# Initial Environmental Examination

September 2014

# NEP: Third Small Towns' Water Supply and Sanitation Sector Project–Musikot Khalanga Town Subproject

Prepared by the Ministry of Urban Development for the Asian Development Bank.

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# Initial Environmental Examination (IEE)

Project No. XXXX
June 2014

## NEP: Third Small Towns' Water Supply and Sanitation Sector Project – Musikot Khalanga Town Subproject


Prepared by the Ministry of Urban Development for the Asian Development Bank.

## CURRENCY EQUIVALENT

(Official exchange rate of the Nepal Rastra Bank as of 01 March 2014)

| | | |
|---|---|---|
| Currency Unit | - | Nepalese Rupee (NPR) |
| USD 1.00 | = | NRs 98.51 |
| NRs 1.00 | = | USD 0.010151 |

## ABBREVIATIONS

| | |
|---|---|
| ADB | Asian Development Bank |
| AP | Affected person |
| C-EMP | Contractor's environmental management plan |
| DWSS | Department of Water Supply and Sewerage |
| EARF | Environmental assessment and review framework |
| EIA | Environmental impact assessment |
| EMP | Environmental management plan |
| EMR | Environmental monitoring report |
| EPA | Environment Protection Act |
| EPR | Environment Protection Rules |
| EO | Environmental officer |
| ES | Environmental specialist |
| ESA | Environmental safeguard assistant |
| ESE | Environmental safeguard expert |
| IEE | Initial environmental examination |
| GoN | Government of Nepal |
| GRM | Grievance redress mechanism |
| MoSTE | Ministry of Science, Technology and Environment |
| MUD | Ministry of Urban Development |
| NPR | Nepalese Rupee |
| PISU | Project Implementation Support Unit |
| PMO | Project Management Office |
| REA | Rapid environmental assessment |
| SPS | Safeguard Policy Statement |
| STWSSSP | Small Towns' Water Supply and Sanitation Sector Project |
| 2ndSTWSSSP | Second Small Towns' Water Supply and Sanitation Sector Project |
| ToR | terms of reference |
| USD | United States Dollar |
| VDC | Village Development Committee |
| WHO | World Health Organization |
| WSSDO | Water Supply and Sanitation Divisional Office |
| WUSC | Water Users' and Sanitation Committee |

## WEIGHTS AND MEASURES

| | |
|---|---|
| C | Celsius/centigrade |
| dBA | decibel audible |
| ha | hectare/s |
| km | kilometer/s |
| kph | kilometer/s per hour |
| m | meter/s |
| kph | kilometer/s per hour |
| m | meter/s |
| $m^3$ | cubic meter/s |
| masl | meter/s above sea level |
| mg/l | milligram/s per liter |
| mm | millimeter/s |

## NOTES

In the report, "$" refers to US dollars, unless otherwise stated.

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1. The Third Small Towns Water Supply and Sanitation Sector Project (3 STWSSSP) will support the Government of Nepal's 15-year Development Plan for Small Towns. The project will improve water supply and sanitation service delivery in small-scale urban and semi-urban centers across Nepal over a period of five years (2015- 2020).

2. Musikot Khalanga town sub project is one of the subprojects proposed under 3 STWSSSP. The existing water supply system in Musikot Khalanga has poor reliability and the quality of services availed by the consumers is very low. Besides, the services available are only in parts of few wards i.e. ward no 1, 2, 3 of the Musikot Khalanga VDC. The main problem encounter with the existing system is related to the quantity of water supplied. Due to rapidly increasing population of the urban core area and insufficient water discharge in the sources, water is supplied only two hours a day which is by any means not sufficient to the consumers. The sanitary situation of Musikot Khalaga is found to be satisfactory. In the market area about 76.03% households have their own toilets. Some households have flush latrines and some have pit latrines. Hence the majority of the respondent having latrines in the service area has knowledge about the advantage of using latrines. People living in the households which do not have latrines defecate outsides (bushes, jungles etc.). There is no sewerage system in the service area. Solid waste management is also not good. The solid waste from the market area is been collected along the side of main road connecting airport area. Recently DDC has planned to construct the dumping site located in ward no. 9,Tthe land for this purpose has been acquired. The storm water drainage facility are provided to a small stretch along the road sides in the core market area which is also not in proper condition and needs rehabilitation

3. **Categorization.**Musikot Khalanga town subproject is classified as Environment Category B as per the SPS as no significant impacts are envisioned. Accordingly the Initial Environmental Examination (IEE) has been prepared and assesses the environmental impacts and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

4. **Subproject Scope.** The subproject is formulated under 3 STWSSSP to improve water supply and sanitation to improve water supply and sanitation service delivery in Musikot Khalanga Investments under this subproject includes; i) construction of piped water supply system (tube wells, water treatment plant, construction of transmission mains, overhead tank, distribution main and household connections), ii) construction of household latrines and public toilet, and iii) establishment of septage disposal site.

5. **Implementation Arrangements.**The Ministry of Urban Development is the executing agency. The Department of Water Supply and Sewerage (DWSS) is the implementing agency. Implementing activities will be overseen by a separate Project Management Office (PMO) which will be established in DWSS head office in Kathmandu and two Regional Project Management Offices (RPMOs) in the eastern and western region. A team of technical, administrative, and financial officials including safeguard specialists will be provided at the PMO to implement, manage and monitor project implementation activities. The RPMO will be staffed by qualified and experienced officers and will be responsible for the day-to-day activities of project implementation in the field, and will be under the direct administrative control of the PMO. Consultant teams are responsible for subproject planning and management and assuring technical quality of design and construction; and designing the infrastructure and supervising construction; and safeguards preparation.

6. **Description of the Environment.** Subproject components are located in Musikot Khalanga town area or in its immediate surroundings which were converted into agricultural and urban use for many years ago and there is no natural habitat left at these sites. The subproject components will be located in WUSC sites, public road rights-of-way (ROW) and community managed forests (that are not declared as protected areas). There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject locations.

7. **Environment Management.** An environmental management plan (EMP) is included as part of this IEE, which includes i) mitigation measures for environmental impacts during implementation, ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting, iii) public consultation and information disclosure, and iv) a grievance redress . A number of impacts and their significance have already been reduced by amending the designs. The EMP will be included in civil work bidding and contract documents.

8. Locations and sitting of the proposed infrastructures were considered to further reduce impacts. The concepts considered in design of sub project are: i) demand for new piped water supply; ii) maximum population coverage with pipe layout mostly in residential areas and areas of high growth rate; iii) avoidance of water-use conflicts, iv) locating pipelines within ROWs to reduce acquisition of land; v) locating pipeline at least 10 meters from latrines, septic tanks and any main drains to avoid contaminations; vi) locating tube wells at least 30 m upstream from sanitation facilities, vii) locating household and public latrines and septic tanks at least 30 meters downstream from the nearest drinking water source; viii) piloting controlled disposal of septage in accordance to WHO and US EPA standards to reduce the likelihood of uncontrolled disposal as currently practiced; ix) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection.

9. During the construction phase, impacts mainly arise from the need to dispose of moderate quantities of waste soil; and from the disturbance of residents, businesses, and traffic. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. These are common temporary impacts of construction in urban work in lean season and minimizing inconvenience by best construction methods will be employed. Traffic management will be necessary during pipe laying on busy roads. In t operational phases, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

10. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to be conducted during construction. The environmental monitoring program will ensured by a program of environmental monitoring to be conducted during construction. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

11. The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of subproject. The IEE will be made available at public locations in the town and will be disclosed to wider audience via the ADB and DWSS websites. The consultation process will be continued and expanded during project

implementation to ensure that stakeholders are fully engaged in the project and have opportunity to participate in its development and implementation.

12. The proposed subproject will bring several improvements including: (i) the benefits of access to reliable supply of safe and potable water by over one thousand households and access to improved sanitation facility by the public at the bus park and market places from proposed three numbers of public toilets.

13. **Consultation, Disclosure, and Grievance Redress.** Public consultations were done in the preparation of the project and IEE. Ongoing consultations will occur throughout the project implementation period. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

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

15. **Conclusions and Recommendations.** Therefore the proposed subproject is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of IEE, there are no significant impacts and the classification of the subproject as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009). The Government of Nepal EA will incorporate the findings and recommendation of this IEE and prescribed environmental management in the EMP.

# I. INTRODUCTION

## A. Name and Address of the Individual Institution Preparing the Report

16. **Name of the Proposal.**The name of the proposal is "Initial Environmental Examination" of Musikot Khalanga Town water supply and sanitation project in Rukum District. The location map of the proposed proposal is given in Figure.

17. **Name and Address of the Proponent.**The project proponent Second Small Towns Water Supply and Sanitation Sector Project (SSTWSSP) under Department of Water Supply and Sewerage (DWSS) will be the responsible agency for the implementation of the proposal. The name and address of the proponent is given below.

Government of Nepal
Ministry of Urban Development
Department of Water Supply and Sewerage
Second Small Town Water Supply and Sanitation Sector Project
Project Management Office
Panipokhari, Kathmandu
Tel: ++977 1 4423848, 977 1 4412348
Fax: ++977 1 4413280
E-mail: info@stwsssp.gov.np
Website: www.sstwssp.gov.np

## B. Basis and Extent of the IEE Study

18. The government of Nepal has prepared a 15 years development plan to implement the water supply and sanitation programs in emerging towns or small towns in order to improve the health and the quality of life of the people living in the project towns by constructing and extending water supply system, drainage and sanitation facilities and providing health and hygiene education programs in the towns. The project follows the community managed demand responsive approach where the community will be involved from the very planning phase to the implementation phase for the operation and maintenance of the subprojects soon after it is completed. The project, 'Small Towns Water Supply and Sanitation Sector Project, STWSSSP' is the outcome of that effort. The "Asian Development Bank" (ADB) has been providing financial assistance to implement the project in both the phases. The "Department of Water Supply and Sewerage" (DWSS) is the implementing agency whereas the "Ministry of Urban Development" (MOUD) is the executing agency.

19. Both the Nepali law and ADB policy require that the environmental implications of individual developments are taken into account in the planning and decision making process and that action is taken to reduce the impacts to acceptable levels. This is done through the environmental assessment process, which has become an integral part of lending operations and project development and implementation worldwide. Though this IEE report is prepared meeting GoN and ADB requirements, the IEE template of EPA/EPR 1997 of GoN is followed to prepare the document.

20. The IEE Report primarily: (i) provides information on the subproject and its environmental requirements; (ii) provides the necessary baseline conditions of the physical, ecological, physical cultural and socio-economic environments and/or resources in and surrounding the Subproject's area of influence; (ii) identifies and assesses potential impacts

arising from the implementation of the Subproject 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 Subproject preparation (v) recommends a mechanism to address grievances on the environmental performance of the Subproject; and (vi) provides an environmental management plan.

## C. Objectives and Scope of the Environmental Study

21. The main objective of the present IEE study for Water Supply and Sanitation purpose is to fulfill the requirements pertaining to Rule 3, Annex G of Schedule 1 of the Environmental Protection Act, 1997 (including amendments 1999 and 2007) and to ensure the environmental and social sustainability of the project. It aims to help the decision makers to make informed decision about the project.

22. The specific objectives of the IEE study are as follows:

- To identify, predict and evaluate the potential beneficial and adverse impacts of the project on the physical, biological and socio-economical resources in the project area
- To suggest enhancement measures to augment the benefits of the project and to propose suitable mitigation measures to avoid, minimize and compensate the adverse impacts of the project
- To prepare appropriate Environmental Management Action Plan (EMAP)
- To inform public about the proposed project and its impact on their livelihood
- To prepare an IEE as per the EPR, 1997

23. **Scope.**The present IEE study for the water supply and sanitation project is proposed for Khalanga VDC in Rukum district. The study focuses on the adverse environmental impacts and its mitigation measures relating to the location, design, construction and operation of all the project activities.

## D. Relevancy of the Project

24. The proposed water supply and sanitation project is a need to be studied from the environmental point of view as per EPA 1997 and EPR 1997 (Amendments 1999 and 2007). The Proposed Musikot Khalanga Town Water Supply and Sanitation Project is intended to serve the Khalanga VDC ward no. 1, 2, 3, 5 &8 . 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 overcome the hardship they are facing in fetching even a single jar of water. The project needs to go through IEE process as stipulated in EPR 1997(Amendments 1999 and 2007).

25. 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 (H) shall only be applicable, if the proposal does not fall under categories (A) through (H) of Annex 3. Table 2.1 compares the status of the project point by point against the conditions defined by Environment Protection Act 1997 and Environment Protection Regulation 1997 (and its amendments 2007) for which a drinking water will require IEE or EIA.

**Table I-1: 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 Annex 3 h | Conditions in the project |
|---|---|---|---|---|
| 1 | River Control (training) | Up to 1 kilometer | Over 1 kilometer | NA |
| 2 | Channeling Water from one Watershed to Another | 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 Source with a safe yield of | Up to 1 cusec and utilizing up to 50 % of the available quantity | More than 1 cusec and utilizing the total available quantity | NA |
| 5 | Ground Water Recharge | Up to 50 % of total aquifer | More than 50 % of aquifer | NA |
| 6 | Water Treatment | Up to 25 liter per sec | More than 25 liter per sec | Within the limit, two separate treatment unit of capacity less than the threshold |
| 7 | Construction of Tunnel for Channeling Drinking Water | Tunnel constructed | Tunnel constructed | Not constructed |
| 8 | Water Resource Development which Displaces People Permanent Residents) | 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 18741 population |
| 11 | Connection of New Source to Supply Water to existing water supply system for a population of | 10, 000 - 100, 000 | More than 100, 000 | NA |
| 12 | Operation of a drinking water supply system with inclusion of sewage disposal system with sewage treatment system | Installed | Installed | Sewage treatment system with reed bed treatment plant has been proposed to install in project. |
| 13 | Extraction of ground water from sources which are located at point and non-point sources of biological and chemical pollution and/or their influenced areas. | Not done | Done | No non-point and point sources of pollution is present in the vicinity of the water source |
| 14 | Operation of water supply project included in a multipurpose project utilizing a source of 25 liter per sec water. (Construction of Multiple Purpose Reservoir Required) | Not operated | Operated | This is not a multipurpose project and is solely for water supply |

## II. GON AND ADB PLAN, POLICY AND REGULATIONS RELATED TO ENVIRONMENTAL AND SOCIAL SAFEGUARDS

### A. GoN's National Laws, Policies, Acts, Regulations, Standards and Guidelines

26. Most of the national policies and laws of the Government of Nepal (GoN) are in favor of environmentally sound economic development and growth. Following table summarizes the relevant policies, acts and regulations and guidelines that have been an integral part of the project and have been reviewed during the preparation of the IEE report.

