्षकको नाम <u>उदित शर्मा</u>             | अन्तरवार्ता मिति <u>२०७४/०६/०२</u> |
|                                                | नोट नं. <u>८४३-८४५</u>             |

**१. सामाजिक-आर्थिक तथा अन्य विवरण**

(उपयुक्त कोठामा (✓) यो चिन्ह लगाउनुस वा आवश्यक विवरणहरू भर्नुहोस्)

- १.१ अन्तरवार्ता दिनेको नाम कुँजेल दिपेन्द्र
- १.२ घरधुरीको नाम कुँजेल दिपेन्द्र लिंग: पुरुष ☒ महिला ☐ तेस्रो लिङ्ग ☐ पेशा ☐
- परिवार सदस्य: पुरुष ४ महिला ४ तेस्रो लिङ्ग ☐ जम्मा ☐ एकल महिला घरमालि भए ☐
- १.३ यस परिवारको आर्थिक रूपमा अशक्तता भएका परिवार सदस्य संख्या: ☒
- १.४ जाति/जनजातिमध्ये कुन हो? क) ब्राह्मण ☒ ख) जनजाति ☐ ग) दलित ☐ घ) अन्य ☐
- परिवारको स्वरूप एकल ☐ संयुक्त ☒
- १.५ घर परिवारका सदस्यहरूको विवरण तलमाथि

| क्र.सं. | घरपरिवारका सदस्यको नाम | उमेर | लिंग | शिक्षा स्तर | पेशा |
|---------|------------------------|------|------|-------------|------|
| १       |                        |      |      |             |      |
| २       |                        |      |      |             |      |
| ३       |                        |      |      |             |      |
| ४       |                        |      |      |             |      |
| ५       |                        |      |      |             |      |
| ६       |                        |      |      |             |      |
| ७       |                        |      |      |             |      |
| ८       |                        |      |      |             |      |
| ९       |                        |      |      |             |      |
| १०      |                        |      |      |             |      |

नोट: पेशा १. कृषि ☒ व्यापार ३. नोकरी ४. उद्योगधन्दा ५. रेभिटेन्स (वैदेशिक रोजगार)  
६. ज्याला ७. अन्य ८. कुनै पेशा नभएका आश्रित जस्तै: विद्यार्थी, मृत्तिणी, अशक्त बृद्धाश्रयी ९. बर्ष सन्तिको सालबान्धना आदि नोट गर्ने

१.६ शिक्षा १. निरक्षर ☒ साक्षर ३. प्राथमिकसम्म ४. माध्यमिकसम्म ५. एस.एल.सी. उत्तिर्ण  
६. आई.ए. ७. वि.ए. ८. एम.ए. ९. अन्य

१.७ यस परिवारमा असोवास गर्ने अन्य सदस्यहरूको विवरण सहयोगी ☐ डेरावाज ☐ कुल संख्या ☒

१.८ यस वसत/शहरमा कहिले देखि बस्दै आउनु भएको छ? ☐ वर्ष  
स्वामी ☒ बसाइँ गरेको ☐ बसाइँ सरी आएका भए कुन जिल्लाबाट

१.९ बसाइँ गर्नेको कारण: प्राकृतिक प्रकोप ☐ व्यापार/व्यवसाय ☐ शिक्षा ☐ दन्त ☐ जिविकोपार्जन ☐

१.१० या घर आफ्नै हो? हो ☒ भाडामा बसेको ☐ अन्य ☐ भाडामा बसेको भए मासिक कति तिर्नुहुन्छ ☐

१.११ यस घरमा मान्छा कोठा बाहेक अन्य कति वटा कोठाहरू छन्?

१ कोठा ☐ २ कोठा ☐ ३ कोठा ☐ कोठा वा सो भन्दा बढी ☒

१.१२ घरको अवलोकन गरी घरको किसिम लेख्ने । पक्की ☒ पक्की ☐ कच्ची ☐

(पक्की भन्ने हो भने, भर्खर पक्की भएका घरहरूको लागि, तीनको छाना रङ्ग, स्लेट/फिफ्टी, टायल आदि कम्पनी : माटो गाढो होर टायल/छपेटले छाएको।)

१.१३ यस परिवारसँग जम्मा जमीन छ ? छ ☒ छैन ☐ छैन भने सुकम्मासीको रूपमा राख्नु पर्ने

जम्मा कति छ ४ रोपनी

१.१४ यहाले गाई/बैसी पाल्नु भएको छ ? छ ☒ छैन ☐ छ भने कतिवटा : एउटा ☐ दुवटा वा बढी ☒

१.१५ तपाईंको परिवारमा तल उल्लेखित कुन कुन सामान छ ? (भएको सामानको संख्या लेख्नु)

| क्र.सं. | सामग्री            | संख्या | कैफियत | क्र.सं. | सामग्री                | संख्या | कैफियत |
|---------|--------------------|--------|--------|---------|------------------------|--------|--------|
| १       | स्पाइकम रिमोस      | १      |        | १०      | स्टोम/समस/बुली         | १      |        |
| २       | मोटरसाइकल          | १      |        | ११      | रेफ्रिजरेटर            | १      |        |
| ३       | बैलगाडा            |        |        | १२      | क्यामिज मेसिन          |        |        |
| ४       | कार/जिप            |        |        | १३      | ट्राटोर्फिल्टर         | १      |        |
| ५       | मिनीबस/बस          |        |        | १४      | कम्प्युटर              |        |        |
| ६       | ट्याक्टर/ट्रक      |        |        | १५      | इमेल/इन्टरनेटको पहुँच  |        |        |
| ७       | रेडियो/क्यासेट     | १      |        | १६      | अन्य भए उल्लेख गर्नु । |        |        |
| ८       | टेलिभिजन/भिडियोसेट | १      |        |         |                        |        |        |

१.१६ यदि बल्ले भन्ना कृषि भए कति महिना खान पुग्छ ? ३ महिना ☐ ६ महिना ☐ ९ महिना ☐ १२ महिना ☐

यदि तपास भएमा कसरी खान्नु हुन्छ ? १ व ☐ फार ☐ २ ☐ कुरी ☐ ३ जु ☐ माथि ☐ ४ ☐ समेटेस ☐ वैदेशिक रोजगार ☐ ५ ☐ ज्याला ☐ ६ ☐ अन्य ☐

१.१७ तपाईंको परिवारको दोस्रो वार्षिक खर्च कति छ उल्लेख गर्नुहोस् । ☐

| क्र.सं. | वर्षको वार्षिक र किसिम                                                            | मासिक खर्च र | कैफियत       |
|---------|-----------------------------------------------------------------------------------|--------------|--------------|
| १       | (क) कृषि तर्फ                                                                     |              |              |
| १.१     | रसायनिक मल, विउ, किटनाशक आदि खरिद गर्न                                            |              |              |
| १.२     | माटोको ढोपारी, रोजी, सोडन, बानी काटने, भित्राउने, ढुवानी र बिक्री गर्दा हुने खर्च |              |              |
| १.३     | अन्य भए उल्लेख गर्नुस।                                                            |              |              |
|         | (क) को जम्मा                                                                      |              |              |
| २       | (ख) गृह/कृषि तर्फ                                                                 |              |              |
| २.१     | खाद्यान्न (अन्न र दैनिक उपभोग्य वस्तु)                                            |              |              |
| २.२     | कपडा                                                                              |              |              |
| २.३     | शिक्षा                                                                            |              |              |
| २.४     | घर भाडा/घर सम्बन्ध                                                                |              |              |
| २.५     | यातायात/संचार                                                                     |              |              |
| २.६     | विद्युत                                                                           |              |              |
| २.७     | पानी प्रोत/मसत सम्भार                                                             |              |              |
| २.८     | रोग/उपचार (पानीबाट हुने रोग)                                                      |              | वार्षिक खर्च |
| २.९     | आवधि/उपचार (अन्य रोग)                                                             |              | वार्षिक खर्च |
| २.१०    | अन्य चरित्तव र मर्यादा सञ्चार आदि उल्लेख गर्नु                                    |              | वार्षिक खर्च |
|         | (ख) को जम्मा                                                                      |              |              |
|         | कुल को कुल जम्मा                                                                  | २५,०००/-     |              |

१.१८ तपाईंको परिवारको औसत मासिक आय कति छ उल्लेख गर्नुहोस् ।

| क्र.सं. | वायव्योत      | समान परिवार | प्राप्त हुने वाय | कैफियत      |
|---------|---------------|-------------|------------------|-------------|
|         |               | पुरुष       | महिला            | (रु. मासिक) |
| १       | (क) कृषि तर्फ |             |                  |             |

|     |                                                             |  |  |          |  |
|-----|-------------------------------------------------------------|--|--|----------|--|
| १.१ | कृषि उत्पादनको विक्रीबाट आय (मकै, गहुँ, धान, तरकारी, फलफूल) |  |  |          |  |
| १.२ | पर्याजन्य उत्पादन (दुध, बही, घ्यू, बाख्रा, कुखुरा आदि)      |  |  |          |  |
|     | (क) को जम्मा                                                |  |  |          |  |
| २   | खा. गृह कार्य तर्फ                                          |  |  |          |  |
| २.१ | चोकरी, साँगीर                                               |  |  |          |  |
| २.२ | ज्याला मजदुरी                                               |  |  |          |  |
| २.३ | पेन्सन/उपदान आदी                                            |  |  |          |  |
| २.४ | वैदेशीक रोजगार (रमितेन्स)                                   |  |  |          |  |
| २.५ | पसल/व्यापार                                                 |  |  |          |  |
| २.६ | उपयोग                                                       |  |  |          |  |
| २.७ | पसल घर भाडा                                                 |  |  |          |  |
| २.८ | गाडी/बुक्की व्यवसाय                                         |  |  |          |  |
| २.९ | अन्य भए उल्लेख गर्ने                                        |  |  |          |  |
|     | (ख) को जम्मा                                                |  |  |          |  |
|     | क+ख कुल जम्मा                                               |  |  | ४६,८८०/- |  |

१.१९ सराईको परिवारले कुनै ऋण लिएको छ छ ☐ छैन ☒ छ भने रकम रु

## २. खानेपानी तथा सरसफाइ व्यवस्थापन

२.१ तपाईंको परिवारले पिउन, खाना पकाउनको लागि प्रयोग गर्ने पानीको स्रोत कुन हो ? दैनिक कति लिटर पानी खर्चनु हुन्छ ?  
 भण्डारण तालको कोठामा ☒ बिन्दु लगाउनुहोस् ।

| क्र.सं. | वर्षा/स्रोत                   | ✓                                   | लिटर/दैनिक | सुख्खा नाममा                  | ✓                        | लिटर/दैनिक |
|---------|-------------------------------|-------------------------------------|------------|-------------------------------|--------------------------|------------|
| १       | इनार/कुवा                     | <input type="checkbox"/>            |            | इनार/कुवा                     | <input type="checkbox"/> |            |
| २       | टयुबेल/स्याण्डपम्प/डिप टयुबेल | <input type="checkbox"/>            |            | टयुबेल/स्याण्डपम्प/डिप टयुबेल | <input type="checkbox"/> |            |
| ३       | सार्वजनिक धारा                | <input type="checkbox"/>            |            | सार्वजनिक धारा                | <input type="checkbox"/> |            |
| ४       | निजी धारा                     | <input type="checkbox"/>            |            | निजी धारा                     | <input type="checkbox"/> |            |
| ५       | मूल खोला, नदी, पोखरी          | <input checked="" type="checkbox"/> |            | मूल खोला, नदी, पोखरी          | <input type="checkbox"/> |            |
| ६       | विक्रेतासँग पानी किनेर        | <input type="checkbox"/>            |            | विक्रेतासँग पानी किनेर        | <input type="checkbox"/> |            |
| ७       | बर्षातको पानी संकलन गरेर      | <input type="checkbox"/>            |            | बर्षातको पानी संकलन गरेर      | <input type="checkbox"/> |            |
| ८       | अन्य                          | <input type="checkbox"/>            |            | अन्य                          | <input type="checkbox"/> |            |

२.२ दैनिक आवश्यक पानी आपान गर्नको लागि पानी संकलनबारे निम्न विस्तृत विवरण दिनुहोस् ।

| क्र.सं. | विवरण                               | पुरुष नाममा |       |       |       | जम्मा | महिला नाममा |       |       |       | जम्मा |
|---------|-------------------------------------|-------------|-------|-------|-------|-------|-------------|-------|-------|-------|-------|
|         |                                     | पुरुष       | महिला | बाबिक | बाबिक |       | पुरुष       | महिला | बाबिक | बाबिक |       |
| १.      | कति खेप/पटक                         |             |       |       |       |       |             |       |       |       |       |
| २.      | लिटर खेप                            |             |       |       |       | ४८५८० |             |       |       |       |       |
| ३.      | कुल परिमाण                          |             |       |       |       |       |             |       |       |       |       |
| ४.      | पानी ल्याउन लाग्ने समय (भिजेडा) खेप |             |       |       |       |       |             |       |       |       |       |
|         | • पानीको महान सम्म पुग्न            |             |       |       |       |       |             |       |       |       |       |
|         | • भोजनमा पखनु पर्ने समय             |             |       |       |       |       |             |       |       |       |       |
|         | • फर्कदा लाग्ने समय                 |             |       |       |       |       |             |       |       |       |       |
| ५.      | प्रति खेप लाग्ने समय                |             |       |       |       |       |             |       |       |       |       |

नोट: अन्तरवार्ता भित्र व्यक्तित्व पानीको भाडा हेरी खोको समुदाय भित्र गए परिमाण उल्लेख गर्ने ।

## ३. निजी धारा जडान

३.१ के तपाईंले घरमा बाह्य धारा जडान गर्नु भएको छ ? छ ☐ छैन ☒ यदि छ भने कस्ता प्रकारको छ ?

क) घरभित्र निजी धारा ☐ ख) कम्पाउण्डभित्र निजी धारा ☐ ग) सामुदायिक धारा ☐

३.२ तपाईंको घरमा प्रयोग हुने पानीको गुणस्तर कस्ता छ १) राम्रो २) ठिकै ३) खराब

३.३ के तपाई आफ्नो घरमा धारा जोड्न चाहनु हुन्छ ? चाहन्छ ☒ चाहन्न ☐

३.४ यदि तपाईको घरमा निजी धारा जडान भएको छैन भने, किन जडान नगरेको ?

क) खर्च गर्ने क्षमता नभएकोले ☐

ख) जडान शुल्क धेरै पर्ने भएकोले ☐

ग) मासिक पानी बिल धेरै आउने भएकोले ☐

घ) पानीको मात्रा पर्याप्त नभएकोले ☐

ड) पानीको आपूर्ति नियमित नभएकोले ☒

च) यस क्षेत्रमा पाइपलाइन जडान गर्ने व्यवस्था उपलब्ध नभएकोले ☐

छ) पानीको गुणस्तर राम्रो नभएकोले ☐

ज) अन्य कारण उल्लेख गर्ने ☐

म) थाहा छैन ☐

३.५ हाल तपाईले पानीधारा बापत महसुसमा पानीको महशुस तिर्दै हुनुहुन्छ ? छ ☐ छैन ☒

### सह-लगानि अवधारणा सम्बन्धी प्राथमिकता

४.१ यदि तपाईको नगरपालिका/गा वि.स. मा विभिन्न योजना सञ्चालन गर्ने रकम उपलब्ध छ भने निम्नलिखित मध्ये कुन कुन योजनालाई पहिलो प्राथमिकता दिनुहुन्छ ?

क) सडक बत्ती ☐

छ) विद्युत ☐

ख) कालापत्र सडक ☐

ज) संचार ☐

ग) विद्यालय ☐

झ) सरसफाई सुविधा ☒

घ) अस्पताल ☐

ञ) सिंचाई ☐

ड) व्यवस्थित खानपानी प्रणाली ☒

ट) माटीपाँवा घर्मेभाला ☐

च) पैदलयात्री सडक ☐

ठ) अन्य ☐

४.२ यदि तपाईको घरमा धारा छैन र निजी धारा राख्न इच्छुक हुनुहुन्छ भने, कति रकम सह-लगानी गर्न सम्मत् हुन्छ ? कृपया तल दिइएको तालिकामा निजी धारा राख्न कति रकम सम्म लगानी गर्नुहुन्छ लगानीको रकमको सीमामा ☒ चिन्ह लगाउनुहोस ।

|   |                      |                          |   |                     |                                     |
|---|----------------------|--------------------------|---|---------------------|-------------------------------------|
| १ | १५००० भन्दा माथि     | <input type="checkbox"/> | ४ | ३००१ देखि १००० सम्म | <input type="checkbox"/>            |
| २ | ९००१ देखि १५००० सम्म | <input type="checkbox"/> | ५ | १५०१ देखि ३००० सम्म | <input checked="" type="checkbox"/> |
| ३ | ६००१ देखि ९००० सम्म  | <input type="checkbox"/> | ६ | १५०० भन्दा कम       | <input type="checkbox"/>            |

४.३ निजी धारा जडान बापत लाग्ने शुल्क व्यहोर्नु प्रसन्न ? मन्जुर छ ☒ मन्जुर छैन ☐

४.४ नयाँ खानेपानी योजना शुरु भएमा आफ्नो घरमा धारा जडान गरी नयाँ नियमानुसार मासिक पानी महशुस नियमित वकफाउनु तयार हुनुहुन्छ ? ☐

छ ☒ छैन ☐ यदि इच्छुक हुनु हुन्छ भने तल दिइएको तालिकामा पानी महशुसको सीमामा ☒ चिन्ह लगाएर आफ्नो इच्छा व्यक्त गर्नुहोस ।

|   |                   |                                     |
|---|-------------------|-------------------------------------|
| १ | रु ५०० भन्दा माथि | <input type="checkbox"/>            |
| २ | रु ४५१ देखि ५००   | <input type="checkbox"/>            |
| ३ | रु ४०१ देखि ४५०   | <input type="checkbox"/>            |
| ४ | रु ३५१ देखि ४००   | <input type="checkbox"/>            |
| ५ | रु ३०१ देखि ३५०   | <input type="checkbox"/>            |
| ६ | रु २५१ देखि ३००   | <input type="checkbox"/>            |
| ७ | रु २०१ देखि २५०   | <input checked="" type="checkbox"/> |
| ८ | रु १५१ देखि २००   | <input type="checkbox"/>            |

४.५ नयाँ खानेपानी वितरण प्रणालीको व्यवस्था हुँदा तपाईंको परिवारबाट प्रतिव्यक्ति स्वरूप अग्रिम लागतको ५% रकम दिन तयार हुनु हुन्छ ? छु ☒ छैन ☐

४.६ नयाँ सरसफाई सुविधा (सामुदायिक भोचालय तथा सतही ढल) निर्माणको लागि सह लगानी स्वरूप १५% स्थानीय निकाय र उपभोक्ताले सहलगानी गर्न इच्छुक हुनुहुन्छ ? छु ☒ छैन ☐

## ५. लैङ्गिक दृष्टिकोणबाट महिला सहभागिता

(आयोजनाको विभिन्न चरणमा महिला सहभागिता सम्बन्धि जेरेलाभान्वित विपन्न वर्गको, आदिवासी, जनजाति, दलित तथा पिछाडि एका वर्गको समावेशी सहभागिता सम्बन्धि जानकारी संकलन गर्न प्रत्येक घरदेखि सोधिने प्रश्नहरू तल प्रस्तुत गरिएको छ।)

### क) महिलाहरूको उपस्थिति र सहभागिता

५.१ आयोजनाकोबारेमा छलफल गर्न कुनै बैठक बोलाईएको थियो ?

थियो ☐ थिएन ☒ थाहा भएन ☒

५.२ के आयोजनाको छनौट गर्न बैठकमा महिला उपभोक्ताहरूको उपस्थिति थियो ?

थियो ☐ थिएन ☐

यदि थियो भने, महिला उपभोक्ताहरूको भूमिका कस्तो थियो ?

सुने मात्र ☐ अन्तर्क्रियात्मक ☐ निर्णायक ☐

५.३ आयोजनाको क्रियाकलापहरूको रेखदेख गर्न के खानेपानी उपभोक्ता तथा सरसफाई

समिति/संस्था गठन भएको छ ? छ ☐ छैन थाहा छैन ☐

### ख) लैङ्गिकताका आधारमा कार्य विभाजन

५.४ तलको तालिकामा दिइएको कामहरूअक्सर कस्ले गर्ने गर्दछ ? (✓) चिन्ह लगाउनुस् (दैनिक घण्टामा)

| क्र.सं. | घरायसी क्रियाकलापहरू              | पुरुष | महिला | कुल समय |
|---------|-----------------------------------|-------|-------|---------|
| १       | खानेपानी भर्ने, बोक्ने, भण्डारण   |       | ✓     |         |
| २       | भान्सा तयार गर्ने भाँडा माथुन     |       | ✓     |         |
| ३       | बालबालिका र वृद्धवृद्धाको स्याहार |       | ✓     |         |
| ४       | लगा धुने घर सफा गर्ने             |       | ✓     |         |
| ५       | खाद्यान्न भण्डारण तथा तयारी       |       | ✓     |         |
| ६       | अन्य                              |       |       |         |

### ग) पारिवारिक व्यवस्थापन, आय श्रोत र अन्य विषयमा महिलाहरूको नियन्त्रण र पहुँच

५.५ तलको तालिकामा उल्लेखित पारिवारिक विषय वा क्षेत्रहरूमा निर्णय गर्दा यहाँको घर पारिवारमा महिलाको भनाई सुनवाई हुन्छ ? उपयुक्त कोठामा (✓) चिन्ह लगाउनुस्

| क्र.सं. | विषय वा कार्यक्षेत्रहरू                                                             | हुन्छ (✓) | हदैन (✓) |
|---------|-------------------------------------------------------------------------------------|-----------|----------|
| १       | आर्थिक सरोकारका कुराहरू                                                             | ✓         |          |
| २       | केटाकेटीको शिक्षा शिक्षा                                                            | ✓         |          |
| ३       | केटाकेटी र वृद्धवृद्धाको स्वास्थ्य र स्याहार                                        | ✓         |          |
| ४       | अचल सम्पत्ति किनबेच (घर जग्गा)                                                      | ✓         |          |
| ५       | दैनिक क्रियाकलापहरू                                                                 | ✓         |          |
| ६       | सामाजिक विधि व्यवहार, विवाह, बर्तवन्ध, चाडपर्व तथा सामाजिक/पारिवारिक सुसम्बन्धन आदि | ✓         |          |
| ७       | अन्य                                                                                |           |          |

५.६ यहाँको परिवारमा पारिवारिक सम्पत्तिको निम्न विषयमा महिलाको पहुँच र स्वामित्व रहेको छ/छैन तलको तालिकामा उपयुक्त कोठामा (✓) चिन्ह लगाउनुस्

| क्र.सं. | विषय                   | पहुँच | स्वामित्व |
|---------|------------------------|-------|-----------|
| १       | जग्गा जमिन             |       |           |
| २       | घर तथा अन्य संरचनाहरू  |       |           |
| ३       | चल सम्पत्ति/संचित पैसा | ✓     |           |
| ४       | दैनिक क्रियाकलापहरू    | ✓     |           |
| ५       | अन्य                   |       |           |

घ) खा.पा.उ.स.स. तथा समुदायमा महिलाको स्तर (हसियत) निम्न बुदाहरू फोर्केस गुप छलफलको आधारमा जानकारी लिएर रिपोर्ट गर्नुपर्नेछ।

| क्र.सं. | विषय                             | उच्च | मध्यम | निम्न |
|---------|----------------------------------|------|-------|-------|
| १       | आत्मसम्मानबोध                    | ✓    |       |       |
| २       | आत्मविश्वास/नेतृत्व शीप          | ✓    |       |       |
| ३       | दायित्वबोध र क्षमता              |      | ✓     |       |
| ४       | ल्याकत, तर्क संगत, धैर्य र मेहनत |      | ✓     |       |
| ५       | अन्य                             |      |       |       |

## ६. सम विकासमा पहुँचका आधारमा सामाजिक समावेशी सहभागिता

क) आयोजना क्रियाकलापमा गैरलाभान्वित विपन्न वर्गहरु, पिछडाएका वर्ग, जातजाति, बलित, अपाङ्गता भएका व्यक्तिको उपस्थिति

६.१ आयोजनाकोचारेमा छलफल गर्ने कुनै भेला/बैठकमा समावेशी तवरले बोलाइएको थियो ?  
थियो ☐ थिएन ☐ थाहा छैन ☐

६.२ के आयोजनाको छनोट गर्न बैठकमा समावेशीताको आधारमा सहभागीहरुको उपस्थिति थियो ?  
थियो ☐ थिएन ☐

६.३ के खा.पा.उ.स.स.को गठनमा समावेशीता अंगीकार भएको थियो? थियो ☐ थिएन ☐

ख) निर्णय प्रक्रियामा समावेशी प्रकृया अपनाइएको थियो ?

६.४ आयोजना छनोट गर्न जातजातिहरुको कस्तो भूमिका कस्तो थियो ?  
उच्च ☐ मध्यम ☐ निम्न ☐

६.५ साना सहर/खानेपानी आयोजना कायम/व्ययन गर्न सामाजिक समावेशी आधारमा उपभोक्ताहरुको परिचालन गर्न भएको प्रयास कस्तो थियो? राम्रो ☐ मध्यम ☒ निम्न ☐

## ७. स्वास्थ्य र सरसफाई

क) खानेपानी

१ तपाईंको विचारमा पानीको गुणस्तर तराई (खराब) भएमा के समस्याहरु देखिन सक्छ ?  
(एक भन्दा बढी उत्तर आउन सक्ने)

१.१ दुर्गन्ध आउने / नमिठो स्वाद ☒ १.२ रस विभिन्न/खीने ☒  
१.३ बिरामी बनाउने ☒ १.४ अन्य (उल्लेख गर्नु)

२ के तपाईंलाई पानी भर्ने र राख्ने भाँडो पानी भर्नु र भण्डार गर्नु पूर्व सफा गर्नुपर्छ भन्ने थाहा छ ☒ छैन ☐

यदि छ भने, पानी राख्ने भाँडो कसरी सफा गर्नु हुन्छ ?