**Table II-1: National Policies, Acts, Regulations and Guidelines**

| |
|---|
| ***Policies*** |
| ***Interim Constitution of Nepal, 2007***<br>The interim constitution of Nepal realized environmental protection as the policy of the state. Clause (4) of Article (35) of the constitution states that 'The State shall, while mobilizing the natural resources and heritage of the country that might be useful and beneficial to the interest of the nation, pursue a policy of giving priority to the local community'. The Clause (5) states that 'The State shall make necessary arrangements to maintain the natural environment. The State shall give priority to special protection of the environment, and rare wildlife, and prevent further damage due to physical development activities, by increasing awareness of the general public about environmental cleanliness. Provision shall be made for the protection of the forest, vegetation and biodiversity, their sustainable use and for equitable distribution of the benefits derived from them'. |
| ***Second Three Year Interim Plan (2068 - 2071)***<br>The interim plan provides the most recent guidance on urban sector priorities highlighting, in particular, the need to address the effects of rapid urbanization on service levels, water quality and scheme maintenance. It proposes the full integration of sewerage, on-site sanitation and solid waste management in all urban schemes and specially endorses cost recovery from consumers. Local authorities are responsible for overseeing project implementation but with private sector organizations playing increasing roles. |
| ***National Policy on Rural Drinking Water Supply and Sanitation, 2004***<br>Provides guidance on water and sanitation service provision in rural areas using community led participatory approaches. While partially relevant t the urban context, particularly around the integration of inputs and local capacity building, it generally fails to address the complex operational challenges to be faced by Municipal authorities in implementing and managing urban services. |
| ***National Urban Policy (2007)***<br>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. |
| ***National Urban Water Supply and Sanitation Sector Policy, 2009***<br>Formulated to provide the overall policy support and guidance towards achieving equity in service delivery by ensuring that the financially marginalized households within the system areas are mainstreamed as valid customers of service through design and implementation of financial incentives where so required. It aims to ensure that the roles and responsibilities of central and local government bodies, external development partners, private sector including NGOs and user groups are clearly defined in scheme implementation and regulation and performance management in accordance with national decentralization policy. |
| ***Acts and Regulations*** |
| ***Environmental Protection Act (EPA), 1997 & Environmental Protection Regulations (EPA), 1999 (and amendments)***<br>EPA and EPR have several provisions to institutionalize environmental consideration in development projects. Section (5) of EPA stipulates that 'a proponent who is desirous of implementing any proposal shall have to submit such a proposal, accompanied by the report on Initial Environmental Examination or Environmental Impact Assessment of the proposal, to the concerned agency for the approval of such a proposal. The EPR elaborates provisions to prepare and submit the scoping report, Terms of Reference (TOR), and IEE/EIA report for approval and includes public consultation processes. As per the EPR, the Environmental Assessment report, in general, should include detail information on impacts and environmental protection measures, including implementation plan, monitoring and evaluation and environmental auditing. Public consultation is a pre-requisite in all the |

prescribed projects.

***Local Self Governance Act, 1999 & Local Self Governance Regulations, 2000***

The Act empowers the local bodies for the conservation of soil, forest and other natural resources and implements environmental conservation activities. It also describes about the user group formation to implement the programs in the local areas. The Regulation has provisions for Village Development Committee (VDC), District Development Committee (DDCs) and municipality to coordinate and implement development projects/programs and to provide approval or clearance of the proposed project.

***Water Resources Act, 1992 & Water Resources Regulation, 2000***

Water Resource Act is an umbrella act governing water resource management. It declares the order of priority of water use; vests ownership of water in the state; prohibits water pollution; and provides for the formation of Water User Association and system of licensing. The Regulation sets out the procedure to register a WUA and to obtain a license and sets out the rights and obligations of WUA and license holders.

***Drinking Water Regulations, 1998***

Regulates the use of drinking water and deals with the control of water pollution and maintenance of quality standards for drinking water. It also sets out the conditions of service utilization by consumers

***Nepal Water Supply Corporation Act, 1989 (and amendments) & Water Supply Management Board Act, 2006 & Water Supply Tariff Fixation Commission Act,2006***

These acts facilitate the improved management of water and sanitation services. They establish the legal basis for private sector management of schemes and independent fee setting and regulation applicable to all urban schemes

.

***Water Tax Act, 1966***

Under the Act, the water user who use water through a tap distributed by the government is obliged to pay water tax as fixed by prevalent laws and charges are levied if the tax is not paid within the time as fixed by the law.

***Solid Waste Management Act (2011)***

Article 4 provides that the management of hazardous, medical, chemical or industrial waste rests upon the generators of such wastes. Management should be as prescribed in the Act. Article 5 provides that individuals and entities have the duty to reduce the amount of solid waste generated while carrying out work or business.

***Land Acquisition Act, 1977 & Land Acquisition Rules, 1969***

The Land Acquisition Act and the Rules are the two main legal instruments that specify procedural matters of land acquisition and compensation. Under these, the Government is allowed to acquire any private land paying reasonable compensation to the affected party for any public purposes or for operation of any development project initiated by government institutions and the water resources laying and originating within such acquired area is spontaneously acquired under this process.

***Forest Act, 1993 & Forest Regulations, 1995 (including amendments)***

Since forest has an important role in managing water resources, Forest Act has many provisions effecting the integrated water resources management of the country. The basic objective is developing and conserving the forests of the country. The government can provide parts of any type of forest for the implementation of national priority plan with the assurance that it does not adversely affect the environment. The Regulation further elaborate legal measures for the conservation of forests and wild animals.

***Labor Act, 1992***

The Act emphasizes on occupational health and safety of workers and stipulates provision of necessary safety gears and adopting necessary precautionary measures against potentially hazardous machine/equipment in the workplace. It also stipulates to make arrangements 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.

***Child Labor Prohibition and Regulation Act, 2001***

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 sub clause 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"

***Town Development Act, 1988***

The Act has provisions about the formation of town development committee in any town area to implement town planning and in carrying out the developmental and reconstruction work of that town.

***Standards and Guidelines***

***National EIA Guidelines, 1993***

In the process of implementing National Conservation Strategy (NCS) in 1990, the government of Nepal in collaboration with The World Conservation Union - IUCN developed a locally suitable environmental assessment guideline. Although National EIA guidelines are procedural guidelines, it substantially encouraged the proponent to prepare an EIA report of the prescribed development projects and programmes and serves as the primary source of integrating environmental aspects in major development projects. The National EIA Guidelines contains objectives, methods of screening projects requiring the level of environmental assessment (IEE or EIA), scoping, impact identification and prediction, report review, monitoring and evaluation and impact auditing ensuring public participation during the preparation of the IEE/ EIA report.

***National Drinking Water Quality Standards (NDWQS) and Directives, 2005***

Provides details of the water quality standards to be applied to all water supply schemes. These set out the water quality parameters, which the water suppliers should adhere to. The directives also ensures that the water sampling, testing and analysis procedures used to certify that the drinking water supplied or to be supplied conforms to the NDWQS and also sets the monitoring and surveillance procedures to certify that the quality of supplied water conforms to the standards.

***Water Resource Strategy, 2002***

Provides a systematic framework for water resource development and identifies action plans to avoid and resolve conflicts and achieve water related development objectives. It has identified the need to integrate and coordinate all the uses of natural resources within the catchment basis and has laid emphasis on the development and management of water resources in a holistic, systematic manner, relying on integrated water resources management.

27. Relevant Environment Standards:

**Table II-2: 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 Guideline Values on Noise Level |
| Drinking water quality | National Drinking Water Quality Standards, 2006 | WHO Guidelines for Drinking-water Quality, Fourth Edition, 2011 |

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

## B. ADB Policy (ADB's Safeguard Policy Statement, 2009)

28. ADB's Safeguard Policy Statement (SPS), a consolidated policy, describes common objectives of ADB's safeguards, lays out policy principles, and outlines the delivery process for ADB's safeguard policy. The SPS is designed for application to current and future lending modalities and caters to the varying capacities and needs of clients in both the public and private sectors and will supersede the three current safeguard policies.

29. ADB's current safeguard policies are generally understood to be operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including

protecting the rights of those likely to be affected or marginalized by the development process.

30. ADB's SPS highlights a number of areas that require attention in ADB's environmental assessment process. It addresses the need for more upstream environmental assessment at the level of country programming, the need for more structured consultation in the conduct of environmental assessments, the need for greater emphasis on monitoring and compliance with environmentalrequirements during project implementation, and finally the need to view environmental assessment as an ongoing process rather than a one-time event.

31. ADB requires environment assessment of all project loans, program loans, sector loans, sector development program loans, financial intermediation loans, and private sector investment operations. The process of determining a project's environment category is based on a screening checklist that considers the type, size, and location of the proposed project. Loans are classified into category A (with potentially significant environmental impacts); category B (with potentially less significant environmental impacts); category C (unlikely to have significant environmental impacts); and a new category, FI, (credit line for subprojects through a financial intermediary, or equity investment in a financial intermediary). A project's environment assessment category is determined by the category of its most environmentally sensitive component, including both direct and indirect impacts. An IEE is required for category B projects, and an EIA, requiring greater depth of analysis, for category A projects. No environmental assessment is required for category C projects although their environmental implications nevertheless need to be reviewed.

32. The proposed Musikot Khalanga Town Water Supply and Sanitation Project is classified as environment category B as per the ADB guidelines and following normal procedures for project loans, an IEE was conducted. The IEE has been done based on the checklist completed to support the environmental classification of project under ADB (Refer Annex A for REA checklist).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. With respect to 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.[1]

33. ADB's Environmental Safeguards policy principles are defined in SPS (2009), Safeguard Requirements 1 and the IEE is intended to meet these requirements.

**Table II-3: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 Subproject is **NOT**: (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. |

[1] 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/EnvironmentalGuiidelines

| | |
|---|---|
| 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 trans boundary global impacts, including climate change. | IEE has been undertaken to meet this requirement. (Section VI). No trans boundary& 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 Section III. |
| Avoid, and where avoidance is not possible, minimize, mitigate, &/or offset adverse impacts and enhance positive impacts by means of 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. Section IX |
| 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. Annex D. A grievance redress mechanism for the resolution of valid Project-related social and environmental issues/concerns is presented in Section VIII. |
| Disclose a draft EA (including the EMP) in a timely manner, before project appraisal, in an accessible place & in 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 prior to Project appraisal. The GoN has approved the IEE Report. Copies of both SPS-compliant IEE and GoN-approved IEE will be made available at the offices of the PMO, PISU 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, | The subproject does not encroach into areas of critical habitats. Transmission main from RVT-Sitalpati to RVT-Intermediate passes through a community forest. The Community Forest Users' Group has given its consent for the Subproject to use the land for said component. No tree will be cut. However, ground cover and low shrubs in the subproject footprint and some work easement will have to be removed for the transmission main. Although in due time, ground cover is expected to naturally grow over the backfilled affected area, EMP recommends seeding of the re-surfaced area to accelerated re-growth. |

and management of renewable natural resources.

| | |
|---|---|
| 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 Subproject 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 Subproject 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 communities. | EMP provides measures to mitigate health and safety hazards during construction and operation. |
| Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during 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 Subproject will not affect any physical cultural resource. The EMP recommends the measure/s to mitigate adverse impact on PCRs in case of chance find. |

# III. APPROACH AND METHODOLOGIES FOR CONDUCTING IEE

## A. Approach and Methodology

34. The present initial environmental examination report has been prepared based on the terms of reference (TOR) submitted to PMO for the approval process from the ministry of Urban Development, of the government of Nepal. The study has followed the provisions outlined in the Environmental Protection Act, 1997 and Environmental Protection Regulation, 1997 and Safeguard Policy Statement, 2009 of the Asian Development Bank (ADB). The major activities undertaken during the preparation of IEE are outlined below.

35. **Desk Study**.The available secondary data such as relevant information, documents, related maps, aerial photographs, newspaper etc. and the engineering report of the project and other relevant documents were thoroughly reviewed. Policies, legislations and guidelines relevant to the project were referred. The desk study also involved the preparation of questionnaire/checklists/matrices for collection of primary data for both bio-physical and socio-economic assessments.

36. **Field Work**.A detail field investigation was carried out during June 2013 to collect the baseline information on the basis of physical, socio economic and cultural environment of

the project area. The local communities were consulted to comprehend the existing social and physical nature of the area. A walkover survey was carried out to identify the environmental structures and to gather relevant baseline information. The details of the field study on various aspects (physical, biological and socio-economical) and the questionnaire used for socio economic survey of the project area.

37. **Physical Assessment.**Existing physical attributes of the project area were studied through topographical map and site observation, complemented by secondary source of information from reports and interviews.

38. **Biological Assessment.**The ecological attributes of the area were gathered during the field survey. Information on vegetation pattern, wildlife, parks and reserves, sensitive habitats were collected. Identification of wild flora and fauna, rare and endangered species were done during field observation and by questionnaire survey. The scientific names of the flora and fauna were later recorded using secondary data/references.

39. **Socio-economic Assessment.**Socio-economic and cultural environment of the project such as population, community structure, distribution of income, source of livelihood, and expected water users were obtained through various secondary and primary sources of data. These included literature review, questionnaire survey, focus group discussion, and the suggestions and comments obtained from all relevant stakeholders through public notices.