२.१ खाँची भाँडा मात्रले ☐ २.२ खरानी पानीले ☐ २.३ भुस/पिछो र पानीले ☐  
२.४ साबुन पानीले ☒ २.५ अन्य (उल्लेख गर्नुस्)

३ तपाईं घरमा पानी कसरी राख्नु हुन्छ ?

(एक भन्दा बढी उत्तर आउन सक्ने)

३.१) पानी भर्ने पहिले भाँडा सफा गर्ने ☒

३.२) बासी पानी फर्काउने ☐

३.३) पानी राख्ने भाँडा राम्रोसँग ढाकेर/छोपेर राख्ने ☒

३.४) अन्य (उल्लेख गर्ने) ☐

गर्ने)

तपाईं गाग्री वा छैटोबाट पानी कसरी निकाल्नुहुन्छ ?

४.१) पानी सार्ने अर्घि अर्खोरा, लोटा, करुवा मग धोएर ☐

४.२) गिलास, मग, कप गाग्रीमा डुवाएर ☐

४.३) गाग्रीबाट लोटा, अर्खोरा, करुवा गिलासमा पानी सारेर ☒

४.४) अन्य (उल्लेख गर्ने) ☐

## ख. चर्पी

१. के तपाईंको घरमा चर्पी छ ? ☒ छैन ☐ (हैन भने १.३ जाने)

१.१) यदि छ भने, कस्तो प्रकारको चर्पी छ ☐

१) खाल्डो चर्पी ☐

४) सिस्टम फलस ☐

२) भन्टिलेटेड खाल्डो चर्पी ☐

५) अन्य ☐

३) बाहिर सिल/पोर फलस ☐

यदि छ भने, तपाईंको घरमा चर्पी कसकसले प्रयोग गर्नुहुन्छ ? ☐

१) खेत २) बच्चा बाहेक सबैले ३) बयस्क ४) दोहल मात्र ५) तिरामी मात्रैले

यदि छैन भने, दिमाग्दारी गर्ने कहाँ जान्नुहुन्छ ? ☐

(के खोला/मझ/किनार ख. खुल्ला मैदान/ठाउँ गा. घर सडक छेउ घ. जहाँ सजिलो हुन्छ)

१.४) के तपाईंको समुदाय खुल्लदिसामुक्त क्षेत्र घोषणा भएको छ ? ☒ छैन ☐

## ग. खानेकुराको सरसफाइ

१. खाद्यपदार्थ दोषित हुनबाट कसरी बचाउनुहुन्छ ? (एक भन्दा बढी उत्तर आउन सक्ने)

१.१) पकाएको खाना छोपेर/ढाकेर राख्ने ☒

१.२) सफा हातले खाना पस्कने गर्नाले ☒

१.३) काँचै खाइने खानेकुरा राम्रोसँग मखालेर छोपेर ☒

१.४) हाल गोडा सफा गरेर मात्र खानेकुरा पसेर ☒

१.५) धेरै बासी वा सडे रालेका खाना, फलफूल बियजन गर्ने ☒

१.६) डाड् पन्य थाल/भाँडोकडा सफा गरेर मात्र खाना पस्कने/खाते ☒

१.७) कुला/चौकी पकाउने भाँडा, ठकनहरू सफा राख्ने ☒

२. के तपाईं खानेकुरा छोपेर/ढाकेर राख्नुहुन्छ ?

राख्छु ☒

राख्दिन ☐

घ. व्यक्तिगत सरसफाइ (प्रत्येकको संख्या अनुसार क्याकलापमा टिक चिन्ह लगाएर संख्या राख्ने । जस्तो

चारजनाको परिवार भए हरेक क्याकलापमा टिक सहित चारको संख्या आउनुपर्ने

१. तपाईं र परिवारका अन्य सदस्यले कहिले र के गरेपछि हात धुनुहुन्छ ? धुने भए यस्तो (✓) चिन्ह लगाउनुहोस् र

नधुने भए यस्तो (✗) चिन्ह लगाउनुहोस् । (एक भन्दा बढी उत्तर आउन सक्ने)

| संख्या | क्याकलापमा टिक चिन्ह लगाउनुहोस् | संख्या | क्याकलापमा टिक चिन्ह लगाउनुहोस् |
|--------|---------------------------------|--------|---------------------------------|
| १      | खाना खाने अघि                   | ५      | खाना खाएपछि                     |
| २      | खाना खाएपछि                     | ६      | दिमाग्दारी                      |
| ३      | दिमाग्दारी                      | ७      | फोहर मैला छाँडपछि               |
| ४      | फोहर मैला छाँडपछि               |        |                                 |

|   |                                       |  |  |                                     |  |                                     |  |
|---|---------------------------------------|--|--|-------------------------------------|--|-------------------------------------|--|
| ४ | कामबाट फर्केपछि                       |  |  | <input checked="" type="checkbox"/> |  | <input checked="" type="checkbox"/> |  |
| ५ | केटाकेटीलाई हिमा<br>पिसाव गराइ सकेपछि |  |  | <input checked="" type="checkbox"/> |  | <input checked="" type="checkbox"/> |  |
| ७ | अन्य (उल्लेख गर्ने)                   |  |  |                                     |  |                                     |  |

२. तपाईं र परिवारका अन्य सदस्यले के ले हात धुनुहुन्छ ? धुनेमा यस्तो ☒ चिन्ह लगाउनुहोस् र नधुनेमा यस्तो ☐ चिन्ह लगाउनुहोस् ।

|       |                     |  |  |                                     |  |                                     |  |
|-------|---------------------|--|--|-------------------------------------|--|-------------------------------------|--|
| १     | पानी मात्रै         |  |  |                                     |  |                                     |  |
| २     | खरानी पानी          |  |  |                                     |  |                                     |  |
| ३     | भस्म/पिठो पानी      |  |  |                                     |  |                                     |  |
| ४     | साबुन पानी          |  |  | <input checked="" type="checkbox"/> |  | <input checked="" type="checkbox"/> |  |
| ५     | अन्य (उल्लेख गर्ने) |  |  |                                     |  |                                     |  |
| जम्मा |                     |  |  |                                     |  |                                     |  |

३. तपाईं र परिवारका अन्य सदस्यले कहिले कहिले नुहाउनुहुन्छ ?  
नुहाउने भए यस्तो ☒ चिन्ह लगाउनुहोस् र ननुहाउने भए यस्तो ☐ चिन्ह लगाउनुहोस् ।

|       |                  |  |  |                                     |  |  |                                     |
|-------|------------------|--|--|-------------------------------------|--|--|-------------------------------------|
| १     | प्रत्येक दिन     |  |  |                                     |  |  |                                     |
| २     | एक दिन बिराप्पेर |  |  |                                     |  |  | <input checked="" type="checkbox"/> |
| ३     | हप्तामा २ पटक    |  |  | <input checked="" type="checkbox"/> |  |  |                                     |
| ४     | हप्तामा १ पटक    |  |  |                                     |  |  |                                     |
| ५     | २ हप्तामा १ पटक  |  |  |                                     |  |  |                                     |
| ६     | महिनामा एक पटक   |  |  |                                     |  |  |                                     |
| जम्मा |                  |  |  |                                     |  |  |                                     |

#### ६. फोहर मैला व्यवस्थापन

१. तपाईंको घरबाट निस्कने ठोस फोहर मैला कहाँ बिसर्जन गर्नुहुन्छ ?  
१.१ घर नजिक खाँडोमा ☒ १.२ निजी फोहर संकलनकर्तालाई दिने ☐  
१.३ गा.वि.स. नगरपालिकाले व्यवस्था गरेको खाँडो वा क्यानमा ☐ १.४ अन्य (उल्लेख गर्ने) ☐  
२. ठोस तथा तरल फोहर बस्तुलाई अव्यवस्थित तरिकाले बिसर्जन गर्नाले हुने नराम्रा असरहरूको के हुन् ? (एक भन्दा बढी उत्तर आउन सक्ने)  
२.१ फोहोर बाष्पावस्था बृद्धि ☒ २.२ बासिखुट्टे, भिँगा, किराहरूको बृद्धि ☒  
२.३ रोग सन्तमा बृद्धि ☒ २.४ अन्य (उल्लेख गर्ने) ☐  
३. तपाईंको घरबाट निस्कने फोहर पानी कहाँ बिसर्जन गर्नुहुन्छ ?  
३.१ खारमा (Soak pit) ☐ ३.२ सरकारी बारीमा/करसा बारीमा ☒  
३.३ सार्वजनिक ढलमा ☐ ३.४ अन्य (उल्लेख गर्ने) ☐

#### ७. बस्तुभाउको फोहर व्यवस्थापन

१. के तपाईंले बस्तुभाउ पाल्नु भएको छ ? छ ☒ छैन ☐ छैन भने पानी जस्तै सुरुवात रोपमा जाने।  
यदि छ भने कुन कुन प्रकारका छन ? तिनोहरूलाई कहाँ राख्नु हुन्छ ?

|   |          |  |  |                                     |  |  |  |
|---|----------|--|--|-------------------------------------|--|--|--|
| १ | गाई/जेरा |  |  | <input checked="" type="checkbox"/> |  |  |  |
| २ | बगर/सगर  |  |  |                                     |  |  |  |
| ३ | बाख्रा   |  |  |                                     |  |  |  |

|   |           |  |
|---|-----------|--|
| ४ | कक्षा/हाम |  |
| ५ | अन्य      |  |

२. बस्तुभाउबाट निस्कने फोहोर कहाँ र कसरी विसर्जन गर्नुहुन्छ ?

- २.१ मलखादमा ☐ २.२ भागी बाल्ने/गुईठा बनाउने ☒  
 २.३ गोबर ग्यास प्लान्टमा प्रयोग गर्ने ☐ २.४ अन्य (उल्लेख गर्ने) ☐

३. बस्तुभाउको फोहोर मैलाको जथाभावी अव्यवस्थित तवरले विसर्जन गर्दा हुने खराब असरहरू के हुन् ? (एक भन्दा बढी उत्तर आउन सक्ने)

- ३.१ वातावरणीय फोहोरमा वृद्धि हुने ☒ ३.२ लाभखुट्टे, फिगा, किराहरूको वृद्धि हुने ☒  
 ३.३ रोगव्याधि बढ्ने तथा सन् ☒ ३.४ गाँउ, छराछमेक तथा नगर अव्यवस्थित देखिने ☒  
 ३.५ अन्य (उल्लेख गर्ने) ☐

छ. सेफ्टेज (फोहोरलेदो) व्यवस्थापन (चापबाट सेफ्टीट्याकमा जम्मा भएको फोहोरलेदो यस प्रश्नहरू सहित)

१०. चापबाट विसर्जित मलसमुच्च व्यवस्थापन (जम्मा) कहाँ गर्ने गरेको छ ?

- १०.१ ☒ रिङ्ग खान्डा ☐ सेफ्टी ट्याक ☐ अन्य ☐

२) तौ सेफ्टी ट्याक/खान्डाको क्षमता कति (ठूला सानो साइज) छ ?

- २) मलसम्म कहिल्यै सफा गर्ने भएको छ ? छ ☒ छैन ☐ छुपने कति वर्षमा भरियो ? ☐

सफागर्न कति रकम तिर्नु भयो ? रु.

४) सेफ्टी ट्याकबाट निस्कने फोहोर प्रशोधन पछि मलका रूपमा प्रयोग गर्ने तयार हुनुहुन्छ ? छ ☒ छैन ☐

५) सेफ्टी ट्याकबाट निस्कने फोहोर सफागर्न कतिसम्म रकम तिर्न तयार हुनुहुन्छ ? छ ☐ छैन ☐

६) १ तिर्न तयार भए कतिसम्म तिर्नुहुन्छ ? रु. २००० सम्म ☒ रु. २००० माथि ☐

७. तपाईंको घरबाट सेफ्टीट्याकमा जम्मा भएको फोहोर लेदो (सेफ्टेज) कसरी थाक्नु गर्नुहुन्छ ?

- ७.१ आफैँ सफा गर्ने ☐ ७.२ सफागर्ने मान्छे प्रयोग गर्ने ☒ ७.३ व्यवस्थित कम्पनीको सेवासित ☐ ७.४ अन्य ☐

८. सेफ्टेज/फोहोर लेदो कहाँ व्यवस्थित गर्ने गरेको छ ?

- ८.१ खुल्ला ठाउँमा ☐ ८.२ खोला/नाला, खोल्सा/खोल्सीमा ☐ ८.३ वन/जंगल/सार्वजनिक स्थानमा ☐ ८.४ सडक बाटो छुट्याउ ☐ ८.५ अनुकुल अनुसार ☒ ८.६ अन्य ☐

९. सेफ्टेज/फोहोर लेदो व्यवस्थान सुधार गर्न चाहनुहुन्छ ? चाहान्छ ☒ चाहान्छ ☐

१०. सेफ्टेज/फोहोर लेदो व्यवस्थान सुधार गर्दा के गर्न चाहान्नु हुन्छ ?

- १०.१ सेफ्टीट्याक बनाउने ☒ १०.२ भागको सेफ्टीट्याक/चर्पीको खान्डा सुधार गर्ने ☐

१०.३ तपाईंको चर्पीबाट ढल जोडी सामुहिक रूपमा सेफ्टेज प्रशोधन प्रणाली व्यवस्थापन गरे सेवासित तयार हुनुहुन्छ ?