40. **Data Processing.**The information obtained from the desk study and field works were processed in a standard format to maintain consistency. The data were tabulated and maps were interpreted. The mitigation and monitoring measures were then proposed based on the impacts identified during the study.

41. **Preparation of IEE report.**Upon meeting the GoN and ADB requirements for conducting IEE, an IEE report is prepared in a format prescribed in Environmental Protection Regulations 1997. The format for EPR 1997 is followed but the requirements of ADB are compiledwhile preparing the report in GoN format.

## IV. DESCRIPTION OF THE PROJECT

### A. Location and Accessibility of the Project Area

42. Musikot Khalanga is the headquarters of Rukum District in the mid-west hills of Nepal. It extends from 28° 37' 45" N and 82° 27' 59" E to 28° 37' 27" N and 82° 27' 56" E at elevation ranging from 1300 to 1500 meters elevation above mean sea level (msl). Rukum district is a middle hill district some 297 km west of Kathmandu in Rapti zone of Nepal's Mid-Western Region. Rapti highway (H11) from Tulsipur connects Musikot to national road network. Rapti highway extends from Tulsipur along Sarda River as finished sealed gravel surface road up to Salyan (Sitalpati) and earthen road section to Musikot, Rukum. The existing earthen section is under construction to upgrade as finished sealed gravel surface road. Musikot Khalanga town has bus connections to Tulsipur, Gorahi, Nepalgunj and Kathmandu. Before the road link flights were the only option to Musikot Khalanga. There are two airports, located in Chaurjahari and salle in Rukum which is being serviced by Nepal Airlines Corporation (NAC) to Kathmandu and Nepalgunj. The district's headquarter is named as Musikot or Musikot Khalanga often jumlikhlanga. The sub project area is delineated on the Google Map as presented in the Figure.



43. Rukum, Musikot Khalanga lies on mild slope of hill surrounded by forest with subtropical climate. The mean air temperature at khalanga ranges from 24.4$^{o}$ C to 18.8$^{o}$ C with an average of 12.8$^{o}$ C .Its geography favors lot of rainfall. Average rainfall based on the metrological data is recorded as 1500mm. The maximum precipitation data was recorded as 2843mm in 2000 A.D.

## B. Existing Water Supply and Sanitation Situation

### 1. Water Supply System

44. Musikot is emerging town with increasing water demand. The current demand is partially fulfilled by some existing water supply systems. There are many local small water

supply systems. Major water supply systems which are providing service in urban settlements are explained as follows.

### 2. GheuKhola System

45. This system is gravity flow system established in 2040-2042 BS taping water from GheuKhola. The intake structure is costructed on stone masonry at 1520 m above msl. The measured discharge at source was found to be 3 lps. 63mm HDPE pipe is used as transmission line. A 65 cu.m Stone masonry reservoir is made near water user committee office in the premises of District Water Supply Office, Rukum. The condition of reservoir is satisfactory and properly functioning. WUC has made various efforts to maintain the condition and serviceability of the tank.

46. This system served the major market area including Mathillo Bazaar and Bich Bazaar. Two distribution mains run to DDC area and Distict Administration Office area. 50mm HDPE and 75mm HDPE are two transmission mains. The distribution serves in KalikaMandir area, Balmandirtole and government offices also. Water supplied can poorly meet the basic requirement.

### 3. OkharKhola System

47. This system is gravity flow system established in 2063-2064 BS and extended in 2067-2068 taping water from OkharKhola in two springs. The intake structures are stone masonry. The measured discharge at source was found to be 0.3+ 0.25 lps. 50mm HDPE and another 40mm HDPE pipe are used as transmission line to reservoir. Two 20 Cu.m Ferro cement reservoir is made near Hulak office. The extended new reservoir and the old one are good and properly functioning.

48. This system served the major market area including PatuKhola, Shallaghari and tallo bazaar. Two distribution mains run along the market to serve the service area. Two distribution mains run along the pocket area.75mm HDPE and 40 mm HDPE run for distribution. The water supply is insufficient in the area. There are no major commercial Institutions in the area. Water supplied mainly for household level.

49. There are near about 178 private tap stand including connections for Go and NGOs extending in Khalanga, Salaghari and Patukhola area. There are 2 public tap stands. The distribution system is intermittent. Supply is made three hours in the morning and two hours in the evening. Water revenue is collected as Rs.7.5 per units collective Rs. 75 for 10 units in private taps and 10 units for Institutional and commercial blocks especially hotels and they charge Rs. 125 for 10 units for an office. Rs. 12 additional charge collected for Extra units. The connection Charges were collected as Rs. 4200.

50. The current situation of water supply is insufficient for growing demand. To meet the current demand the improvement in the supply system along with increase extraction of water from the source.

### 4. BhitriKhola/TimurKhola System

51. This system is gravity flow system established in 2060-612 through tapping water source located in north eastern part of the ward no. 2. The system is providing services to main bazaar area of ward no. 2, Army Barack area, Airport area. The same source is being used by the district hospital with construction of 12 cum ferrocement tank in their premises. Only 14 cum capacity ferrocement tank is providing service to the beneficiary community and institutions. The system is being operated as an intermittent system. The practice of water tariff collections is carried out for the operation & maintenance of the system.

### 5. SijeriKhola System

52. This system is also a gravity system & serving the community of ward no. 3 with using the source SijeriKholaMuhan located in North-Eastern part of ward no. 3. The system is built in 2058. There are two small tank located within the community to serve the community. The tariff collection practices are carried out for O & M of the system.

## C. Sanitation Facilities in Project Areas

53. The sanitary condition of the project area is satisfactory. Majority of the households have their own toilets in or outside the house. In fast growing urban areas most of the buildings have been constructed with water sealed toilet or flush toilet with septic tanks. The latrine or toilet coverage in the project area is satisfactory i.e. 76.03%. Annual rainfall of 1500 mm and rainfall intensity of 65 mm per hour has been observed at the project area. In sloppy landscapes all the surface run-off storm water were either observed or accumulated by the plants, animals and parts of them infiltrated and rest started to flow. Very few water borne diseases had been observed in the project area during the field visit.

## D. Drainage Facilities in Project Areas

54. There are no proper surface drainage facilities available in the sub-project area except in the market area. The project area is situated in hilly area. Due to this, there is high probability of landslides in rainy season. During road construction, constructions of some surface drainage were also been included. However, during our discussion with the WUSC it was clear that the interest on the implementation of drainage improvement in the area falls in the last preference.

## E. Solid Waste Management in Project Areas

55. There is no system of solid waste collection and disposal. Some housekeepers and shopkeepers arrange to throw solid waste in their own-premises. The general trend is to throw the waste wherever convenient. The District Development Committee is taking the initiative to construct a landfill site in the forest located in Ward No. 9 of Khalanga VDC.

## F. Type, Category and Need of the Subproject

56. The proposed **"Musikot Khalanga Town Water Supply and Sanitation Project"** is a surface water based gravity type water supply system project covering Musikot Khalanga VDC ward no. 1, 2, 3, 5, and 8. The project comprises of two major components- water supply and sanitation.

57. The water supply part comprises of a gravity flow scheme. Five intakes have been proposed out of which four numbers of sources lies in Musikot Khalanga VDC itself and one source PanaKhala lies in the adjacent Shank VDC, to fulfill the water demands of the people of the project area. Also five reservoirs have been proposed for storage of water.

58. The existing system in Khalanga is supplying water to about 2-3 hrs a day with intermittent supply with very limited untreated water. This shows a hardship of water at all the. In the light of this situation, the desire for better and improved services are the needs of the people residing in the area and thus the project area has been identified as falling under the sever category of problem.

59. Musikot is emerging town with increasing water demand. The current demand is partially fulfilled by some existing water supply systems through haphazard distribution with intermittent supply of water for few hours that need to be augmented for better service. The

improvement of existing system cannot fulfill the total water demand of project area and need of additional source in the higher elevation is necessary to meet the water demand.

60. Hence to meet the current as well as growing future demand of Khalanga, Musikot, a well-managed water supply system is felt needed. The Musikot Khalanga Small Town Water Supply and Sanitation Project is a good opportunity for the community to fulfill their water supply and sanitation need.

### 1. Magnitude of Operation of Project

61. The water supply system has been designed for a base year population of 10113 for the year 2015. The system has been designed to tap surface water source from five number of intake using five different water sources for a total design year population of 18741. Five numbers of water storage reservoir tanks has been proposed at different locations considering in mind the elevation difference of the service area to reduce the break pressure tanks with a capacity varying from 350cum to 30cum of capacity. The capacity of 350cum, 105cum, 50cum, 40cum and 30cum with total of 575cum storage capacity of reservoirs are designed for the collection and storage of water.

### 2. Proposed Schedule for Implementation

62. The exact schedule for implementation of the project will be known after the work has been assigned to the contractor. For the feasibility study, detailed engineering design study and construction, three years period has been assigned. Therefore the base year for the project has been assumed as the year 2015 and considering design period as 20 year the design year has been taken as the year 2035.

63. The main task associated with the project will be as follows:

- Preparation of Detailed Engineering Design
- Preparation of Working Drawings
- Preparation of Quantity and Cost Estimates
- Carrying out of Economic and Financial Analysis and level of Water Tariff
- Preparation of Socio Technical Profile
- Environmental Study of the Sub Project Area
- Preparation of Tender Documents
- Awarding of Contract
- Construction
- Operation and Maintenance

64. The project has been designed with the principle of active community participation from the design stage itself. The implementation strategy of the project is based on the community management approach, which includes encouraging the financial responsibility towards the improved facility. Therefore, user participation at the outset of the planning and design exercise is an essential requirement. The community has to contribute 50% of the total construction cost. Out of which 5% has to be deposited before implementation of the project as upfront cash. Another 35% - 45% to be contributed taking the loan from TDF. The loan should be recovered within the time frame of 15 years with 5 years of grace period, along with the interest of 5% per annum through their affordable water tariffs plus. Tariff raised by the service has to support towards maintenance of the supply system of the water supply system. DWSS is acting as the initiator/coordinator for the purpose.

## 3. Project Requirements

### i. Materials Required for Constructions

65. The following Table shows the materials required during construction and operation of Musikot Khalanga Town Water Supply and Sanitation Project.

**Table IV-1: Materials Required**

| Particulars | Unit | Quantity | Source | Adequacy |
|---|---|---|---|---|
| Cement | Bags | 6800 | Dang | Sufficient |
| Aggregate | Cu m | 585 | BheriKhola, Rukum | Sufficient |
| Sand | Cu m | 235 | BheriKhola, Rukum | Sufficient |

### ii. Human Resource

66. The proposed Musikot Khalanga Town Water Supply and Sanitation Project, entails both skilled and unskilled laborers for its construction and operation in the proposed site. As such for this work a total of 8600 skilled labors and 54680 unskilled labors person days are required. The laborers estimation were made on the basis of rate analysis and as far as possible they will be hired from the local market and its adjoining area.

**Description of the Sub-project**

67. The Musikot Khalanga Town Water Supply and Sanitation Project have been designed as surface water based water supply system that will provide sufficient quantity and good quality of water to the residents of Musikot Khalanga VDC. The water supply component of the project consists of following construction components.

- Intake with collection chambers
- Intake Filter
- Slow Sand Treatment Unit
- Chlorine Contact Tank
- Ground water Reservoir
- House (Private) Connection
- System Appurtenances
- Chemical Storage and Chemical Dosing unit
- Office Building
- Guard and Operator Quarter
- Water Quality Testing Laboratory
- Boundary Wall

68. The sanitation component of the project consists of a construction of 3 numbers of public toilets at the Bus Park at Salle and at Ticket counter in Main Bazaar and near school at Serigaun. 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 deal with all the sludge generated from the waste water.

69. The decentralized waste water treatment plant is also designed only in conceptual plan to facilitate the core urban area for about 200 households. The system includes grit removal chamber and reed bed treatment system with septic tank unit. The effluent water from the treatment plant is provisioned for the irrigation purpose for the paddy land lying in lower elevation. The treatment plant is conceptualized at downhill side of the main settlement where the waste water is being disposed haphazardly by the community at

present time as well. Though the design of the waste water treatment plant is carriedout, this sub project doesnot include these components as are not forwarded for implementation. The subproject only includes public toilet, septage carrying vehicle, waste collection vehicle and sludge drying bed as sanitation components.

70. The salient feature of the project is given in Table IV-2

**Table IV-2: Salient Feature**

| S.N. | Items | Description |
|---|---|---|
| **A** | **Project Detail** | |
| **1** | **Name of the Project** | Musikot Khalanga Town Water Supply and Sanitation Project |
| **2** | **Type** | Surface Water |
| **3** | **Study Level** | Detail Engineering Study |
| **4** | **Location Area** | |
| | Region | Mid-Western Development Region |
| | Zone | Rapti |
| | District | Rukum |
| | VDC/Municipality | Musikot Khalanga |
| | Ward | 1, 2, 3, 5 & 8 |
| **5** | **Available Facilities** | |
| | Road | Rapti Highway |
| | Electricity | Available |
| | Communication | Available |
| | Health Services | Available |
| | Banking Facilities | Available |
| **B** | **Detail of System & Design Component** | |
| **1** | **Source Characteristics** | |
| | Source Type | Surface Water |
| | Number of Water Source Used | 5 |
| | Name of Source | PanaKhola, LaharaVijaune, SijeriKhola, TimurKhola and GhiuKholaMuhan |
| | Source Location | Shank VDC Ward No. 9, Musikot Khalanga Ward no. 3, 3, 2 & 1 respectively |
| | Safe Yield (lps) | 49.60 lps |
| | Design Tapping Yield (lps) | 30 lps |
| **2** | **Type of Structures** | |
| | (a) Intake | 5 |
| | (b) Slow sand filter with chlorine contact tank | 2 set |
| | (c) Water Storage Tank (Capacity / Nos.) | 5 (570 cum) |
| | (d) Office Building | 1 |
| | (e) Guard cum Operator House | 2 |
| | (f) Chemical Storage cum Pump House | 2 |
| | (g) Interruption Chamber | 5 |
| | (h) Interruption Chamber | 66 |

| S.N. | Items | Description |
|---|---|---|
| | (i) Valve Chamber | 47 |
| | (j) Boundary Wall | 350 m |
| | (k) Household Connection | 1057 |
| | (l) Fire Hydrant | 5 |
| **3** | **Pipe Line** | |
| | HDPE Pipe (Km) | **41.015** |
| | GI Pipe (Km) | **2.465** |
| | DI Pipe (Km) | **0.628** |
| | **Total** | **44.11** |
| **4** | **Social Status** | |
| | Present Population (2012) | 9219 |
| | Base Year Population (2015) | 10113 |
| | Design Year Population (2030) | 18741 |
| | Growth Rate % | 3.13 |
| | Household Numbers (2012) | 1214 |
| **5** | **Total Cost of the Water Supply Scheme** | **NRs. 169,592,567.00** |
| **6** | **Cost Sharing Arrangement** | |
| | GoN/ADB Grant (70%) | NRs. 118,714,796.90 |
| | TDF Loan (25%) | NRs. 42,398,141.75 |
| | WUSC's Contribution for upfront (Cash 5 %) | NRs. 8,479,628.35 |
| **7** | **Economic Analysis** | |
| | FIRR | |
| | EIRR | |
| **8** | **Environment** | |
| | ADB Category | B, Only IEE necessary |
| | IEE finding | No significant adverse impact. |
| **9** | **Cost Per Unit/Per Capita Cost** | |
| | For Base Year Population | 16680 |
| | Design Year Population | 9001 |
| **10** | **Total Cost of Sanitation Components** | |
| | Total Cost of Waste Water Management System of Immediate Needs | **NRs. 16,572,979.36** |
| | GoN Component (85 %) | NRs 14,087,032.46 |
| | Local Body contribution (15%) | NRs 2,485,946.90 |
| **11** | **Total Cost of the Water Supply Scheme excluding Sanitation Components** | **NRs. 169,592,567.00** |
| **12** | **Total Cost of Project including Sanitation Components** | **NRs. 186,165,546.30** |

**Figure IV-1: Project Area Map Showing Proposed Service Area with Proposed Transmission and Distribution Pipeline Network**

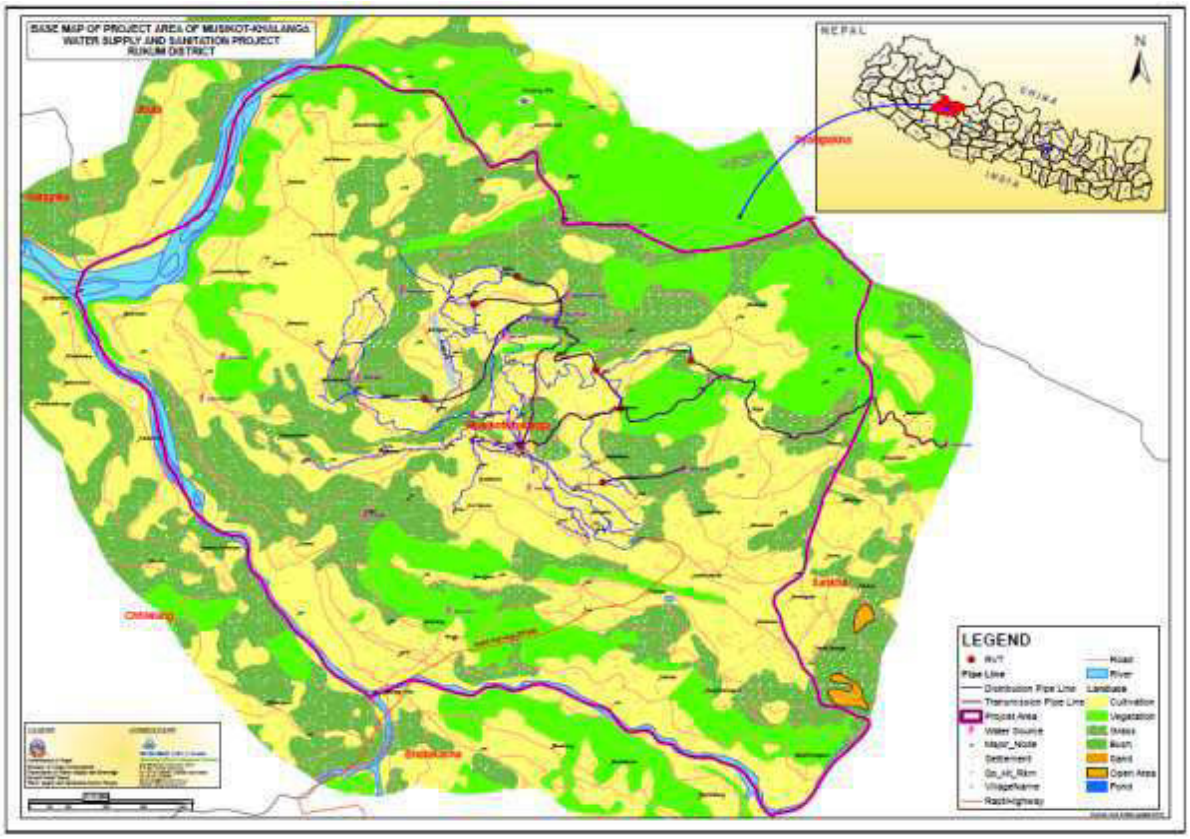



**Figure IV-2:Schematic Diagram of System Showing Different Components of the Sub Project**

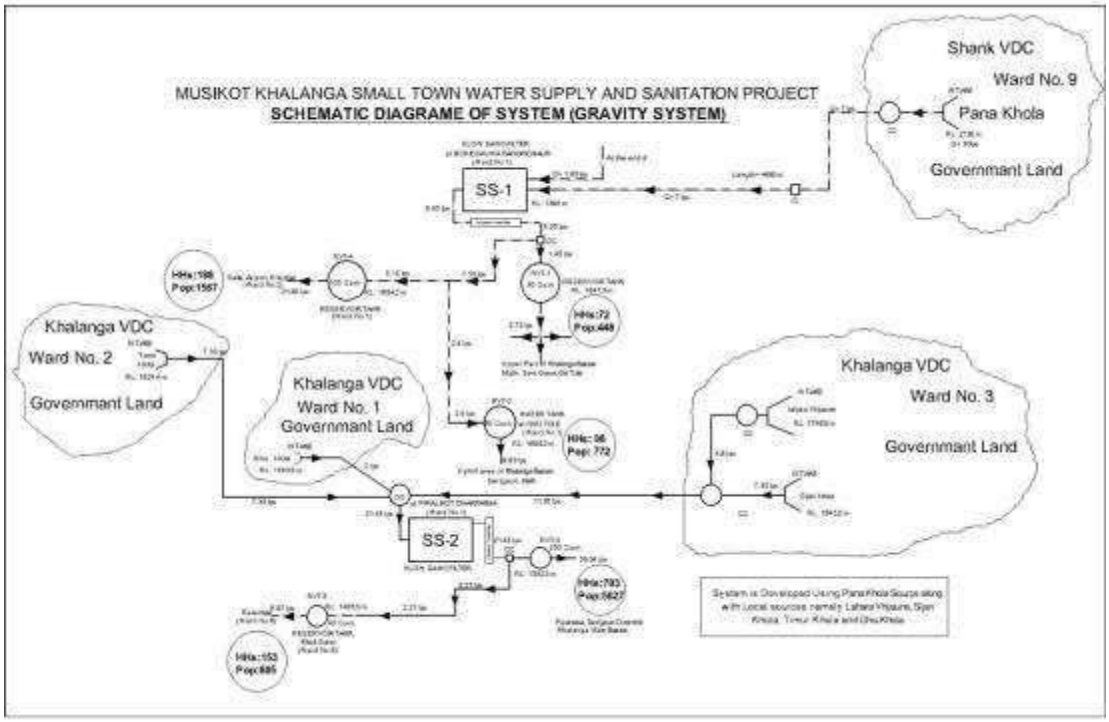
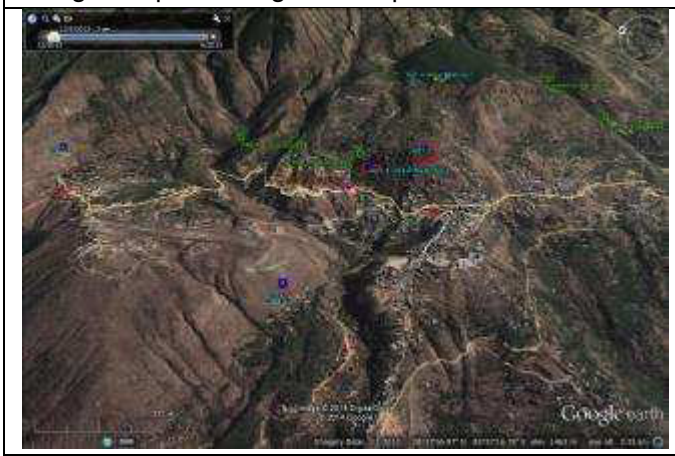


**Figure IV-3:Google map showing different components of the proposed Musikot-Khalanga water supply and sanitation project**

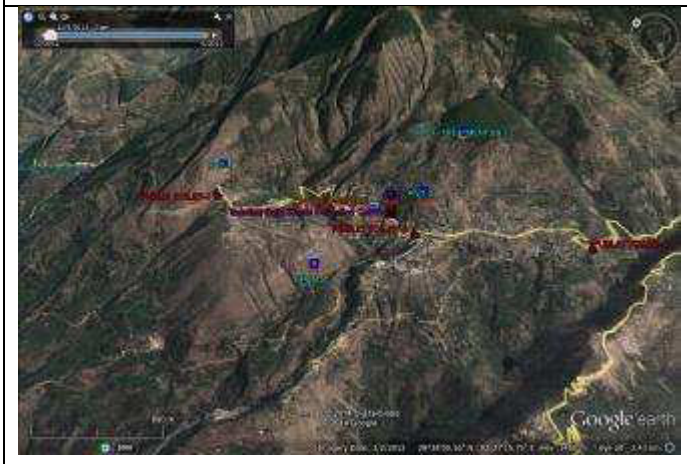
Google Map Showing All Components

Google Map Showing Water Sources



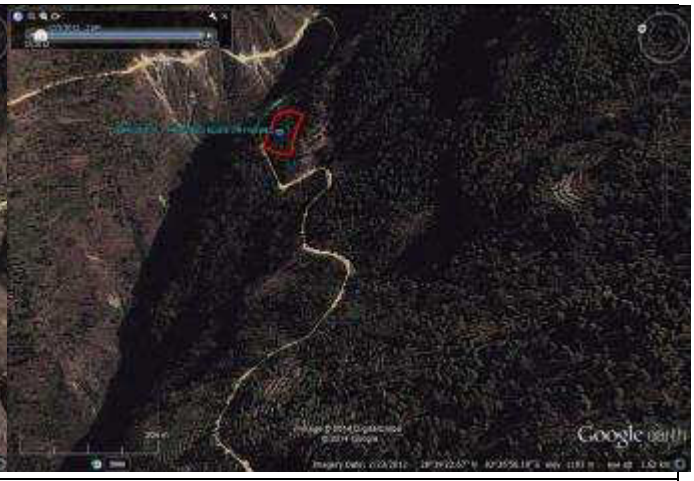
Google Map Showing Core Urban Area and Airport Located Within Service Area

Google Map Showing the Locations of Proposed Reservoir Tanks



Google Map Showing Proposed Public Toilets Location

Google Map Showing Proposed RVT-2, RVT-3 Public Toilet and Office Building

| | |
|---|---|
|  |  |
| Google Map Showing RVT-4 and Proposed Airport Service Area in Salle Bazaar Ward No. 2 of Musikot Khalanga | Proposed Location for the construction of Sludge Drying Bed (The DDC have proposed same location for the dumping site and the access road is about to be completed for the purpose) |

## G. Sub-Project Components

71. The major components of a surface source based water supply system in the hilly region consists typically of intake structures, transmission mains, treatment units, reservoirs, valve boxes and distribution system. The sanitation components proposed are public toilets and sludge drying bed for septage management. The tractor for solid waste collection and septage carrying vehicle for septage management is also included in sanitation component of the project. The descriptions of the components proposed in sub project are presented in as follows.

### 1. Intake Structures

72. Spring or surface source is common for the water supply scheme in the hilly region. A small weir is constructed across the river or spring source. This intake is a well type masonry or concrete structure whose function is to provide calm and still water free from floating matter of water supply scheme. Success of an intake greatly depends upon location of the intake. Strainers in the form of perforated pipes are provided in all the intake inlets. After drawing water through intake, water is conveyed to collection chamber.

73. One number of stream intake is proposed to tap water from PanaKhola source and three number of spring intake is proposed to tap water from springs. The detail of the sources proposed in subproject is presented in the Table.

**Table IV-3:Proposed Water Source for Musikot Khalanga Small Town Water Supply Project**

| S.N | Source Name | Source Type | VDC | WardNo. | Land Ownership |
|---|---|---|---|---|---|
| 1 | Panakhola | Spring fed stream | Shank | 9 | VDC/Government Land |
| 2 | GhiuKhola | Spring | Khalanga | 1 | VDC/Government Land |
| 3 | TimurKhola | Spring fed stream | Khalanga | 2 | VDC/Government Land |
| 4 | LaharaBhijaune | Spring | Khalanga | 3 | VDC/Government Land |
| 5 | SijiriKhola | Spring fed stream | Khalanga | 3 | VDC/Government Land |

### 2. Transmission Mains

74. From the collection chamber water is conveyed to the reservoir through transmission main mostly using HDPE pipes and in some section GI pipes are also proposed to be used as per the site condition.

### 3. Water Treatment System

75. As per the water quality test report of the proposed water source, the quality of source is found within the NDWQS standard during dry as well as rainy season but taking in consideration of the future possibility of contamination due to any other cause consultant have proposed slow sand filtration system without any pretreatment facility with provision of post chlorination facility to prevent the possibility of supplying contaminated water to consumer. The three numbers of slow sand filtration treatment units are proposed for the standby purpose as well.