- १०.४ अन्य (उल्लेख गर्ने) ☐

१०.५ सुधार गर्ने कति रकम सम्म लगानी गर्न ईच्छा छ ? सुधार तौ गर्ने रु.

ज. शारीरिक/अन्य सरुवा रोगहरू

१. शारीरिक/अन्य सरुवा रोगको कारणहरू के हुन् ? (एक भन्दा बढी उत्तर आउन सक्ने)

- १.१ दूषित पानी प्रयोग गर्दा ☒ १.२ दूषित खाना खाँदा ☒

- १.३ घर तथा सार्वजनिक स्थलमा फोहोर बढ्नाले ☒ १.४ भान्सोको मलमूत्र जथाभावी विसर्जन गर्नाले ☒

- १.५ फोहोर मैला जथाभावी फर्काउने गर्दा ☒ १.६ स्वास्थ्य शिक्षा तथा स्वस्थ बानीको अभाव ☒

- १.७ सरसफाई र स्वास्थ्य सम्बन्धी ज्ञान र चेतनाको अभावले ☒ १.८ अन्य ☐

२. तपाईंको परिवारमा कोही घिरामी परेता के गर्नुहुन्छ ? प्राथमिकता अनुसार तम्बर लेख्ने

- २.१ घरायसी उपचार गर्ने ☐ २.२ धामी, भाँकी, पुजारी कहाँ लाने ☐  
 २.३ औषधि पसलमा जाने ☒ २.४ स्वास्थ्य चौक वा अस्पतालमा जाने ☒  
 २.५ अन्य (उल्लेख गर्ने)

३. यदि परिवारमा कसैलाई फाडापखाला लागेमा के गर्नुहुन्छ ? (प्राथमिकता अनुसार नम्बर लेख्ने)

- ३.१ जीवनजल खुवाउने ☒ ३.२ घरायसी उपचार गर्ने ☐  
 ३.३ धामी, भाँकी वा पुजारी कहाँ जाने ☐ ३.४ औषधि पसलमा जाने ☐  
 ३.५ स्वास्थ्य चौक वा अस्पतालमा जाने ☒ ३.६ अन्य (उल्लेख गर्ने)

४. गत एक सालभित्रमा तपाईंको परिवारका सदस्यहरु फाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरुबाट प्रभावित थिए ?  
 प्रभावित भएका भए कति जना थिए तलको तालिकामा सय्यौटाट गर्ने ।

| क्र.सं. | नाम                        | फाडापखाला | आउ | पानीजन्य अन्य सरुवा रोगहरु | जम्मा |
|---------|----------------------------|-----------|----|----------------------------|-------|
| १       | फाडापखाला                  |           |    |                            |       |
| २       | आउ                         |           |    |                            |       |
| ३       | पानीजन्य अन्य सरुवा रोगहरु |           |    |                            |       |
| ४       | टोइफाइड                    |           |    |                            |       |
| ५       | होला                       |           |    |                            |       |
| ६       | छाना सम्बन्धी रोग          |           |    |                            |       |
| ७       | ओलोरोग (सलेरिया)           |           |    |                            |       |
| ८       | कमलपित्त (जण्डिस)          |           |    |                            |       |
| ९       | अन्य                       |           |    |                            |       |
|         | जम्मा                      |           |    |                            |       |

५. गत एक वर्षभित्र तपाईंको परिवारमा फाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरुबाट कसैको मृत्यु भएको छ ? (मृत्यु भएकाले अवस्था)

| क्र.सं. | नाम                        | फाडापखाला | आउ | पानीजन्य अन्य सरुवा रोगहरु | जम्मा |
|---------|----------------------------|-----------|----|----------------------------|-------|
| १       | फाडापखाला                  |           |    |                            |       |
| २       | आउ                         |           |    |                            |       |
| ३       | पानीजन्य अन्य सरुवा रोगहरु |           |    |                            |       |
| ४       | टोइफाइड                    |           |    |                            |       |
| ५       | होला                       |           |    |                            |       |
| ६       | छाना सम्बन्धी रोग          |           |    |                            |       |
| ७       | ओलोरोग (सलेरिया)           |           |    |                            |       |
| ८       | कमलपित्त (जण्डिस)          |           |    |                            |       |
| ९       | अन्य                       |           |    |                            |       |
|         | जम्मा                      |           |    |                            |       |

६. गत एक वर्षभित्र तपाईंको परिवारका सदस्यलाई फाडापखाला र पानीजन्य अन्य सरुवा रोगहरुका उपचारमा कति रकम खर्च गर्नु भयो ?

| क्र.सं. | नाम                        | फाडापखाला | आउ | पानीजन्य अन्य सरुवा रोगहरु | जम्मा |
|---------|----------------------------|-----------|----|----------------------------|-------|
| १       | फाडापखाला                  |           |    |                            |       |
| २       | आउ                         |           |    |                            |       |
| ३       | पानीजन्य अन्य सरुवा रोगहरु |           |    |                            |       |
| ४       | टोइफाइड                    |           |    |                            |       |
| ५       | होला                       |           |    |                            |       |
| ६       | छाना सम्बन्धी रोग          |           |    |                            |       |
| ७       | ओलोरोग (सलेरिया)           |           |    |                            |       |
| ८       | कमलपित्त (जण्डिस)          |           |    |                            |       |
| ९       | अन्य                       |           |    |                            |       |
|         | जम्मा                      |           |    |                            |       |

अन्यबाधः

**Checklist for Physico-Chemical Environment**

| <b>Parameters</b>             | <b>Description</b>                                                                                                                                                 |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topography                    | Hilly region with gentle slopes                                                                                                                                    |
| Geology (Rock and Soil Types) | Precambrian to Cambrian Kyanite and sillimanite bearing genesis, biotite schist, Metaquartzite, amphibolites, calc-silicate genesis, orthogenesis and angiogenesis |
| Erosion and Sedimentation     | No such events recorded and observed                                                                                                                               |
| Climate                       | Warm temperate or sub-tropical                                                                                                                                     |
| Quarry Sites (If any)         | No                                                                                                                                                                 |
| Land Use                      | Agricultural land is the dominant followed by forests and residential areas.                                                                                       |
| Air Quality                   | Not that severe                                                                                                                                                    |
| Water Quality                 | Moderate                                                                                                                                                           |
| Noise Level                   | Not that severe                                                                                                                                                    |
| Drainage Network              | No proper drainage system                                                                                                                                          |

**CHECKLIST OF BIOLOGICAL ENVIRONMENT**

Project: Ilam WSSP

**CHECKLIST OF FLORA/PLANT LIFE FORMS**

Date: September 07, 2017

| S.No. | Name of plants | Uses      |        |          | Others                                                 |
|-------|----------------|-----------|--------|----------|--------------------------------------------------------|
|       |                | Fuel-wood | Fodder | Medicine |                                                        |
| 1.    | Ainseke        |           |        | ✓        | Fruits, Agroforestry                                   |
| 2.    | Amala          | ✓         |        | ✓        | Edible Fruits                                          |
| 3.    | Angeri         | ✓         |        | ✓        |                                                        |
| 4.    | Asuro          |           |        | ✓        |                                                        |
| 5.    | Aule Chaup     |           |        | ✓        | Edible Fruits, Agroforestry, Flowers for oil & perfume |
| 6.    | Bakaino        |           |        | ✓        | Edible Fruits, Agroforestry                            |
| 7.    | Ban Gahat      |           |        | ✓        | Agroforestry                                           |
| 8.    | Bar            |           |        | ✓        | Edible Fruits, Agroforestry                            |
| 9.    | Barro          |           |        | ✓        | Fruits                                                 |
| 10.   | Bel            |           |        | ✓        | Fruits, Agroforestry, Religious                        |
| 11.   | Bholayo        |           |        |          | Edible Oil                                             |
| 12.   | Bhote Peepot   | ✓         | ✓      | ✓        | Paper, Manufacture                                     |
| 13.   | Bot Dhayara    |           |        |          | Edible gum, Carpentry, Black dye                       |
| 14.   | Chilaune       |           |        | ✓        | Agroforestry, Dyeing                                   |
| 15.   | Chiuri         | ✓         |        | ✓        | Edible Fruits, Agroforestry                            |
| 16.   | Chutro         |           |        | ✓        | Fruits, Dyeing, Alcohol Dist.                          |
| 17.   | Daar           | ✓         |        |          | Fruits for flavoring                                   |
| 18.   | Dabdabe        |           |        |          | Edible Fruits, Agroforestry                            |
| 19.   | Dhabini        |           |        | ✓        | Solid Vegetables " "                                   |
| 20.   | Dhaurse        |           |        | ✓        |                                                        |
| 21.   | Guthi Tarul    |           |        | ✓        | Edible Tubers                                          |
| 22.   | Guesle         | ✓         |        | ✓        | Edible Fruits                                          |
| 23.   | Hallunde       |           |        | ✓        | Edible leaves, Agroforestry                            |
| 24.   | Harro          |           |        | ✓        | Edible Fruits, Dyeing                                  |
| 25.   | Jamun          | ✓         |        | ✓        | Edible Fruits, Agroforestry                            |
| 26.   | Thankri Syaula | ✓         |        |          | Agroforestry                                           |
| 27.   | Kabru (Seti)   |           |        | ✓        |                                                        |
| 28.   | Kopal          |           |        | ✓        | Edible Fruits, Agroforestry                            |
| 29.   | Karcom / Karma |           |        | ✓        |                                                        |
| 30.   | Kabus          | ✓         |        |          | Edible Seeds, Furniture Making                         |
| 31.   | Khair          | ✓         | ✓      | ✓        | Edible Seeds, Dyeing, Tanning                          |
| 32.   | Khangyo        |           |        | ✓        | Edible Fruits                                          |
| 33.   | Khirro         |           |        | ✓        |                                                        |
| 34.   | Kimbui         | ✓         |        | ✓        | Edible Fruits, Agroforestry                            |
| 35.   | Kumbhi         |           |        | ✓        | Edible Oil from seeds                                  |
| 36.   | Kusum          | ✓         |        | ✓        | Edible " " Edible                                      |
| 37.   | Kutmero        |           |        | ✓        | Furniture, Industrial purpose                          |
| 38.   | Lampate        |           |        |          | Edible Fruits, Furniture                               |



Notes:

Project: Ilam WSSP

## CHECKLIST OF BIRDS

Date: September 07, 2017

| S.No. | Birds                   | Remarks |
|-------|-------------------------|---------|
| 1.    | Dacotia Chil            |         |
| 2.    | Chilime                 |         |
| 3.    | Basanta                 |         |
| 4.    | Malaha Huchid           |         |
| 5.    | Kalpechak               |         |
| 6.    | Koili                   |         |
| 7.    | Gatke Lotokosero        |         |
| 8.    | Purna                   |         |
| 9.    | Dongre Rupai            |         |
| 10.   | Battai                  |         |
| 11.   | Nyauli                  |         |
| 12.   | Ghar Bhaygera           |         |
| 13.   | Kafal Pakyo             |         |
| 14.   | Maryus                  |         |
| 15.   | Kali                    |         |
| 16.   | Kaale Kaag              |         |
| 17.   | Pahadi Bui Kuliyo       |         |
| 18.   | Lompuchire Chaiti Shara |         |
| 19.   | Sone Ranz               |         |
| 20.   | Tame Dhukur             |         |
| 21.   | Tuisi Suga              |         |
| 22.   | Luinche                 |         |
| 23.   | Jureli                  |         |
| 24.   | Sanatame Bananchie      |         |
| 25.   | Gobre Chochar           |         |
| 26.   | Kode Bhyakur            |         |
| 27.   | beri Papi Garud         |         |
| 28.   | Pitnuhar chichilkote    |         |
| 29.   | Munaf                   |         |

Note: .....

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Project: Tam WSP

### CHECKLIST OF REPTILES, AMPHIBIANS & FISHES

Date: September 07, 2017

| S.No. | Reptiles, Amphibians & Fishes                                                                                  | Remarks |
|-------|----------------------------------------------------------------------------------------------------------------|---------|
| 1.    | Reptiles : Moryou, Adloo Sarpa, Chhurbire Sarpa, Chhepara, Mausuli                                             |         |
| 2.    | Amphibians : Lekholi Khasre Bhyaguto, Ahale Bhyaguto                                                           |         |
| 3.    | Fishes :<br>Asala<br>Churcin Buduna<br>Faketa<br>Kasre<br>Kalle<br>Singli<br>Gradela<br>Tite<br>Hile<br>Safars |         |

Note:

## CHECKLISTS FOR FOCUS GROUP DISCUSSION

### A. FOCUS GROUP DISCUSSION -1

Date: 06 September, 2017

Project: Ilam Water Supply & Sanitation Project

Venue: Ilam Municipality Office

Number of Participants: 8

Purpose Statement: Information Dissemination to the participants regarding UWSSSP,  
Discussions regarding the proposed project and Roles &  
Responsibilities of various Stakeholders

#### Questions:

1. Do you know about Urban Water Supply & Sanitation (Sector) Project? If yes, can you please share the information you know about this project?
2. How do you feel about the project proposed in your town? Do you think that this proposed project is important for your town?
3. How familiar are you with the term "Environment"?
4. Are there any community forests and protected areas within this project area?
5. Do you have any idea about the environmental concerns regarding the proposed project?
6. Do you have any objection regarding the project activities that will be carried out at core bazaar area?
7. As a stakeholder, how can you contribute from your side to minimize the anticipated environmental issues?
8. Lastly, what would you say are the most important issues you would like to express about this project?