76. The proposed water treatment system layout for each subsystem is presented in the following figures

**Figure IV-4: Schematic Layout of Treatment Plant for Sub System-I**

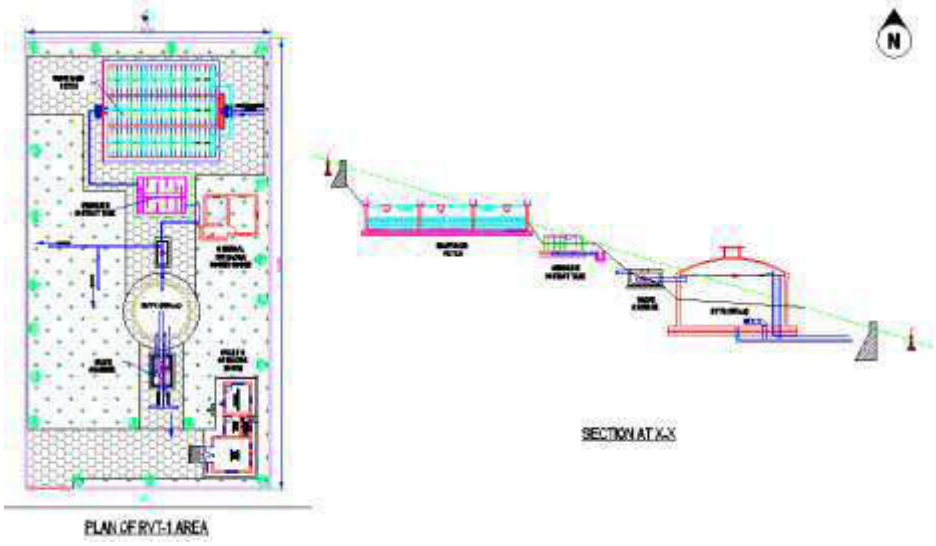
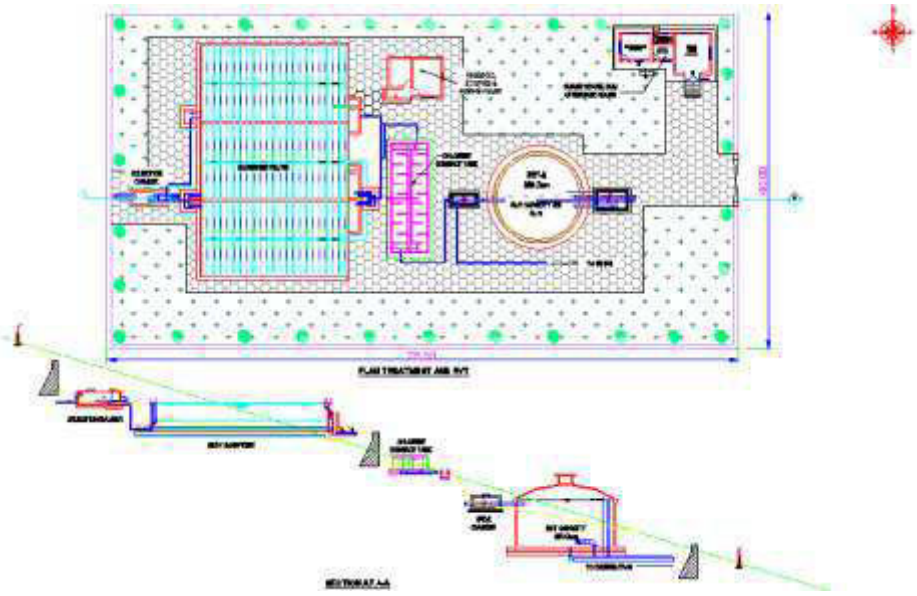



**Figure IV-5: Schematic Layout of Treatment Plant for Sub System-II**



### 4. Reservoir Tank

77. From the collection chamber, water is conveyed to the reservoir tank for the required storage of water. Being the hill terrain and scatterings of settlements, the multi-artery system is proposed to reduce the need of break pressure tank and to distribute water effectively. As per the sizing of reservoirs for different schemes, different sizes of reservoirs have been provided.

78. The proposed reservoir sizes for Musikot Khalanga Small Town Water Supply Project and Sanitation Project are presented in the following table.

**Table IV-4: Reservoirs Proposed in System**

| Reservoirs | Reservoir Location | Ward No. | Service Area | Land ownership | Reservoir Capacity | Remarks |
|---|---|---|---|---|---|---|
| RVT-1 | Boregaure/ Dangrichaur | 1 | Uphill area of Math, Khalanga Bazaar and GiriTole | VDC / Government Land | 30 | Treatment plant Sub System-1 (SS-1) is also proposed in same location |
| RVT-2 | DangriChaurSisne, near FM Tower GiriTole | 1 | Uphill area of Khalanga Bazaar and Serigaun. Downhill of Math | VDC / Government Land | 50 | |
| RVT-3 | PipalbotDharpakha, Near GhiuKhola | 1 | Khalanga Bazaar, Seri Gaun, Pipalneta | VDC / Government Land | 350 | Treatment plant Sub System-1 (SS-2) is also proposed in same location |
| RVT-4 | Bindejure, Salle, Uphill of Hospital Area | 2 | Salle Bazaar, Airport, District Hospital | VDC / Government Land | 105 | |
| RVT-5 | Khali Gaira | 2 | Ratmata, | VDC / Government Land | 40 | |
| Treatment plant SS-1 | Boregaure/ Dangrichaur | 1 | Service area of RVT-1, RVT-2 and RVT-4 | VDC / Government Land | 8.95 lps | Proposed at the same location/parcel asRVT-1, one guard cum operator house, one chemical storage and dosing house, one slow sand filter and one chlorine contact tank are proposed at the location; a boundary wall is proposed around the facility. |

| Reservoirs | Reservoir Location | Ward No. | Service Area | Land ownership | Reservoir Capacity | Remarks |
|---|---|---|---|---|---|---|
| Treatment plant SS-2 | PipalbotDharpakha, Near GhiuKhola | 1 | Service area of RVT-3 and RVT-5 | VDC / Government Land | 21.43 lps | Proposed at the same location/parcel as RVT-3, one guard cum operator house, one chemical storage and dosing house, one slow sand filter and one chlorine contact tank are proposed at the location; a boundary wall is proposed around the facility. |

79. **Distribution Main.**The distribution system comprises of a pipe network, which are looped in certain cases and branched in other. The network has been analyzed using Excel base spread sheet as designed based on Darcy Weisberg's formula for head-loss calculation. The surface Roughness factors of 1mm, 1mm and 0.1mm have taken for the pipe material of GI, DI and HDPE, respectively in order to carry out water network analyses. The entire system has been designed using GI, DI and HDPE pipes. The total pipe length of the proposed system works out to be 44.08 Km. Details of the hydraulic pipe line design and related information is provided in Appendix Volume III and layout details are given in Drawing Volume.

80. **Appurtenances.**These shall primarily comprise of valve chambers to house flow control valves, control valves for controlling flow etc. Altogether 43 valve chambers are expected in the system.

81. **Guard Quarter and Boundary Wall**.Guard quarters with optimum space and boundary wall have been proposed to safeguard storage tanks from vandalism as well as contamination.

82. **Electrical and Mechanical Work.**As the proposed water supply is simple type of gravity system, the electricity is needed only for the lighting purpose in the treatment plant area and office building area. There is no special electromechanical component to be proposed.

83. **Public Toilets.**Being rapidly urbanizing VDC the need of the public toilet facility is being felt in the Musikot Khalanga. For the ODF declaration along with construction of household level toilet in each household the sanitation facility for the visitors is very essential. Three numbers of public toilet in each ward and market centre of ward no.1, 2 and 3 is proposed in the project. The location of proposed Public Toilet is shown in the Google map and the photographs of the location are also presented.

84. **Sludge Drying Bed.**The safe disposal of septage is very essential for the environmental safeguard along with the provision of toilets. The sludge drying bed is proposed for septage management. About 500sqm of land is required for the sludge drying bed which is provided by VDC near solid waste dumping site being constructed by DDC. The access road to the site is also being constructed by DDC to access the dumping site location. As there is no habitation and no water source located in the vicinity of the proposed sludge drying bed the negative impact is not significant. The dried sludge can be used by the farmers as fertilizers.

85. **Vehicle for collection and transportation of solid waste and septage.**One number of tractor and one number of septage collection vehicles is proposed for collection and transportation of solid waste and septage to dumping site and sludge drying bed location.

86. The photographs of the sites and locations where major structures of the water supply and sanitation components of Musikot Khalanga Town Water Supply and Sanitation Project are proposed is presented in the tabular form for the clear understanding of the existing site condition.

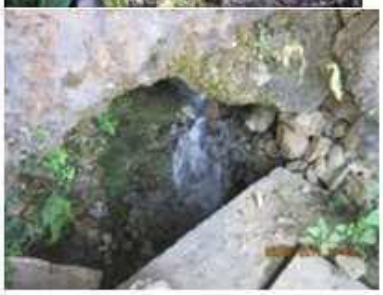
**Photographs of Site Locations of Different Proposed Structures**

*A) Source Location (Intake and Collection Chamber Site)*

*1-Pana Khola*

*2-Timur Khola Source*

*3-Ghiu Khola Source*



4-Location of Lahara Vijaune source

5- Sijeri Khola Source

1-RVT-1 & Treatment Plant - 1 at Dangrichaur

2- RVT-2 Near FM Tower

3- RVT-3 & TreatementPlant -2

4- RVT-4 at Salle

5- RVT-5 at Khali Gaira, Ratamata

Public Toilet-1

Proposed land area for the construction of toilet at school land

Public Toilet-2

Proposed land area for the construction of toilet at Sahid Maidan (VDC land)

Public Toilet -3

Proposed land area for the construction of toilet at Salle near to Bus Park

Location of Proposed Office Building

Sludge Drying Bed (Open space available between the trees)

Access Road constructed by DDC to Proposed Dumping site, at the same location DDC/VDC have provided the land for construction of sludge drying bed for septage managment

The presently the land is baren land and only used as pasture land

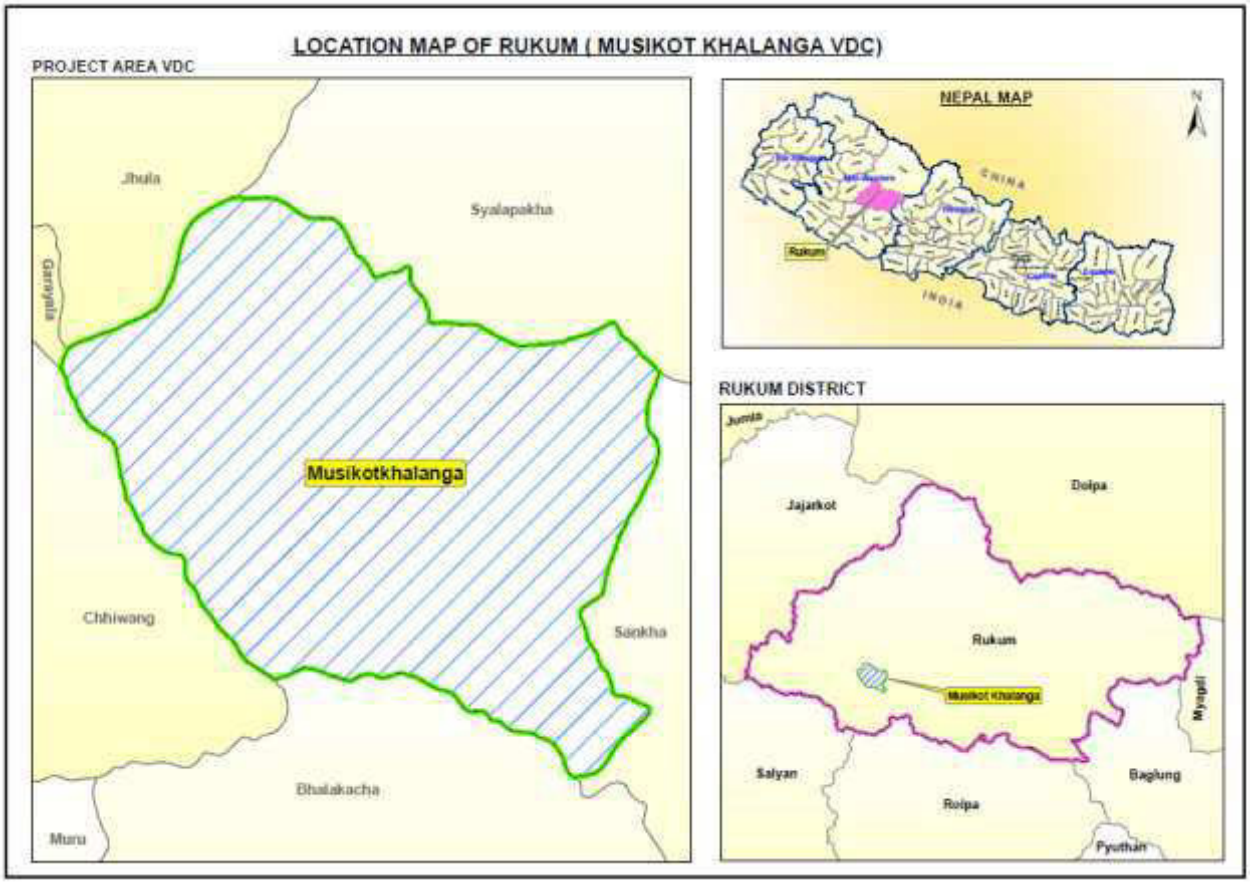
# V. DESCRIPTION OF THE ENVIRONMENT

## A. Physical and Chemical Environment and Resources, Landforms and Topography

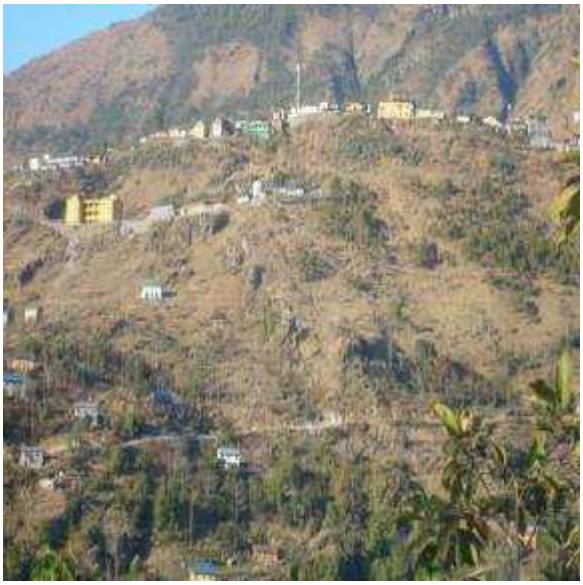
87. Rukum is a hilly district situated between 28° 29'' to 29° 00'' north latitude and 82°12'' to 82° 53' East longitude. The elevation of the district is 754 m to 6000 m and headquarter is 1448 m above the sea level. Total area of the district is 2877 square kilometer.

88. The subproject service areas of the project cover ward no. 1, 2, 3, 5, & 8 of Musikot Khalanga VDC of Rukum district of Rapti Zone which lies in Mid-Western Development Region. The project area is surrounded by Sankh VDC in the East, Sanobheri River in the West, Syallapakha VDC in the North and Bhalekharka VDC/Rapti Highway in the south.

**Figure V-1: Location Map**



**Photographs Showing the Topography of Service Area in Musikot Khalanga Town Water Supply and Sanitation Project**





## B. Geology and Soils

89. Musikot Khalanga is mostly dominated by clay soil along with boulders. Based on field observations during Subproject feasibility study, the project area has flat alluvial land consisting of 1-1.5 m thick top soil underlain by gravel, cobble and boulder of about 25.0 to 30.0 m thick in the center and slightly thinning outward to the foothills around the Srinagar valley and followed by bed rock. Highly fractured sufficient joints and faults show highly permeable rocks around the areas.

90. Diverse geology can be acquainted within the district. The area is mostly dominated by conglomerates. According to the National Agriculture Census 2058 for agriculture clay soil 5715.9 ha, brown soil 5237.3 ha, alluvial soil 5159.5 ha area land is covered. In most of the area high iron content red soil is found.

## C. Climate and Rainfall

91. The climate of Rukum ranges from subtropical to temperate to alpine. The mean air temperature recorded in the district ranges 24.4°C to 18.8°C with an average of 12.8°C .Its geography favors lots of rainfall. The average rainfall based on the metrological data is recorded as 1600mm. The maximum precipitation data was recorded as 2843mm in 2000 A.D. It lies in the Basin of Bheri River, a major tributary of the Karnali. Mostly Rukum is drained by west flowing tributaries such as Uttar Ganga and to the north of that the SaniBheri draining southern slopes of the western Dhaulagiri Himalaya

## D. Flora and Fauna in Project Areas

92. **Flora.** Musikot Khalanga is surrounded by forest with mostly dominated by species such as Khotte sallo(*Pinus roxburghii*), uttis(*Alnus nepalensis*), Laliguras(*Rhododendron arboreum*), ainselu(*Rubus ellipticus*),Kattus(*Castonopsis indica*), Chutro( *Berberis aristata* The commonly extracted NTFP from forest other than timber and fuel wood includes Amala (*Phyllanthu amarus*) Ritho(*Vernacular sapindis* ) ,Tejpat(*Cinnamomum tamala*),Kaulo(*Machilus odoratissima*), Timur(*Zanthoxylum alatum*) and many more. In the rainy season, many kinds of Buki flowers are blooming and that add more attractive feature to the whole area. The most known herbs as medicinal herbs include Yarchagumba (*Cordyceps sinensis*),Kutki(*Picrorhiza Kurroa*),Satuwa(*Parispoly phyla Sm.*),PanchaAule(*Dactylorhiza hetagirea*),Padamchalno etc. are also found in this region. The forests are mainly categorized as government and community forest. Most Government forest is in good condition with rich floral diversity.

93. **Fauna**.In Rukum the most dominant species are kasturi, deer, wolf, thar etc. Also birds such as Danphe, Munal are found residing on this area. In addition, species such as boar (*Sus Scrofa Domesticus*), bear, monkey, peacock, Danphe (*lophophorus impeyanus*), clouded leopard (*Neofelis diardi*), dhaman snake (*Ptyas* mucosa), kalij (*Lophura leucomelanos*) Pheasant, porcupine (*Hystrix indica*), squirrel (*Funambulus palmarum* ) ,

94. **Protected Area.**In the periphery of the subproject area, there is no declared protected area. Forest lands can be found within the project area.

## E. Socio-Economic and Cultural Resources

### 1. Demography

95. **Population and Settlement Pattern.**The settlement pattern is more dominant along the district headquarter mainly located at ward no 1 of Musikot Khalanga VDC. The ward no 2 and 3 are also in rapid urban growth as being located in adjacent area of main Bazaar

Area having available land for urban expansion. There are 1214 households in the project area. The male and female ratio is 1:0.88 (male 53.33% and female 46.67%). The average family size is 5.6. Among the project wards, ward no. 1 is the major market area and there are maximum HHs and populations and rental population comparing to other wards. Major district level office is also available in ward no. 1. The detail of HHs and population is presented in the following table.

**Table V-1: Ward Wise Distribution of Household and Population**

| Ward no | No of Hhs | Permanent | | | | | | Rented | | Total Popn | Avg Pop |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Female | % | Male | % | Total | % | Popn | % | | |
| 1 | 513 | 1245 | 40 | 1297 | 35.6 | 2542 | 37.6 | 1600 | 64.9 | 4142 | 5 |
| 2 | 213 | 554 | 17.8 | 1012 | 27.8 | 1566 | 23.2 | 215 | 8.7 | 1781 | 7.4 |
| 3 | 219 | 613 | 19.7 | 632 | 17.4 | 1245 | 18.4 | 499 | 20.2 | 1744 | 5.7 |
| 5 | 116 | 317 | 10.2 | 308 | 8.5 | 625 | 9.3 | 122 | 4.9 | 747 | 5.4 |
| 8 | 153 | 383 | 12.3 | 392 | 10.8 | 775 | 11.5 | 30 | 1.2 | 805 | 5.1 |
| **Total** | **1214** | **3112** | **100** | **3641** | **100** | **6753** | **100** | **2466** | **100** | **9219** | **5.6** |

Source: Socio-Economic Survey 2012

96. Approximately, 18.92 percent of the population was engaged in a service and 16.32 were engaged in agriculture. About 1.43 percent, were engaged as wage laborers and 2.96 percent people depend upon remittance. About 1.70 percent of the economically active people were found engaged in industrial sector. About 10.67 percent people depend on trade/business which includes small scale business also. Dependent population, student, housewife, retired person and mixed occupation were categorized as other which is highest (47.98%) among all the other categories. Ward wise detail is presented in table below

97. **Caste and Ethnicity.**The Brahman, Chhetri, Giri, Puri, Rai, Magar, Gurung, Kami, Damai and Sharki are the main cast/ethnic groups. According to the survey, Chhetri/Brahmans/Sanyashi (others) jointly constitutes about 76.31 percent of total project area population. Beside these groups, Rai, Mager, Newar, Sarki, Damai, and Muslim are the minor ethnic groups.

### 2. Health and Sanitation

98. Health and sanitation condition in the major settlements in Khalanga bazaar, Salla bazaar and Siragaun bazaar is satisfactory but is in very primitive stage. There are private clinic and community managed hospital and some private clinics.

99. The people use on-site-sanitation system even though there are about 1300 nos of toilets including public toilet without necessary flushing, soak pits and disposal facilities. Water-borne diseases are common as in other parts of the country, especially in the rainy season. The river water is used for bathing, washing purposes but all sorts of refuses, solid and liquid wastes have been haphazardly disposed along the river bed. The district is in need of a major shift towards sanitation. There is a high practice of open defecation in the area.

### 3. Education Facilities

100. In Khalanga the education facilities satisfactory. About 15.07 percent of the total population is illiterate. About 12.11 percent falls under the literate one hardly anyone has

completes primary education. The survey revealed that 15.52 percent of the total populations have completed primary level, 16.14 percent secondary level and about 15.70 percent have completed the SLC level education. About 10.94 percent have completed the intermediate level education. Diploma, degree and other. Completions are 12.11 percent, 1.79 percent and 0.63 percent respectively. It is also noted that, rest of the population (7.39%) are less than 5 years, which was not accounted Although literacy percentage is highercompared to illiterate ones, it still requires an effort to scale it to the maximum level.

**Table V-2: Percentage of Distribution of Population by Educational Status**

| Education | Total | |
|---|---|---|
| | Population | % |
| Illiterate | 168 | 15.07 |
| Literate | 135 | 12.11 |
| Primary | 173 | 15.52 |
| Secondary | 180 | 16.14 |
| SLC | 175 | 15.7 |
| IA | 122 | 10.94 |
| BA | 135 | 12.11 |
| MA | 20 | 1.79 |
| **Total** | **1115** | **100** |

Source: **Socio-Economic Survey 2012**

### 4. Physical and Cultural Heritage

101. The major religious places of Rukum districts are DigreSaiKumariMandir, Shiva Mandir,KalikaMandir,BijayaswariMandir,BhagawatiMandir,and BijayaswariLaxminarayanMandir(Athbiskot-6),Sai-KumariMandir (shyalakhadi) Kalika Mandir (Musikot). In addition to these there are different types of ancient natural arts in Rukum district. It is well known for 52 Pokhari (lakes) and 53 Takuri (hills). The different type of lakes and ponds, summits has added to the beauty of Rukum district. The Rukum Kamal Taal (a spiritual pond in Rukum) and Deurali Cave has also been one of the major attractions of tourists tothisplace.

### 5. Employment

102. The economic activities of all household members of 15 years age or older up to 60 years were collected during the survey. According to the findings, about 67.19 percent people were economically active. Remaining 32.81 percent were taking care of the household, going to school, retired or economically inactive for other reasons.

103. Approximately, the highest 18.92 percent of the population were engaged in a service. About 16.32 percent were engaged in agriculture. The categories of workers accounted for 1.43 percent, were engaged as wage laborers. About 2.96 percent people depend upon remittance. About 1.70 percent of the economically active people were found engaged in industrial sector. About 10.67 percent people depend on trade/business which includes small scale business also. Dependent population, student, housewife, retired person and mixed occupation are categorized as other which is highest (47.98%) among all the other categories. Ward wise detail is presented in table below.

**Table V-3:Economically Active and Dependent Population**

| S.N | Status | No. | Percentage |
|---|---|---|---|
| 1 | Economically Active population | 809 | 67.19 |
| 2 | Dependent population | 395 | 32.81 |

| | | |
|---|---|---|
| **Total** | **2456** | **100** |

Source: **Socio-Economic Survey 2012**

## 6. Economic Development and Prospects of Growth

### Land Use

104. The land use pattern of the Rukum district shows transformation from rural areas to urbanization especially in the Khalanga VDC, which is the district headquarter of Rukum district. From the field survey it can be assumed that out of total 1256 households, only 795 HHs (63.29 %) have land and 36.70 % households have only houses but no land. Among the land holding households, 47.42 % percent have more than five ropanis of land and 52.57 % household have less than five ropanis of land. There is a huge inclination towards urbanization and increase in the settlements, particularly after the Rukum water supply project commencement. Salyan bazaar has mostly expanded along Khalanga VDC.

**Table V-4: Land Holding Status**

| Land Holding | Khalanga | % |
|---|---|---|
| No | 461 | 36.70 |
| Yes | 795 | 63.29 |
| **Total** | **1,256** | **100.00** |

105. Within the cultivation area, there are clusters of compact but most are spread out settlements on its periphery. The clusters are connected with earthen or graveled roads, and there is a huge inclination towards urbanization and increase in the settlement growth, particularly after the commencement of the water supply project. Salyan bazaar has mostly expanded along Khalanga VDC.

### Infrastructure

### i. Transportation

106. On the route to Rukum, the road is all earthen. There is a direct flight from Kathmandu to Rukum once a week from Nepaljung to Rukum. Also there are other local buses travelling to and from different districts. There is some difficulty rearding the transportation facility for the people travelling off on the route. Every day 2-3 buses from Kathmandu, Nepalgunj and Dang are there.

### ii. Drinking Water Supply

107. There is a hardship for fetching drinking water in the project area. The existing water supply systems are not functioning in proper manner The water supply part comprises of a gravity flow scheme. Five intakes have been proposed out of which four numbers of sources lies in Musikot Khalanga VDC itself and one source PanaKhola lies in the adjacent Shank VD, to fulfill the water demands of the people of the project area. Also five reservoirs have been proposed for storage of water.

108. The existing system in Khalanga is supplying water to about 2-3 hrs a day with intermittent supply with very limited untreated water. This shows a hardship of water at all the. In the light of this situation, the desire for better and improved services are the needs of the people residing in the area and thus the project area has been identified as falling under the sever category of problem.

109. The quantity served is not sufficient and people are forced to depend on shallow wells to meet their daily needs. Thus the small town water supply project will provide a privilege for the consumers to obtain safe drinking water at their house doors.

### iii. Surface Drainage, Sanitation and Sewerage

110. There are no proper surface drainage facilities available in the sub-project area except in the market area. The project area is situated in hilly area. Due to this, landslides take place in the rainy season. During road construction, construction of some surface drainage has been included. However, during our discussion with the WUSC it was clear that the interest on the implementation of drainage improvement in the area falls in the last preference.