  
Engineer



## FINDINGS OF EACH QUESTIONS/ISSUES RAISED

1. All the participants are aware about the proposed project.
2. According to the participants, they are in need of the improved water supply system as they are facing hardship of water for years. Thus, they expect this proposed project to improve the existing water system.
3. The participants are also found aware about the environment.
4. No such protected areas are known to be existing within the project area. However, it is known that few community forests falls within the project area.
5. Their main concerns regarding the environmental aspects are Dust Emissions, Water Quality, Noise Pollution, Community Forest Conservation, Traffic Congestion, Obstruction to the vendors & passersby, Damage to the existing facilities and Construction Waste & Solid Waste Management during construction period. They are also concerned about effective operation & management and anticipated leakage problems during operation phase.
6. They stated "No Objection" regarding the project activities that will be carried out at core bazaar area. However, they urged to carry out the project activities at this area with proper care and prompt actions regarding excavation & backfilling works.
7. After assuring about the mitigation measures for the environmental concerns they raised, they committed to contribute to support safeguard implementation of the proposed project.
8. Their positive response towards the implementation of the proposed project indicates Willingness to Pay for this project. The most important issue they raised about the proposed project is the assurance for the provision of safe, reliable and sufficient water supply system.



*[Signature]*  
Engineer



## B. FOCUS GROUP DISCUSSION -2

Date: 14 September, 2017

Project: Ilam Water Supply & Sanitation Project

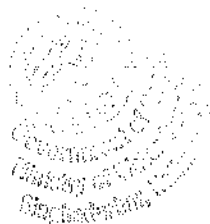
Venue: DCC, Ilam Hall

Number of Participants: 8

Purpose Statement: Information Dissemination to the participants regarding preparation of technical & social survey works, Discussions regarding the proposed project and Roles & Responsibilities of various Stakeholders

### Questions/Issues:

1. You must be familiar with UWSSSP as we had already discussed about it in our earlier discussion program dated September 06, 2017. Now, we are here to carry out technical & survey works of the proposed project. Do you have to say anything regarding this?
2. The issue raised regarding service area is not now possible to consider as the service area has already been delineated earlier in consultation with WUSC & local community and for your information we have already discussed about it during our earlier discussion program also. But, we assure you that all the parts of the proposed service area will not be missed out during our survey. During survey, we urged all of you to provide full support.
3. Our design shows that project components like RVt1 & Small Guard House need to be constructed within Gumba Danda community forest area. Hence, during survey, we want you to help us to establish coordination with the concerned community forest users group.
4. We are happy that you all are very aware of the conservation of the community forests. We are pleased to inform that our design does not involve any kind of destructive works within the community forest areas.
5. As we have already discussed about the environmental concerns regarding the proposed project in our earlier discussion programs, we like to inform you that more or less obviously some environmental issues will be raised during construction of the project; however, those issues will not be either extreme or permanent.
6. As a stakeholder, how will you contribute from your side to minimize the anticipated environmental issues?
7. Lastly, what would you like to say about this project?



*Copy for*  
Engineer

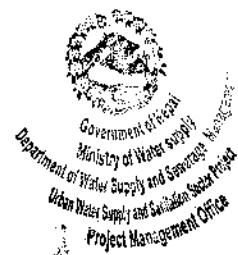


## FINDINGS OF EACH QUESTIONS/ISSUES RAISED

1. According to the participants, they are happy that their desire for the reliable, safe & potable water supply is being fulfilled sooner. Now, the only thing they want is that the proposed project should cover almost all the areas of Ilam municipality. They requested our team to consider this during technical design works.
2. After giving assurance regarding service area, they showed positive response towards provision of full support during survey works.
3. The participants assured us to help to establish coordination with the concerned community forest users group as soon as possible. They also assured us to provide consent letter from the concerned forest groups for our convenience. However, they entail assurance from us regarding the conservation of the community forests.
4. They are happy to know about the community forests regarding the proposed project.
5. They still showed concerns regarding the environmental aspects that include Dust Emissions, Water Quality, Noise Pollution, Traffic Congestion, Obstruction to the vendors & passersby, Damage to the existing facilities and Construction Waste & Solid Waste Management during construction period as like in the earlier discussion programs. We assure them about the mitigation of these likely environmental impacts by adopting the proposed mitigation measures.
6. As a responsible stakeholder, they committed to contribute to support safeguard implementation of the proposed project.
7. Lastly, the participants expressed their aspiration to get adequate, safe, reliable and potable water supply service from the proposed project along with the mitigated environmental impacts.



*[Signature]*  
Engineer



### C. FOCUS GROUP DISCUSSION- 3

Date: 15 September, 2017

Project: Ilam Water Supply & Sanitation Project

Venue: Ilam Municipality Office

Number of Participants: 7 (including representatives of Gumba Danda Community Forest Women User's Group)

Purpose Statement: Discussions regarding the proposed project

#### Questions/Issues:

1. We all are here to carry out technical & survey works of the proposed project. As WUSC must have already disseminated information to you all about the construction of the project components within this community forest area. Do you have anything to share regarding this?
2. We now believe that you are quite clear about the layout plan of the proposed project within this community forest area. For our convenience, we request you to provide the Consent Letter or No Objection letter regarding the construction activities of the proposed project.
3. It will be easier for us to carry out the survey works in your presence as we expect to get positive outcomes through your guidance during survey.
4. As the active members of this concerned community forest users group are present in this discussion program, you must be well known about the likely adverse environmental impacts of the proposed project during construction phase. Do you have any problem regarding this?
5. Your fear is rational but we assure you that this will not happen at any cost as we have proposed the proper mitigation measures for each adverse impact and we have also prepared the environmental management plan to effectively implement the proposed mitigation measures. If you are still in doubt, we are here with the proposed EMP, please have a look at this and if you have any queries please don't hesitate to share with us
6. Besides being secondary stakeholders, as you are the inhabitants of this project town, you are also the primary stakeholders or we can say "Beneficiaries". As a beneficiary, how will you contribute from your side to minimize the anticipated environmental issues?
7. Lastly, what would you like to say about this project?

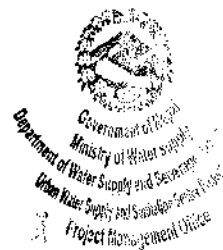
  
*[Signature]*  
Engineer



## FINDINGS OF EACH QUESTIONS/ISSUES RAISED

1. They are aware about the proposed construction activities within their community forest area. They requested to observe the layout drawing of this area to be ensured that the proposed layout does not require cutting the trees. As per their request, we demonstrated the layout and clarify their doubts regarding conservation of forest resources.
2. They seemed appreciative towards us regarding the clarification of the layout drawing. However, before providing the consent letter, they demanded to allow them to get involved during survey works in their area to be fully ensured whether the survey works are carried out as per the proposed layout drawing or not.
3. They seemed enthusiastic towards getting involved in the survey works.
4. They are quite aware about the likely adverse environmental impacts of the proposed project. However, they expect us to either minimize or mitigate these impacts during construction phase as they are in doubt or worry that the expected adverse impacts will be overlooked.
5. After observing the EMP we had prepared, they seemed satisfied with this.
6. As a beneficiary, each of them showed their commitment to contribute to support safeguard implementation of the proposed project as per their capability as far as it is the matter of provision of efficient water supply service to their project town.
7. Lastly, the participants expressed their aspiration to get adequate, safe, reliable and potable water supply service from the proposed project and committed to provide full support during survey works and construction period.

*[Handwritten signature]*



#### **D. FOCUS GROUP DISCUSSION -4**

Date: 10 May, 2018

Project: Ilam Water Supply & Sanitation Project

Venue: Sandakpur Rural Municipality-Ward no. 2 Office

Number of Participants: 7

Purpose Statement: Discussions regarding the proposed project

##### **Questions/Issues:**

1. We all are here to carry out discussions regarding the use of water sources for the proposed project, located at your rural municipality. Do you have any idea regarding this? If yes, please share with us.
2. How familiar are you with the term "Environment"?
3. Do you have any idea about the environmental concerns regarding the proposed project?
4. Do you know that the proposed project will involve intake construction and transmission route construction along with the tapping of water from the proposed sources? Do you have any objection regarding this?
5. As a stakeholder, how can you contribute from your side to minimize the anticipated environmental issues?
6. Lastly, what would you say are the most important issues you would like to express about this project?

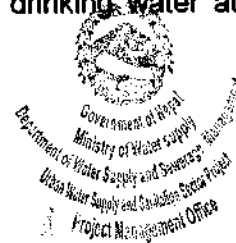


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Enclaves

## FINDINGS OF EACH QUESTIONS/ISSUES RAISED

1. All the participants are aware about the proposed project.
2. The participants are also found aware about the environment.
3. Their main concerns regarding the environmental aspects are Dust Emissions, Water Quality, Noise Pollution, Obstruction to the passersby, and Damage to the existing facilities and Generation of Construction Waste & Its Management during construction period. They are also concerned about effective operation & management and anticipated leakage problems during operation phase.
4. They stated "No Objection" regarding the project activities that will be carried out at Sandakpur Rural Municipality Ward No. 2 area. However, they urged to carry out the project activities at this area with proper considerations regarding source protection measures, source yield, prompt actions regarding excavation & backfilling works etc.
5. After assuring about the mitigation measures for the environmental concerns they raised, they committed to contribute to support safeguard implementation of the proposed project.
6. Their positive response towards tapping of water from the sources located at their own place indicates their grandeur and the empathy they have for the people of Ilam municipality facing acute water shortage problem. The most important issue they raised regarding the use of their water sources is that the tapping of water from the proposed sources should not result in deprivation of drinking water at Sandakpur Rural Municipality.

  
Engineer



**ANNEX 5:  
CHLORINE USE GUIDELINES**



*[Signature]*  
Engineer



## GUIDELINE VALUE

In humans and animals exposed to chlorine in drinking-water, specific adverse treatment related effects have not been observed.

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)

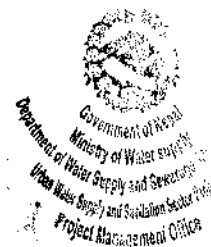
|          |                                      |
|----------|--------------------------------------|
| Chlorine | below 5 milligrams per liter (mg/L)* |
|----------|--------------------------------------|

\*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

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.

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.



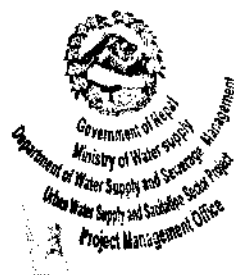
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Engineer



**ANNEX 6:  
WATER QUALITY TEST REPORTS**



*Kalyan*  
Engineer



NS Lab Accreditation No.: 09-2065/69

Regd. No. 53875/064/096

**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)

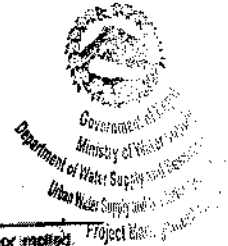
**Test Report/Certificate**Report No.: 458/2074  
Entry No.: AASTHA-358-2074  
Sample: Water  
Client: TAI-ICON JV  
Source: Greeting Khola, Greeting, IamDate received: 02-06-2074  
Date completed: 04-06-2074  
Sampled By: Client

| S. N. | Parameters                                   | Method                                                   | Observed Values | National Drinking Water Quality Standard |
|-------|----------------------------------------------|----------------------------------------------------------|-----------------|------------------------------------------|
| 1.    | pH at 25°C                                   | 4500-H APHA-AWWA-WEF 2012, 22nd Edition                  | 7.2             | 6.5-8.5                                  |
| 2.    | Electrical Conductivity, (µmhos/cm)          | 2510-B APHA-AWWA-WEF 2012, 22nd Edition                  | 90              | 1500                                     |
| 3.    | Turbidity, (NTU)                             | 2130-B APHA-AWWA-WEF 2012, 22nd Edition                  | <5              | 5 (15)                                   |
| 4.    | Taste and Odor                               |                                                          | N.O.            | Not Objectionable                        |
| 5.    | Color, (PCU)                                 | 2120-C APHA-AWWA-WEF 2012, 22nd Edition                  | 0.08            | 5 (15)                                   |
| 6.    | Total Hardness as CaCO <sub>3</sub> , (mg/l) | 2340-C APHA-AWWA-WEF 2012, 22nd 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.    | Chlorine, (mg/l)                             | 4500-Cl-B APHA-AWWA-WEF 2012, 22nd Edition               | 1.72            | 250                                      |
| 10.   | Ammonia, (mg/l)                              | 4500-NH <sub>3</sub> -B APHA-AWWA-WEF 2012, 22nd Edition | 0.05            | 1.5                                      |
| 11.   | Nitrate, (mg/l)                              | 4500-NO <sub>3</sub> -B APHA-AWWA-WEF 2012, 22nd Edition | 1.51            | 50.0                                     |
| 12.   | Aluminum, (mg/l)                             | 3500-Al-B APHA-AWWA-WEF 2012, 22nd Edition               | 0.029           | 0.20                                     |
| 13.   | Fluoride, (mg/l)                             | 4500-F-B APHA-AWWA-WEF 2012, 22nd Edition                | 0.08            | 0.5-1.5                                  |
| 14.   | Sulfate, (mg/l)                              | 4500-SO <sub>4</sub> -C APHA-AWWA-WEF 2012, 22nd Edition | <1.0            | 250                                      |
| 15.   | Mercury*, (ng/l)                             | 3500-Hg-C APHA-AWWA-WEF 2012, 22nd Edition               | <0.001          | 0.001                                    |
| 16.   | Calcium, (mg/l)                              | 3500-Ca-B APHA-AWWA-WEF 2012, 22nd Edition               | 6.4             | 200                                      |
| 17.   | Iron*, (mg/l)                                |                                                          | <0.03           | 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          | 0.001                                    |
| 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 NQWQS specified limit.