111. There is no system of solid waste collection and disposal. Some housekeepers and shopkeepers arrange to throw solid waste in their own-premises. The general trend is to throw the waste wherever convenient. Thus to avoid the immediate odor nuisance solid wastes are regularly collected from the bazaar areas and disposed off at different vacant lands and river banks. To add more improvement on the system of collection and disposal solid waste needs to be separated and the residues should be properly disposed. This requires areas for the separation of the solid waste and disposal. A proper landfill site must be planned and constructed. The District Devolvement Committee is taking the initiative to construct a landfill site in the forest located in Ward No. 9 of Khalanga VDC.

112. The sanitary condition of the project area is satisfactory. Majority of the households have their own toilets in or outside the house. In fast growing urban areas most of the buildings have been constructed with water sealed toilet or flush toilet with septic tanks. The latrine or toilet coverage in the project area is satisfactory i.e. 76.03%. Annual rainfall of 1500 mm and rainfall intensity of 65 mm per hour has been observed at the project area. In sloppy landscapes all the surface run-off storm water were either observed or accumulated by the plants, animals and parts of them infiltrated and rest started to flow. Very few water borne diseases had been observed in the project area during the field. Visit.

### iv. Electricity

113. Almost all the houses of Rukum have electricity facilities. But the electricity poles need to be placed properly maintenance of such structures should be done at regular intervals.

### Communication

114. The communication facility is very good in the project area. There are more than 500 telephone lines distributed within the community itself. Also there are mobile communication towers supporting mobile telephones. They have been facilitated with mobile phone services which include GSM, CDMA, NCELL, NTC etc. Most of the organizations in the district have telephones as well as internet facilities.

## 7. Economic Characteristics

### i. Industries

115. Only a few industries are found in this area. There are rice grinding mills, three mustard oil grinding mills, three grinding mills for other items poultry farm. Apart from this

there is one bakery which manufactures different tailor shops, electrical workshops and jewelry shops.

116. The hotels and lodges at Rukum only cater to the needs of the local people and do not offer comforts like attached toilets or running water required for the tourists.

### ii. Agricultural Development

117. As agriculture being one of the important sources of income generation for the people of the project area, it has aided in contributing in totality to the agricultural sector of the nation. Out of total 1449 households, only 1222 HHs (84.33 percent) have land and 15.67 percent household have only house but they do not have any land. Among the land holding households 57.94 percent have more than five ropani lands and 42.06 household have less than five ropani lands. Ward wise land holding status and land holding pattern is presented.

### iii. Mineral Development

118. Mineral exploitation activities are non-existent and there are no mineral based industries in the project area. The project area comprises of small business enterprises. Big industries involving in the extraction of minerals from the surrounding project area are not in existence and project related activities will not bring any devastating changes to the original state.

### iv. Tourism Industry

119. Rukum has tremendous potential of being a good tourist destination for both internal as well as external travelers. two number of airports are located within Rukum district and one witin the service area of proposed subproject. As witin the vicinity of project area there are several religious destinations and senic beauty for tourist. The Bheri river within the VDC boundary is currently being utilized by hospitilaty and tourism industries for adventurous sports through rafting .the major tourism attraction of Rukum district is Dangri temple , historic Rukumkot etc.

## 8. Development Organization

120. Apart from educational institutions there are few NGO, CBOs and private offices in the service area. Banking services are available within the VDC. The majority of the government offices are located in ward nos. 1, 2 and 3 of Khalanga VDC. There is one commercial banks, two development banks, one finances, three cooperatives institutions and around 30 NGO/INGO in the project area.

## F. Major Environmental Problems of Project Areas

121. Some of the major environmental problems prevalent to Rukum district are as follows:

122. **Air Quality.**There are no industries in Rukum district. Air pollution is caused by fugitive dust from vehicles movements particularly over unpaved road andgrounds, constructions activities.The roadway linking to Rukum district are not black topped, as a result area around the roadways are polluted by dust and smoke emitted by the vehicle that runs on the roadways. . 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

123. **Acoustic Environment.**The sources of noise in Rukum Town are the construction activities and vehicle movement. The anthropogenic noise is confined in few clustered settlements and in market places inSallaandKhalanga Bazaar and only in the daytime. At nighttime, noise is generated with the arrivals and departures of buses at the bus park. From field observation, noise level in Rukum District is within the national and international permissible standards at daytime and nighttime

124. **Water Quality.**The proposed "Musikot Khalanga Town Water Supply and Sanitation Project" is a surface water based gravity type water supply system project covering Musikot Khalanga VDC ward no. 1, 2, 3, 5, and 8. The project comprises of two major components-water supply and sanitation.

125. The water supply part comprises of a gravity flow scheme. Five intakes have been proposed out of which four numbers of sources lies in Musikot Khalanga VDC itself and one source PanaKhoala lies in the adjacent Shank VD, to fulfill the water demands of the people of the project area. Also five reservoirs have been proposed for storage of water.

126. **Solid Waste Management.**There is no proper system of solid waste collection and disposal. There is lack of proper of education and knowledge regarding management of solid waste and waste water. The wastewater generation will be discarded properly in a nearby stream. Since the area is not an industrial focused area the waste water generated is mostly from a residential area, being domestic one and is being disposed into septic tank and soak pit where natural treatment occurs so its effluent is not so much harmful.

127. **Sanitation Services**.Majority of the households have their own toilets in or outside the house. In the core, most of the buildings have been constructed with attached water sealed toilet or flush toilet with septic tanks. The latrine or toilet coverage in the subproject area is some 56 per cent. The rest of the households do not have any type of sanitation facility in their premises. This absence of latrines has forced the concerned households to resort to open defecation. Water-borne disease cases are on the rise, particularly during the dry season when access to water supply is scanty. The subproject area has only one public toilet, situated at the bus park; however it is wanting of replacement or rehabilitation. The effort towards the initiation to adopt proper sanitation system can still be found because children at school are being made to practice it, since every school and college has at least one toilet.

## VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

### A. Positive Environmental Impacts and Benefits

128. There will be opportunities for local employment and increased earnings of local enterprises during construction. When completed, the Subproject will bring about the following environmental benefits, impacts and outcomes:

- Water supply
  - The benefit of having access to reliable and adequate supply of safe and potable water;
  - Promotion of good hygiene and sanitation practices and reduced health and safety risks as positive impacts; and

- Enhanced public health, improved quality of life and safe communities as outcomes.

- Sanitation
  - the benefit of public commuters having access to improved sanitation facility;
  - promotion of good hygiene and sanitation practices and reduced health and safety risks as positive impacts; and
  - enhanced public environment (in common public facilities like bus park), enhanced public health and safe communities as outcomes.

129. Overall, the Subproject will lead to enhanced public health and urban environment, significantly contributing to a qualitative improvement in the lives of Musikot Town residents.

130. 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. This should be an integral component of Output 2.

### 1. Construction Phase: Positive Impacts during Construction Phase

#### i. Employment Generation

131. The project will generate direct employment opportunities to the local people of the area. As the project involves construction work it will offer opportunities for various skilled and non-skilled workers. The amount of money earned by the local people will directly affect the local economy thereby reducing the chances of seasonal migrations of the local people. The project will provide short term direct employment benefits to the majority of the construction workers and even long term employment to few workers during the operation of the project. In order to augment such benefits, priority will be given to employ local laborers as far as possible.

132. The local people particularly the poor; Dalits, ethnic minorities and women will be given priority for employment. They will be provided with job trainings.

133. This is a direct type, positive nature impact which is of very low magnitude and for short term duration.

#### ii. Skill Enhancement

134. 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 constructing tanks, drains, slope stabilization methods will provide transferable skills. These skills will directly benefit the local people in the long term for similar activities in the future. Such benefits will be augmented by making proper work plans and codes of conduct during the construction period.

135. The person assigned for the laying of the pipes shall be given on the job training on plumbing, bathroom fittings and construction.

136. This is a direct type, positive nature impact which is of very low magnitude and is for long term duration. The skills of local people as required for project shall be enhanced by providing skill training prior the initiation of the project. The project should allocate budget for such type of trainings.

### iii. Local Trade and Business Opportunities

137. In order to meet the food and other demands of the construction workers, there will be opportunities to establish small tea shops and eating places around the vicinity of the project area. The demand of the local food items; beverages and other necessary items of the workshop will provide direct benefits to the supplier, farmers and retailers. These will increase the local trade and business opportunities in the area which will be augmented by providing awareness and ensuring good relations between the local people and outside work force.

138. The local entrepreneurs shall be supported, cooperatives will be promoted and linkages with banks and other financial institutions shall be developed.

139. This is a direct type, positive nature impact which is of a very low magnitude and is for an intermittent duration of time.

## 2. Operation Phase: Beneficial Impacts during operation phase of project

### i. Improved Health and Hygiene

140. Deteriorating water quality and unsanitary conditions are often the causes of water borne communicable diseases. The survey report showed that the people in the project area are mostly dependent on water from existing sources such as ponds, streams etc. which have high chances of contamination. After the implementation of the project, the health and hygiene of the local people will improve and help reduce occurrence of water borne diseases in the area. In order to enhance such benefits regular maintenance of the water supply and sanitation components will be done so that the project operates smoothly and the benefits are intact.

141. Regular maintenance of the water supply system will be done by the users group.

142. This is a direct type, positive nature impact which is of a very high magnitude and is for long term duration.

### ii. Increased Economic Opportunities

143. After the construction of the project, due to improved living conditions, there could be increased migration towards the town from surrounding rural areas which will create opportunities for shops and other business activities in the area. Due to increased economic opportunities, the land value of the area could increase which will uplift the economic status of the local people. These benefits shall be maximized by ensuring regular maintenance of water supply and sanitation components and by promoting land development activities in the area.

144. The town shall manage planned growth with required infrastructure facilities for healthy and hygienic environment in the market areas.

145. This is a direct type, positive nature impact which is of a very low magnitude and is for long term duration.

### iii. Benefits to Women

146. **Beneficial Impacts.**Women and girls are mainly responsible for household activities such as fetching water and cleanliness. Improved water supply and sanitation will improve

the health and hygiene of women, girls and the entire household members. The time they save from fetching water from distant locations and cleanliness will be utilized in other economic and income generation activities.

147. Health and awareness programs and campaigns will be organized within the local community.

148. This is a direct type, positive nature impact which is of a moderate magnitude and is for a long term duration

## B. Adverse Impacts

149. The potential impacts of the proposed Musikot Khalanga Town Water Supply and Sanitation Project may be physical, biological and socio-cultural in nature and can occur at various phases of the project such as the construction, operation and maintenance phases. The magnitude of the impacts shall be small, moderate or high depending upon its severity and will be temporary or last permanently. The impacts are not necessarily always negative; some impacts could be positive as well. The attempt is to augment the positive impacts and remove or minimize the negative impacts by applying suitable mitigation measures.

150. The summary of the anticipated environmental impacts and the mitigation measures are given in Table

### 1. Construction Phase

### i. Physical Environment

151. **Landslide, Soil Erosion and Disturbance of Land**. Construction related activity such as digging of trenches for lying of pipes can affect the local land system causing silt runoff. Ponding of street surfaces could create problems.

152. The mitigation measures are of more precautionary type such as proper and timely back filling of the excavated trenches; reuse of the excavated earth and proper disposal of the surplus excavated soil. The excavated trench will be refilled immediately after laying of pipes and brought back to normal conditions.

153. This is a direct type of impact which has a moderate magnitude, with higher extent covering large areas and is for short term duration.

154. **Impact on Surface Water and Ground water.**Apart from the intake source (MadhKhola) which lies far away from the service area, the project area has other small streams such as Nilgadigad, and Chiauligad running nearby. The excavated soil during the construction period, if not properly managed, could eventually find its way to the surface water and the irrigation canals and may increase the turbidity of the water. There are no private and public groundwater wells that will be affected by the Subproject. Potential groundwater contamination at the dug well site will be caused by the use of dirty or contaminated drilling equipment

155. **Impacts on stored water in adjacent ground reservoir tanks (RVTs).**Construction of new ground reservoir tanks will potentially exposed the water stored in adjacent existing RVTs. Aside from applicable measures to mitigate impacts on surface water quality , adequately hoarding the existing RVTs and providing sandbags in their perimeters would mitigate sedimentation and/or contamination of stored water in adjacent RVTs

156. Mitigation measures:To avoid such impacts there will be proper spoil management system set up in the project area. To minimize such impacts temporary water diversion facilities will be constructed in the upstream to avoid the contamination of water source at the construction site. At the same time, if needed the excavated earth will be disposed in a location where such impacts are minimal.

157. This is a direct type impact of significant magnitude, with a higher extent covering a large area and is for short term duration.

158. **Air and Noise Pollution.**Trucks, tractors and other vehicles used for the transportation of construction materials will create noise and release emissions. The excavation activities will also release dust. All these effects are temporary and will last for the construction period only.

159. **Mitigation measures.**The workers exposed to more than 70- db noise level must be provided with ear plugs. The vehicles used for transportation must be checked for its condition and if it applies to European Emission Standard, Euro III and Nepal government mass emission standard (NVMES, 2069) for all heavy loaded vehicles. The equipment will be checked by technicians before the commencement of work and working at night with equipment producing high noise will be prohibited. To minimize dust and particulate matters, sprinkling of water will be done and the construction materials will be covered during transportation to avoid dust generation. Also open burning of solid wastes generated particularly from labor camps and construction activities will be completely banned.
160.

1. This is a direct type of impact which has a small magnitude, with lower extent covering a small area and is of short term duration.

**ii. Biological Environment**

161. **Degradation of Cultivated Land and Vegetation.**The major structures of the project will be constructed on the land acquired by WUSC. There will be no major disturbance of vegetation and no cutting of trees in the project area but some ground vegetation has to be cleared for the construction of the structures. Even along the alignments of the transmission and distribution lines cutting of trees will not be involved. Some of the topsoil and vegetation may be lost during pipe laying works.
162. Minimization of vegetation clearing and careful cutting of ground vegetation will be done. Trees and shrubs will be planted wherever possible. In case of unavoidable situation due to the obstruction by trees for any structure, the lost trees on public land will be compensated by planting saplings at 1:25 ratio and at 1:1 ratio on private land. A plan and cost for developing greenery shall be taken into consideration for all major sites.