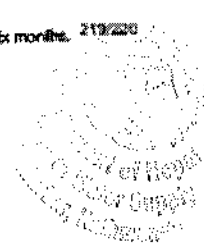
  
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Checked By


  
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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 involved demands and charges 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.

Engineer



NS Lab Accreditation No.: 06-2068/89

Regd. No. 53875/064/065

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Tel: +977-1-4433748, E-mail: aasthalab2065@gmail.com

Center for complete scientific solution

**Test Report/Certificate**

Report No. : 150/2074

Entry No. : AASTHA-353-2074

Sample : Water

Client : TAFC ICON JV

Source : Bhadi Khola, Chao Gairi, Tam

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 20°C                                   | 4500 H <sup>+</sup> , APHA-AWWA-WEF 2012, 22nd Edition                 | 7.3             | 6.5-8.5                                  |
| 2.    | Electrical Conductivity, (µmhos/cm)          | 2510 B, APHA-AWWA-WEF 2012, 22nd Edition                               | 90              | 1500                                     |
| 3.    | Turbidity, NTU                               | 2510 B, APHA-AWWA-WEF 2012, 22nd Edition                               | 45              | 5.10                                     |
| 4.    | Taste and Odor                               |                                                                        | N.O.            | Not Objectable                           |
| 5.    | Color, (PCU)                                 | 2522 C, APHA-AWWA-WEF 2012, 22nd Edition                               | 0.08            | 5.10                                     |
| 6.    | Total Hardness as CaCO <sub>3</sub> , (mg/l) | 2340 C, APHA-AWWA-WEF 2012, 22nd Edition                               | 36              | 500                                      |
| 7.    | Total Dissolved Solid, (mg/l)                | 2540 C, APHA-AWWA-WEF 2012, 22nd Edition                               | 58              | 1000                                     |
| 8.    | Total Residual Chlorine, (mg/l)              | 4500 Cl <sub>2</sub> , APHA-AWWA-WEF 2012, 22nd Edition                | <0.10           | 0.1-0.2                                  |
| 9.    | Cyanide, (mg/l)                              | 4500 CN <sup>-</sup> , APHA-AWWA-WEF 2012, 22nd Edition                | 3.72            | 250                                      |
| 10.   | Ammonia, (mg/l)                              | 4500 NH <sub>3</sub> -N, APHA-AWWA-WEF 2012, 22nd Edition              | 0.10            | 1.5                                      |
| 11.   | Nitrate, (mg/l)                              | 4500 NO <sub>3</sub> -N, APHA-AWWA-WEF 2012, 22nd Edition              | 2.93            | 50.0                                     |
| 12.   | Alumina, (mg/l)                              | 3500 Al <sub>2</sub> O <sub>3</sub> , APHA-AWWA-WEF 2012, 22nd Edition | 0.021           | 0.20                                     |
| 13.   | Fluoride, (mg/l)                             | 4500 F <sup>-</sup> , APHA-AWWA-WEF 2012, 22nd Edition                 | 0.14            | 0.5-1.5                                  |
| 14.   | Sulfate, (mg/l)                              | 4500 SO <sub>4</sub> <sup>2-</sup> , APHA-AWWA-WEF 2012, 22nd Edition  | <1.0            | 250                                      |
| 15.   | Mercury*, (mg/l)                             | 3500 Hg <sup>2+</sup> , APHA-AWWA-WEF 2012, 22nd Edition               | <0.001          | 0.001                                    |
| 16.   | Calcium, (mg/l)                              | 3500 Ca <sup>2+</sup> , APHA-AWWA-WEF 2012, 22nd Edition               | 6.4             | 200                                      |
| 17.   | Iron*, (mg/l)                                |                                                                        | <0.05           | 0.30/0.3                                 |
| 18.   | Manganese*, (mg/l)                           |                                                                        | <0.05           | 0.20                                     |
| 19.   | Cobalt*, (mg/l)                              |                                                                        | <0.01           | 0.01                                     |
| 20.   | Cadmium*, (mg/l)                             | 3113 B, APHA-AWWA-WEF 2012, 22nd Edition                               | <0.003          | 0.005                                    |
| 21.   | Chromium*, (mg/l)                            |                                                                        | <0.05           | 0.05                                     |
| 22.   | Copper*, (mg/l)                              |                                                                        | <0.05           | 1.0                                      |
| 23.   | Zinc*, (mg/l)                                |                                                                        | 0.09            | 3.0                                      |
| 24.   | Arsenic, (mg/l)                              | 3520 As <sup>3+</sup> , APHA-AWWA-WEF 2012, 22nd Edition               | <0.01           | 0.05                                     |

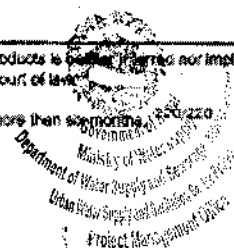
Remarks: Water quality meets NDWS specified limit.

  
Analyzed By


  
Checked By


  
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- Note : 1. The issued report refers only to the tested sample and applicable parameters. Endorsement of products is neither claimed 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 demands 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.  
 5. Parameters in \* are not accredited by NBSM.


  
Project Manager




# Nepal Environmental & Scientific Services (P) Ltd.

G.P.O. Box 7301, Thapathali, Kathmandu, Nepal  
 Phone: +977-1-4244889, 4241001 Fax No: +977-1-4228028, Email: ness@mos.com.np  
 Website: www.nessnepal.com

NESS/Lab. M-03/R1.1

Page 1 of 2

## QS Test Report Certificate

NS Accreditation No. Pa. 01/053-54

Entry No. NCL-752(W)(2)-07-2019 Lab No. 01/053-54 Date Received: 04-07-2019  
 Sample: River Water (Rate Khola) Date Completed: 11-07-2019  
 Client: TAEC/ICON JV Sampling Date: 02-07-2019  
 Sampled By: Client Location: Ilam

| S. N. | Parameters                                 | Test Methods                                                              | Observed Values | Generic Effluent Standards Discharged into Inland Surface Water, GoN 2001 |
|-------|--------------------------------------------|---------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------|
| 1     | pH @ 25°C                                  | Electronic, 4500-H <sup>+</sup> B, APHA                                   | 7.6             | 5.5-9                                                                     |
| 2     | Turbidity (NTU)                            | Nephelometric, 2130 B, APHA                                               | 5               |                                                                           |
| 3     | Color (Chromaticity Unit)                  | Spectrophotometric, 2120 C, APHA                                          | 0.20            |                                                                           |
| 4     | Total Hardness as CaCO <sub>3</sub> (mg/L) | EDTA Titrimetric, 2340 C, APHA                                            | 46              |                                                                           |
| 5     | Calcium (mg/L)                             | EDTA Titrimetric, 3500-Ca B & 3500-Mg B, APHA                             | 17.63           |                                                                           |
| 6     | Total Dissolved Solids (mg/L)              | Oven Drying Method, 180°C, 2540 C, APHA                                   | 26              |                                                                           |
| 7     | Sulphate (mg/L)                            | Gravimetric Method with Ignition of Residue, 4500-SO <sub>4</sub> C, APHA | 7.4             |                                                                           |
| 8     | Residual Chlorine (mg/L)                   | Iodometric Titration, 4500-Cl B, APHA                                     | NR              |                                                                           |
| 9     | Chloride (mg/L)                            | Argentometric Titration, 4500-Cl B, APHA                                  | 2.97            |                                                                           |
| 10    | Nitrite (mg/L)                             | Direct Nesslerization, 4500-NH <sub>2</sub> C, APHA                       | 0.07            |                                                                           |
| 11    | Nitrate (mg/L)                             | UV Spectrophotometric Griessing, 4500-NO <sub>3</sub> B, APHA             | 0.81            |                                                                           |
| 12    | Ammonia (mg/L)                             | Endrome Cyanide R, 3800-NH <sub>3</sub> A, APHA                           | 0.05            |                                                                           |
| 13    | Fluoride (mg/L)                            | SPANDS, 4500-F D, APHA                                                    | 0.06            | 2 max                                                                     |
| 14    | Iron (mg/L)                                |                                                                           | 0.34            |                                                                           |
| 15    | Manganese (mg/L)                           |                                                                           | N.D. (<0.02)    |                                                                           |
| 16    | Cadmium (mg/L)                             |                                                                           | N.D. (<0.003)   | 2 max                                                                     |
| 17    | Copper (mg/L)                              | Direct As - Atomic Abs. 3114 B, APHA                                      | 0.02            | 0.1 max                                                                   |
| 18    | Lead (mg/L)                                |                                                                           | 0.02            | 0.1 max                                                                   |
| 19    | Zinc (mg/L)                                |                                                                           | 0.03            | 0.2 max                                                                   |
| 20    | Arsenic (mg/L)                             | SDOC, 3114 B, APHA                                                        | N.D. (<0.01)    | 0.2 max                                                                   |
| 21    | Mercury (mg/L)                             | Cold Vapor AAS, 3112 B, APHA                                              | N.D. (<0.005)   | 0.01 max                                                                  |

\* Non-accredited Parameter

N.D. = Not Detected

Note: The gravimetric analysis was carried out in controlled temperature condition (20°C).

APHA: American Public Health Association; AAS: Atomic Absorption Spectrophotometer; EDTA: Ethylenediaminetetraacetic acid; NTU: Nephelometric turbidity unit; UV: Ultraviolet.

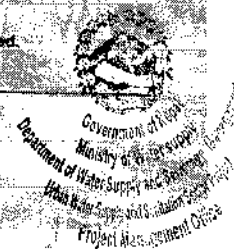
Remarks: All observed values complied the prescribed effluent standards discharged into inland surface water.

(Analyzed By)

(Checked By)

(Authorized Signature)

- Note:
1. This report/certificate is in reference to Laboratory Quality Control Manual, QS (018), section QP7.
  2. The result listed refer only to the tested samples & applicable parameters. Endorsement of products is neither inferred nor implied.
  3. Liability of our institute is limited to the invoiced test parameters & amount only.
  4. Samples will be destroyed after one month from the date of issue of test certificate unless otherwise specified.
  5. This report should not be reproduced wholly / partially for any advertising media without our permission.
  6. The clients are requested to take back their hazardous samples along with the report/certificate.



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# Nepal Environmental & Scientific Services (P) Ltd.

G.P.O. Box: 7301, Thapathali, Kathmandu, Nepal

Phone: +977-1-4244988, 4244989 Fax No: +977-1-4226028 Email: ness@ness.com.np

www.nesspld.com

Page 2 of 2

NESS/Lab. M-03/R1.1

## QS Test Report Certificate

NS Accreditation No. Pro. 01/053-54

Entry No. : NCL - 752(W) (2) - 07 - 2019  
 Sample : River Water (Mewa Khold)  
 Client : TAEC/ICON JV  
 Sampled By : Client

Date Received : 04 - 07 - 2019  
 Date Completed : 11 - 07 - 2019  
 Sampling Date : 02 - 07 - 2019  
 Location : Ilam

| S. N. | Parameters                                 | Test Methods                                                                | Observed Values | Generic Effluent Standards Discharged into Inland Surface Water, Govt 2001 |
|-------|--------------------------------------------|-----------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------|
| 1     | pH @ 25°C                                  | Electrometric, 4600 - H <sup>+</sup> B, APHA                                | 7.6             | 5.5 - 9                                                                    |
| 2     | Turbidity (NTU)                            | Nephelometric, 2130 B, APHA                                                 | 1               | -                                                                          |
| 3     | Color (Chromatic Unit)                     | Spectrophotometric, 2120 C, APHA                                            | 0.33            | -                                                                          |
| 4     | Total Hardness as CaCO <sub>3</sub> (mg/L) | EDTA Tannometric, 2340 C, APHA                                              | 12              | -                                                                          |
| 5     | Calcium (mg/L)                             | EDTA Tannometric, 3500 - Ca B & 3500 - Mg B, APHA                           | 8.81            | -                                                                          |
| 6     | Total Dissolved Solids (mg/L)              | Oven Drying Method, 180°C, 2540 C, APHA                                     | 20              | -                                                                          |
| 7     | Sulphate (mg/L)                            | Gravimetric Method with Ignition of Residue, 4500 - SO <sub>4</sub> B, APHA | N.D. (<1)       | -                                                                          |
| 8     | Residual Chlorine (mg/L)                   | Iodometric Titration, 4500 - Cl B, APHA                                     | Nil             | -                                                                          |
| 9     | Chloride (mg/L)                            | Argentometric Titration, 4500 - Cl B, APHA                                  | 2.97            | -                                                                          |
| 10    | Ammonia (mg/L)                             | Direct Hydroxylization, 4500 - NH <sub>3</sub> C, APHA                      | 0.06            | -                                                                          |
| 11    | Nitrate (mg/L)                             | UV Spectrophotometric Screening, 4500 - NO <sub>3</sub> B, APHA             | 0.95            | -                                                                          |
| 12    | Aluminum (mg/L)                            | Erichrome Cyanine R, 3500 - Al A, APHA                                      | 0.001           | -                                                                          |
| 13    | Fluoride (mg/L)                            | SPANDS, 4500 - F D, APHA                                                    | <0.05           | 2 max.                                                                     |
| 14    | Iron (mg/L)                                | -                                                                           | 0.23            | -                                                                          |
| 15    | Manganese (mg/L)                           | -                                                                           | N.D. (<0.02)    | -                                                                          |
| 16    | Cadmium (mg/L)                             | -                                                                           | N.D. (<0.003)   | 2 max.                                                                     |
| 17    | Lead (mg/L)                                | Direct Air - Acetylene, 5000 - Pb B, APHA                                   | 0.03            | 0.1 max.                                                                   |
| 18    | Copper (mg/L)                              | -                                                                           | N.D.            | 5 max.                                                                     |
| 19    | Zinc (mg/L)                                | -                                                                           | 0.03            | 5 max.                                                                     |
| 20    | Arsenic (mg/L)                             | SDOC, 3114 B, APHA                                                          | N.D. (<0.01)    | 0.2 max.                                                                   |
| 21    | Mercury (mg/L)                             | Cold Vapor AAS, 3112 B, APHA                                                | N.D. (<0.005)   | 0.01 max.                                                                  |

\* Non-accredited Parameter

N.D.: Not Detected

Note: The gravimetric analysis was carried out in controlled temperature condition (20°C).

APHA: American Public Health Association, AAS: Atomic Absorption Spectrophotometer, EDTA: Ethylenediaminetetraacetic acid, NTU: Nephelometric turbidity unit, UV: Ultraviolet.

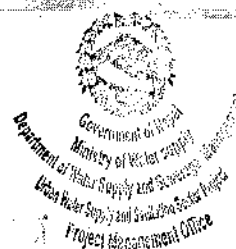
Remarks: All observed values complied the prescribed effluent standards discharged into inland surface water.

(Analyzed By)

(Checked By)

(Authorized Signature)

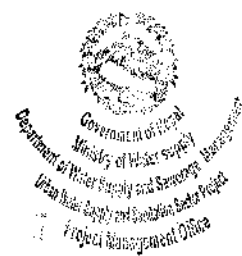
- Note:
1. This report/certificate is in reference to Laboratory Quality Control Manual, QS 1018, section OPT.
  2. The result listed refer only to the tested samples & applicable parameters. Endorsement of products is neither inferred nor implied.
  3. Liability of our Institute is limited to the invoiced test parameters & amount only.
  4. Samples will be destroyed after one month from the date of issue of test certificate unless otherwise specified.
  5. This report should not be reproduced wholly / partially for any advertising media without our permission.
  6. The clients are requested to take back their hazardous samples along with the report/certificate.



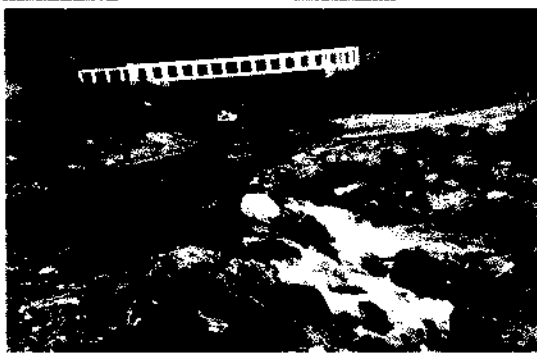
## ANNEX 7: PHOTOGRAPHS



*Copy for*  
*Enclosure*



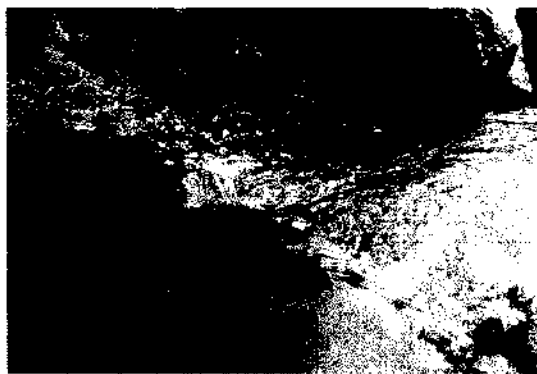




1. Mewa Khola



2. Rate Khola



3. Gitang Khola



4. Existing WTP at Charkhade



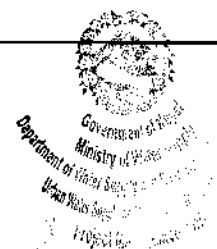
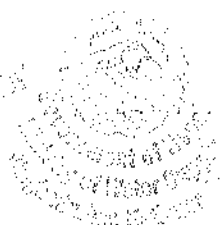
5. Existing Water Tank at Gumba Danda that needs rehabilitation



6. Existing RVT at Gadithumka

*Handwritten signature*

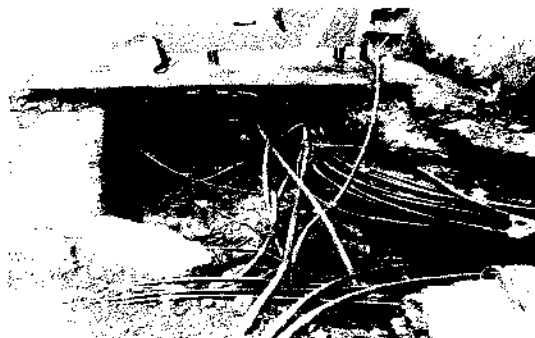
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**7. Proposed land for RVT 9 - private land belonging to Mr. Gyanendra Kumar Siwakoti;**



### 8. Existing condition of distribution pipelines



### 9. Training to the social mobilizers for socio-economic survey



## 10. Meeting with the Mayor of Ilam Municipality



11. Consultation at former Sandakpur VDC ward no 2 Office on May 2018



•12. Consultation at DCC Ilam, May 2018

ENCLOSURE

CC Iran, May 20  
Government of  
Ministry of Health and  
Department of Health Services and  
Under Secretary of Health Services and  
Director of Health Services and

100-443887-100  
 DEPARTMENT OF JUSTICE  
 FEDERAL BUREAU OF INVESTIGATION  
 WASHINGTON, D. C. 20535



## ANNEX 8: COMMENTS INCORPORATION MATRIX



*Copy Recd*  
Engr. S. S. Srinivasan





**Comment and Response Matrix**  
**Ilam Water Supply & Sanitation Project, Ilam**

| S.N.                                                           | Chapter/ Section/<br>Page                        | Comment/Suggestions                                                                                                                                                                                                                                                                                                                              | Response from Consultant                                                                                                                                             |                                                                                                                      |
|----------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
|                                                                |                                                  |                                                                                                                                                                                                                                                                                                                                                  | In chapter/ section/<br>paragraph no. / page no.                                                                                                                     | Description of change<br>Remarks                                                                                     |
| A. By Mr. B.R. Manandhar (Environmental Engineer & Freelancer) |                                                  |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                      |                                                                                                                      |
| 1                                                              | Chapter 2, Sub Section 2.4.15, Figure 3, Page 26 | A project layout map superimposed on topo-map also showing locations of all temporary construction facilities such as camps, stockpiling sites, muck/spoil disposal sites, quarry sites (if applicable) etc. with clear legends need to be presented as well                                                                                     | Chapter 2, Section 2.6, Figure 5, Page 35                                                                                                                            | This has been incorporated.                                                                                          |
| 2                                                              | Chapter 2, Section 2.4, Page 12                  | It should be clearly stated whether or not a crusher plant and internal access roads are also among the project components. If yes, this IEE study should have covered adverse impacts due to them as well.                                                                                                                                      | Chapter 2, Section 2.4.11, Page 25 and 2.4.14 d), Line 97, Page 31<br>Chapter 7, Sub Section 7.2.1.2, Line 285, Page 101 and Sub Section 7.2.2.1, Line 299, Page 104 | This has been incorporated.                                                                                          |
| 3                                                              | Chapter 2                                        | A categorical list of project construction and operation activities needs to be presented in a separate sub-chapter of Project Description.                                                                                                                                                                                                      | Chapter 2, Section 2.7, Page 36 & 37                                                                                                                                 | This has been incorporated.                                                                                          |
| 4                                                              | Chapter 3, Section 3.7, Page 31                  | Delineating project impact area as core area and surrounding area is fine. However, it'd be wrong to relate direct impact and indirect impact with core area and surrounding area respectively. It should also be made sure that the construction sites of all associated structural components of the project are covered within the core area. | Chapter 2, Section 2.6, Page 33                                                                                                                                      | This has been incorporated and included in Chapter 2 under sub chapter Project Area Delineation instead of Chapter 3 |
| 5                                                              | Chapter 3, Section 3.1, Page 28                  | The detailed Engineering Design Report seems to be                                                                                                                                                                                                                                                                                               | Chapter 3, Section 3.1, Line 126, Page 42                                                                                                                            | This has been incorporated.                                                                                          |

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| S.N. | Chapter/ Section/<br>Page         | Comment/Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                             | Response from Consultant                                                                                                                                                                                                               |                                                    |
|------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|      |                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | In chapter/ section/<br>paragraph no. / page no.                                                                                                                                                                                       | Description of change<br>Remarks                   |
|      |                                   | left out of the literature reviewed.                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                        |                                                    |
| 6    | All Chapters                      | Sources are missing in many Tables.                                                                                                                                                                                                                                                                                                                                                                                                                             | All Chapters                                                                                                                                                                                                                           | This has been incorporated.                        |
| 7    | Whole Chapter 3 Page 28 to 32     | Under Methodology, specific standard methods/tools used for impact identification and in-situ measurements and sampling/laboratory analysis, if any, for physico-chemical baseline information collection and methods of quantitative prediction of impacts used should be mentioned as well with their samples annexed to the report.                                                                                                                          | Whole Chapter 3 Page 42 to 64                                                                                                                                                                                                          | This has been incorporated.                        |
| 8    | Chapter 3, Section 3.2.1, Page 29 | It is confusing how data on climate, rainfall and other meteorological conditions were collected as primary information/data through field survey as mentioned in section 3.2.1.                                                                                                                                                                                                                                                                                | Chapter 3, Section 3.3.1, Line 132, Page 43                                                                                                                                                                                            | This has been incorporated.                        |
| 9    | Chapter 7 & 8                     | Adverse impacts of (i) mismanaged/haphazard disposal of debris from dismantled temporary facilities, (ii) disruption to natural drainage particularly in the service area, (iii) accidental leakage/spillage of stored fuel/chemicals and (iv) disposal of raw sludge from the sedimentation tanks need to be included as well in chapter 7. The above suggested adverse impacts need to be addressed in the following chapter with appropriate MMIs described. | Chapter 7, Section 7.2, Sub Section 7.2.1.2, f) Page 102; h) Page 103 and i) Page 103 & 104 & Sub Section 7.2.3.2 b), Page 106<br>Chapter 8, Section 8.1.1.2, f) Page 117; h) Page 118; i) Page 113 & Sub Section 8.1.3.2 b), Page 121 | This has been incorporated.                        |
| 10   | Chapter 3                         | A simple checklist or a simple interaction matrix should have been used as a standard tool for identification of issues/impacts during preparation of the ToR itself.                                                                                                                                                                                                                                                                                           | Chapter 3, Section 3.3, Line 130, Page 43                                                                                                                                                                                              | This has been incorporated in the IEE report.      |
| 11   | Annex 3                           | Unnecessary repetition of project location map and schematic diagrams of transmission/distribution                                                                                                                                                                                                                                                                                                                                                              | Annex 3                                                                                                                                                                                                                                | This has been omitted as per expert's suggestions. |

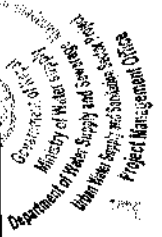
| S.N.                                                | Chapter/ Section/<br>Page                                      | Comment/Suggestions                                                                                                                                                                                                                 | Response from Consultant                                                                         |                                                   |
|-----------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------|
|                                                     |                                                                |                                                                                                                                                                                                                                     | In chapter/ section/<br>paragraph no. / page no.                                                 | Description of change<br>Remarks                  |
|                                                     |                                                                | systems of the project could have been avoided.                                                                                                                                                                                     |                                                                                                  |                                                   |
| 12                                                  | Chapter 7, Section 7.2,<br>Sub Section 7.2.1.2 (f),<br>Page 74 | Anticipated adverse impact on current land use in terms of land-use change within the core area also needs to be explained.                                                                                                         | Chapter 7, Section 7.2, Sub<br>Section 7.2.1.2, g), Line 292,<br>293 & 294, Page 103             | This has been<br>incorporated.                    |
| 13                                                  | Chapter 8, Section<br>8.1.2 (f) & (g), Page 65                 | Mitigation measures for preventing/arresting spilled/leaked fuel/chemicals are missing. Also, separate measures for management of biodegradable SW and non-biodegradable SW need to be provided.                                    | Chapter 8, Section 8.1, Sub<br>Section 8.1.1.2 e) Page 116 &<br>117 & f) Page 117                | This has been explained.                          |
| 14                                                  | Chapter 8,                                                     | Quick Backfilling of excavated trenches accompanied by compaction without delay could avoid potential environmental /social nuisance due to stockpiled spoil especially in the service area.                                        | Chapter 8, Section 8.1, Sub<br>Section 8.1.4.2 d), Line 349, 2 <sup>nd</sup><br>bullet ,Page 123 | This has been<br>incorporated.                    |
| 15                                                  | Chapter 8                                                      | MMs for preventing water and soil contamination due to accidental leakage/spillage of stored fuel/chemicals do not feature in the list of MMs.                                                                                      | Chapter 8, Section 8.1, Sub<br>Section 8.1.1.2 f) Page 117                                       | This has been<br>incorporated.                    |
| 16                                                  | Chapter 11, Section<br>11.2, Page 112 to 121                   | Monitoring parameters should be selected based on source oriented monitoring approach rather than sink oriented monitoring approach to ensure a preventive rather than curative environmental monitoring of project implementation. | Chapter 11, Section 11.3,<br>Table 47, Page 145 to 160                                           | This has been<br>incorporated.                    |
| <b>B. By Mr. Kamal Adhikari (Sociologist/DWSSM)</b> |                                                                |                                                                                                                                                                                                                                     |                                                                                                  |                                                   |
| 1                                                   | Executive Summary,<br>Line 3, Page xviii                       | ADB र नेपाल सरकार अनुसारको सहा ADB र नेपाल सरकारको नीति अनुसार राख्दा ठीक होला                                                                                                                                                      | Executive Summary, Line x,<br>Page xxii                                                          | This has been<br>incorporated.                    |
|                                                     | Chapter 4, Section 4.1,<br>Table 8, Page 36                    | National Water Supply and Sanitation Policy: Draft<br>(?) is it relevant for this report?                                                                                                                                           | Chapter 4, Section 4.1,<br>Table 13, Page 36 (4 <sup>th</sup> row)                               | Its relevancy has been<br>shortly described under |

  
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 Department of Water Supply and Sewerage  
 Urban Water Supply and Sewerage Section  
 Project Management Office

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| S.N. | Chapter/ Section/<br>Page                                                           | Comment/Suggestions                                                                                                                       | Response from Consultant                                                            |                                                                          |
|------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|      |                                                                                     |                                                                                                                                           | In chapter/ section/<br>paragraph no. / page no.                                    | Description of change<br>Remarks                                         |
|      |                                                                                     |                                                                                                                                           |                                                                                     | the heading Relevant Provisions in Table 13                              |
|      | Chapter 4, Section 4.1, Table 8                                                     | Rural Water Supply and Sanitation National Policy, Strategy and Sectoral Strategic Action Plan 2004; insert pertinent IEE related issues. | Chapter 4, Section 4.1, Table 13, Page 50 (3 <sup>rd</sup> & 4 <sup>th</sup> row)   | This has been incorporated.                                              |
|      | Chapter 4, Section 4.1, Table 8, Page 34 to 37                                      | Policies: locate in chronological order and IEE related mainly.                                                                           | Chapter 4, Section 4.1, Table 13, Page 50 to 56                                     | This has been incorporated.                                              |
|      | Executive Summary, Line 2, Page xiii and Chapter 5, Sub Section 5.3.6.1 h), Page 59 | 80 years old system: mention few relevant features indicating current population and water demand/supply situation.                       | Executive Summary, Line 2, Page xiii and Chapter 5, Sub Section 5.3.6.1 h), Page 84 | This has been incorporated.                                              |
|      | Chapter 11, Section 11.5, Page 127                                                  | NRS.5.00.00: tree cutting and uprooting, if required (actual situation not assessed?).                                                    | Chapter 11, Section 11.5, Page 162                                                  | This has been incorporated.                                              |
|      | Chapter 1, Sub Section 1.2.1, Page 2                                                | 1.2.1 Name of the proposal: name of the proposer/project (Ilam Water Supply and Sanitation Project).                                      | Chapter 1, Sub Section 1.2.1, Page 2                                                | This has been incorporated as per EPR 1997, Schedule 5 reporting format. |
|      | Chapter 2, Section 2.3, Table 4, SN. 6 Page 11                                      | Salient features: present population (20: 2017), base year population (2019: 39) and design population (2039: 28).                        | Chapter 2, Section 2.3, Table 4, SN. 6 Page 12                                      | This was a typo. This has been incorporated                              |
|      | Chapter 2, Sub Section 2.4.13 h), Page 24                                           | Spoilage disposal site: far away? (indicate site).                                                                                        | Chapter 2, Sub Section 2.4.14 h), Line 204 Page 33                                  | This has been incorporated.                                              |
|      | Chapter 3, Sub Section 3.4.3, Page 30                                               | Project Affected Families (PAFs): categorically-who?                                                                                      | Chapter 3, Sub Section 3.3.3, Line 136, Page 45                                     | This has been incorporated.                                              |
|      | Chapter 3, Section 3.7, Page 31 & 32                                                | Core, surrounding and adjoining area: site specific impact and management particularly of adjoining area.                                 | Chapter 2, Section 2.6, Line 106 & 107, Page 33 & 34                                | This has been incorporated.                                              |
|      | Chapter 5, Sub Section                                                              | Current population, mention the data extracted from                                                                                       | Chapter 5, Sub Section                                                              | This has been incorporated                                               |

| S.N. | Chapter/ Section/<br>Page                                                                                                                                 | Comment/Suggestions                                                                                                                                        | Response from Consultant                                                                                                                                                                                               |                                                                                                                                                                |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                                                                                                                                           |                                                                                                                                                            | In chapter/ section/<br>paragraph no. / page no.                                                                                                                                                                       | Description of change<br>Remarks                                                                                                                               |
|      | 5.3.1.2, Page 50 & 51                                                                                                                                     | district profile?                                                                                                                                          | 5.3.1.2, Line 194, Page 73                                                                                                                                                                                             | incorporated.                                                                                                                                                  |
|      | Chapter 7, Sub Section<br>7.2.4.3 c), Page 80                                                                                                             | Waste water/FSM: potential threats and management?                                                                                                         | Chapter 7, Sub Section<br>7.2.4.3, Page 110                                                                                                                                                                            | The issues regarding<br>Wastewater/FSM has<br>been omitted as per<br>expert's suggestion as it<br>does not fall under the<br>scope of the proposed<br>project. |
|      | Chapter 7, Sub Section<br>7.1.1.1, Page 68                                                                                                                | Grand opportunity: what, whom and what extent?                                                                                                             | Chapter 7, Sub Section<br>7.1.1.1, Line 272, Page 96                                                                                                                                                                   | This has<br>been<br>incorporated.                                                                                                                              |
|      | Chapter 7, Sub Section<br>7.1.1.2 c), Page 70                                                                                                             | Women empowerment: factors/process? ... as the<br>term empowerment is holistic.                                                                            | Chapter 7, Sub Section<br>7.1.1.2 c), Line 277, 278,<br>279 & 280, Page 98 & 99                                                                                                                                        | This<br>has<br>been<br>incorporated.                                                                                                                           |
|      | Chapter 9                                                                                                                                                 | Critical roles of wide range of stakeholders: other than<br>what is mentioned in the report<br>(e.g. palikas, security personnel, forest office personal.) | Chapter 9, Section 9.1, Table<br>45, Pages 127, 128 & 129.                                                                                                                                                             | This<br>has<br>been<br>incorporated.                                                                                                                           |
|      | Chapter 8, Sub Section<br>8.4.1 c), Page 92                                                                                                               | Safety: safety training manual (preparation?)                                                                                                              | Chapter 8, Sub Sections<br>8.1.4.1 b) Page 121 and<br>8.1.4.2 b), Page 122                                                                                                                                             | This<br>has<br>been<br>incorporated.                                                                                                                           |
|      | Chapter 12                                                                                                                                                | Monitoring: mechanism.                                                                                                                                     | Chapter 12, Pages 171 & 172                                                                                                                                                                                            | This<br>has<br>been<br>incorporated.                                                                                                                           |
|      | Chapter 8, Sub Section<br>8.2.1 a), Page 88 ;<br>Chapter 11, Sub<br>Section 11.2.2 Page<br>110, Table 33, SN 2,<br>Page 115; Sub Section<br>11.4 Page 123 | Policy awareness: when and how?                                                                                                                            | Chapter 8, Sub Section 8.1.2.1<br>a-iii) Page 118 ; Chapter 11,<br>Sub Section 11.2.2 Line 390<br>Page 143 ; Sub Section<br>11.3 Table 47 2 a) 1 <sup>st</sup> Row<br>Page 151 ; Sub Section<br>11.5 Line 399 Page 162 | This<br>has<br>been<br>incorporated.                                                                                                                           |


  
 Government of Nepal  
 Ministry of Urban and Rural Development  
 Department of Water Supply and Sanitation  
 Water Supply and Sanitation Division  
 Project Management Unit

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| S.N.      | Chapter/ Section/<br>Page                       | Comment/Suggestions                                                                                      | Response from Consultant                                                                                                           |                                                                                                                                                                                                                    |         |
|-----------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|           |                                                 |                                                                                                          | In chapter/ section/<br>paragraph no. / page no.                                                                                   | Description of change                                                                                                                                                                                              | Remarks |
|           | Chapter 12                                      | What about site/field monitoring by central team?                                                        | Chapter 12, Line 408, Page 171                                                                                                     | This has been incorporated.                                                                                                                                                                                        |         |
| <b>C.</b> | <b>Comments by MoWS</b>                         |                                                                                                          |                                                                                                                                    |                                                                                                                                                                                                                    |         |
|           | Executive Summary                               | Correct date of Environment Protection act date in Executive Summary (Point no. 3 and Point no.7)        | Executive Summary, Line 5 Page xiii & Line 9- c) & d) Page xvi                                                                     | This has been incorporated.                                                                                                                                                                                        |         |
|           | Chapter 2, Sub Section 2.4.13 a), Page 22       | Why this project require us of forest areas please make clear as per Forest Act Clause 68.               | Chapter 2, Sub Section 2.4.14 a), Page 28                                                                                          | This has been incorporated. However, the reasoning behind the forest area requirement for the construction of project components is as per <b>Section 68 (1) of Forest Act</b> instead of <b>Environment Act</b> . |         |
|           |                                                 | Muchulka should be included in IEE report                                                                | Annex 3                                                                                                                            | This has been explained.                                                                                                                                                                                           |         |
|           |                                                 | Letter which shows this project is National Priority Project                                             | Annex 3-Recommendation Letter from the municipality                                                                                | This has been incorporated.                                                                                                                                                                                        |         |
|           | Chapter 4, Section 4.1, Table 8, Pages 34 to 37 | Include Solid Waste Management Act 2068 and Regulation 2070, Labour Rules, Aquatic Animal Protection Act | Chapter 4, Section 4.1, Table 13- 2 (2 <sup>nd</sup> Row). -Page 52, 9 <sup>th</sup> row-Page 53 and 3-5 <sup>th</sup> Row Page 55 | This has been incorporated.                                                                                                                                                                                        |         |
|           | Annex 7                                         | There are four sources but test result in annex is only two sources                                      | Annex 6                                                                                                                            | This has been incorporated.                                                                                                                                                                                        |         |
|           | Chapter 2, Section 2.3, Table 4, SN. 6 Page 11  | In summary sheet design and Base Year population and Household is exchanged. Please correct it           | Chapter 2, Section 2.3, Table 4, SN. 6 Page 12                                                                                     | This was a typo. This has been incorporated.                                                                                                                                                                       |         |

| S.N. | Chapter/ Section/<br>Page                                                                                                                                    | Comment/Suggestions                                                                                                                                                                                                                  | Response from Consultant                         |                             |         |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------|---------|
|      |                                                                                                                                                              |                                                                                                                                                                                                                                      | In chapter/ section/<br>paragraph no. / page no. | Description of change       | Remarks |
|      | Executive Summary, Line<br>5, Page xiv                                                                                                                       | Although test result shows that Geetang Khola and Bhadi Khola is almost same but treatment is proposed for Geetang Khola but not for Bhadi Khola why? Is this due to spring source or other reason; make this clear in summary sheet | Executive Summary, Line 7,<br>Page xiv           |                             |         |
|      |                                                                                                                                                              | Incorporate all other comments given by experts                                                                                                                                                                                      |                                                  | This has been incorporated. |         |
| D.   | Beside these comments, some other changes within the report were made as per the report requirement that was felt necessary during the report incorporation. |                                                                                                                                                                                                                                      |                                                  |                             |         |

*[Signature]*  
Engineer