163. This is a direct type of impact which is of small magnitude, with lower extent covering a smaller area and is for long term duration.

**iii. Socio-Economic Environment**

164. **Impact to Local Residents.**The construction related activities that generates dust, noise and impede access could disturb the local residents. It may also create traffic problems due to traffic jams near the construction site.

165. Mitigation measures:To cope with such impacts the local residents will be consulted and informed about the disturbances in advance. Temporary diversions and signboards will be provided for the pedestrians. Traffic management will be done to mitigate the impacts.

166. This is a direct type of impact which is of small magnitude, with lower extent covering a smaller area and is for short term duration.

167. **Problems from Outside Work Force.**Haphazard disposal of solid waste and improper sanitary conditions generated by the construction workers may cause pollution of the surrounding environment and affect the health of local people. There could also be some social problems due to irresponsible behavior of the work force such as gambling, alcoholism and disrespect to local people and their culture.

168. Mechanism of safe disposal of waste according to SWMA, 2011 will be developed in the project site and construction camps before the actual commencement of work and unwanted littering and discharge of waste will be prohibited. In addition the contractor shall instruct all the workers to act in a responsible manner within the working premises. A dustbin in the work site will be provided to collect the waste and then finally disposed to a solid waste carrying vehicle which eventually will be discarded to Panadhunga and Sallaghari (dumping site). To create a friendly environment social gathering for the workers will be arranged once a month.

169. This is an indirect type of impact which is of moderate magnitude, with lower extent covering a smaller area and is for short term duration.

170. **Occupational Health and Safety.**During the construction work, the laborers involved in the construction activities may be exposed to different level of health risks and accidents.

171. Mitigation measures: A site health and safety plan will be prepared encouraging the use of safety measures and personal protective equipment (PPE). The laborers will be insured for their health and safety. A first aid box will be kept at a proper and easily accessible place. The general public will be excluded from all the construction sites.

172. This is a direct type of impact which is of significant magnitude, with lower extent covering a smaller area and is for short term duration.

173. **Inadequate Operation and Maintenance.**Under suboptimal operations, the Project will create hazards in term of the overall delivery of the outputs and safety of the personnel. Under such conditions the existence of the Project will be at risk. The people consuming water from such sources will be at higher risks as the whole population will be consuming the same water.

174. **Mitigation.**In order to avoid such a state regular O&M of water treatment plants including chlorinators; regular water quality monitoring of water in the distribution system; immediate action in case of water quality problems; and training and operational supervision of system staff will be conducted.

175. This is a direct type of impact which is of significant magnitude, with larger extent covering large areas and is for short term duration.

176. **Toxic Chemical Hazard.**Chlorine and bleaching powder are toxic to humans. Ingestions, inhalations, application to body parts, especially to such parts as eyes, nose and mouth is extremely hazardous.

177. Mitigation Measures:The storage, in-plant handling and dosages of chlorine (bleaching powder) must be addressed and procedures set up and guidelines developed for its handling and first aid measures to be introduced for emergencies and the training and operational supervision of system staff.

178. This is a direct type of impact which is of significant magnitude, with lower extent covering a smaller area and is for short term duration.

179. **Repair and Maintenance.**Repair of pipe networks will disrupt business in the market area and will be a nuisance to the public. The workers and the public will be at risks from accidents.

180. Mitigation Measures: In order to avoid such issues people of the area should be informed of any work in advance and avoid work during sensitive times: provide walkways/bridges for people and vehicles if trenches have to be dug; provide diversions with the help of the police; and complete works quickly in sensitive areas. Also workers are to be provided with health and safety measures to avoid risks from accidents at sites during pipe repairs and installation of new connections.

181. This is a direct type of impact which is of significant magnitude, with lower extent covering a smaller area and is for short term duration.

182. **Sludge Management.**The sludge produced during the operation of the treatment plant, if disposed haphazardly will create an unsanitary situation and effluent after backwash water after treatment will create soil erosion around adjacent hill sides of the area.

183. Mitigation Measures: A small sludge collection pit will be designed and proposed at the downhill side along the drain to collect the washed sludge. The collected sludge can be used as a fertilizer. This is a direct type of impact which is of low magnitude, with lower extent covering a smaller area and is for short term duration.

## VII. ALTERNATIVE ANALYSIS

184. The aim of the Project is to provide safe and sufficient water supply to the residents of the service area of Musikot Khalanga VDC in Rukum District. The various alternatives to achieve the objectives of the project with minimum impacts to the environment are presented in the following sub-sections.

### A. Design Alternative

185. The proposed project has been formulated to provide reliable and continuous drinking water supply in adequate quantity and good quality to the consumers of the service area. In order to achieve that, a new system was needed to be designed with additional sources of water, increased distribution networks, treatment plants and enhanced storage facilities. The additional system need to be integrated with the existing storage facilities providing cross-connected distribution networks. There are a few existing gravity water systems, which are serving the population of Musikot VDC, but they are rural in nature and supply water through public tap stands without proper treatment and not in sufficient quantity. Therefore the proposed project has been envisaged to streamline the various systems and develop a reliable and sustainable system. As Rukum is a hilly region ground water is unreliable; as such the project has to find an alternative approach in order to meet the requirements. The present project is designed with due consideration to these aspects and thus the proposed design has no alternatives.

### B. Project Site/Location Alternative

186. There are five potential sources available for Rukum Town Water Supply and Sanitation System. The first source is from PanaKhola, which is a perennial system and has sufficient discharge to meet the demand of the area but it has been already booked and

surveyed for irrigation. The second potential source is Gama khola from where water will be supplied by gravity, but it has a low yield and the source is in dispute.

187. No significant adverse environmental impacts are found with the present location of the project. The location of the treatment site has been finalized after consultation with the local community and distribution lines have been fixed with minimum adverse impacts on the environment. Therefore, the proposed location of the project has no alternatives.

### C. Alternative in Technology, Implementation Procedure and Raw Materials

188. The technologies proposed in the project are reliable. The source of water, being a spring fed perennial stream, has a safe yield and is a reliable one. The source is located at a lower altitude and water needs pumping. The stream is far from the residential area and there are no settlements around. There is no barrier and thus water will be easily pumped to the service area. Therefore the system proposed is technically viable.

189. The work involved is labor intensive with a minimum use of mechanical equipment. Most of the construction works will be done manually which will produce minimum adverse environmental impacts. Trained human resources will be used so that there is minimum disturbance to the local system and no health and safety hazards to workers will arise.

190. The working procedures proposed are participatory and the beneficiaries will actively participate in all the phases of the Project. Except from some mechanical equipment, most of the raw materials used will be local. Similarly, as far as possible, local people will be employed for the project so that the chances of conflict are minimal.

### D. No Project Option

191. The No-project alternative prevents the implementation of the Project. This will impede the local people of the area from having safe and sufficient drinking water and a sanitary environment. If the project is not implemented, the people will have to continue depending upon the existing unreliable water supply system for drinking purposes. It also limits the chances of socio-economic development of the area.

192. On the other hand, if the project is implemented, the people of the area will not only benefit from the supply of safe and sufficient drinking water but also improve their health and hygiene. The implementation of the Project will create job opportunities, thereby improving the socio-economic conditions of the local people and help in improving their quality of life. . The implementation of the proposed project will produce only negligible and insignificant adverse environmental impacts. The do-nothing option will be able to avoid some minor environmental impacts; however, difficulty in having safe and reliable water supply; remoteness and poverty of the area will remain intact.

## VIII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION, and GRIEVANCE REDRESS MECHANISM

### A. Information Disclosure, Consolations, and Participations

193. One of the important objectives of the IEE is to facilitate the participation of all the stakeholders and general public right from the pre-construction phase of the project to its operation. Several consultations were held with the locals in the project area to understand their views of the project and to get their consensus.

194. The project has involved a variety of concerned groups, including non-governmental organizations, line agencies, community based organizations and local people while preparing the IEE report. As the TOR is still to be approved from MOUD the formal proceedings including publishing the notice on National Daily News Paper still to be carried out. Despite the delay in formal proceedings the consultants have conducted several interactions with local peoples and stakeholders through informing them about the project and to obtain suggestions about the possible environmental impacts and likely mitigation measures during the implementation of the project. After approval of the TOR the consultant again will be remobilized after publishing of the notice to access the exact response of community and beneficiary at large.

195. During the field survey Focus Group Discussions were held with the local people and public meetings were held in the area to understand public attitudes and views and to get consensus on the Project. Written forms of suggestions were collected during the meetings and from relevant government agencies. During the public consultations, the project objectives were explained and people were requested to give their opinions and suggestions. The list of key people contacted is given in Annex C.

196. The main issues raised during the public consultation were:

- Information dissemination of the project (SSTWSSSP)
- Roles and responsibilities of WUSC, community and other stakeholders
- **Required Cash Contribution and Modality of Project:** WUSC and the community were fully aware of it and they are ready to cooperate with the team and others during implementation of the Project.
- **Service Area Delineation:** The service were delineated for the sub-project during meetings of ward no. 1, ward no. 2, ward no. 3, ward no. 5 and ward no. 8 of Musikot Khalanga VDC
- **Choice of Source:** Though there are numbers of sources available within the VDC, due to the location at below settlement the sources cannot be used economically. For the settlements located in uphill area there is no reliable source within the vicinity that made it mandatory to bring water from the higher altitude to serve the population. The PanaKhola source located in Shank VDC ward no. 9 is proposed to serve the higher altitude settlement. The settlement having comparitably lower altitudes are planned to be served through using four numbers of local sources namely LaharaVijaune, SijeriKhola, TimurKhola and GheuKhola.
- **Survey of Transmission Main and Distribution System:** A decision was made that the technical survey works needs to be done taking PanaKhola as the proposed source which is located at the highest altitude and sources located within the vicinity of service areas namely TimurKhola, GhiuKhola, LaharaVijaune and SijeriKhola also have been proposed to sumpliment the water demand of the service area. New distribution networks are proposed for whole of the service area.
- **Acquisition of Land:** All land required for the construction of various infra-structure such as intake, treatment units, reservoirs etc. lie in the VDC/Government Ownership and the consent for the use of land for the purpose of proposed water supply and sanitation project will be received by WUSC from concerned agency.
- **WUSC Office Building:** WUSC does not have its own building and it was felt necessary for various operational works and so a provision for the building will be made.

- **Reduction of Project Cost:** Design shall be made in such a way that the cost required shall be minimal without compromising the quality of work and workmanship. Existing structures, if usable, shall be used to reduce the cost.

197. The Draft IEE will be sent to DWSS and ADB for review and comments. After incorporating the comments and suggestions from all concerned stakeholders, the final IEE report will be prepared and sent to MOUD for approval.

198. The information on the project has been disclosed not just by active participation of stakeholders during public consultation processes but also formally by making related material of the Project available at a location that is easily accessible to the stakeholders. This normally involves making the draft reports available (in the local language) at public locations in the community and providing a mechanism to obtain comments and suggestions back from the community. ADB encourages governments to upload all the documents into their website. The Executive Summary of the IEE study is to be made public through a depository library system and ADB websites. The full IEE of the proposed project will be posted on the ADB website and also made available to the interested parties upon request. In the future, in order to make the public aware and active in the project, public communication shall be done frequently to inquire about any further queries and give them the highlights of the Project's current status.

199. EMP compliance monitoring will be carried out by PMU by using the automated safeguard monitoring software prepared by NRM. A Safeguard Desk will be established in the sub-project with an expert from DSC assigned as the focal person. The person will be trained by PCU and a monitoring checklist will be provided for recording the compliance status of the sub project. The desk will organize monthly meetings among safeguard members in the team to discuss areas of compliance and non-compliance. They will then organize meetings with the technical team to discuss and agree on corrective measures to mitigate adverse impacts. Records of the meetings will be registered in the minutes, a copy of which will be attached to the regular progress report. Members of WUSC will be involved in the activities of the desk at all stages to transfer knowledge on environment friendly practices so that WUSC will be able to continue the safe practices during operation and maintenance of the system.

200. Future stakeholder consultations of the project shall follow as mentioned below.

- During detailed design, if there would be a major change in design/alignment/location, warranting an update of the IEE, the PMO and PISU will hold at least one public consultation meeting early on in the IEE update to solicit perceived impacts, issues, concerns and recommendations from affected communities.
- Prior to construction, the PMO and PISU will conduct an intensive information, education and communication (IEC) campaign to ensure sufficient level of awareness/information among the affected communities regarding the upcoming construction, its anticipated impacts, the grievance redress mechanism, contact details and location of the PMO and PISU, and status of compliance with Government's environmental safeguard requirements, among others, are attained/provided. Billboards about the subproject, implementation schedule and contact details of the executing agency, PMO-ES, PISU-ESA and Contractors will have been set up at strategic locations within the subprojects' main areas of influence. The grievance redress procedure and details will have been posted at the offices of the PMO, PISU, WUSC and VDC.
- During construction, regular random interviews will be conducted by the PISU-ESA every month to monitor environmental concerns of subproject communities.

- During operation, periodic random interviews will be conducted by the PMO and PISU and WUSC to monitor the environmental concerns of subproject communities.

201. The IEE (in both English and Nepalese), as well as the GoN-approved IEE Report (in Nepalese), will be available at the offices of the PMO, PISU and WUSC for the perusal of interested parties. Copies may be made available upon formal request. The IEE and environmental monitoring reports will be disclosed on the ADB's website.

## B. Grievance Redress Mechanism

202. The purpose of the Project-specific grievance redress mechanism (GRM) is meant for persons seeking satisfactoryresolution to their complaints on the social and environmental performance of the subprojects under the 3STWSSP. 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 Subproject are protected; and (ii) their concerns are effectively and timely addressed.

203. The Project also aims to facilitate a grievance and redress mechanism to address the environmental and social concerns of the community who are affected by the project activities. The proposed project doesn't involve resettlement of any community, and a Resettlement Plan that addresses the Grievance Redress Mechanism (GRM) is not necessary. However, all the stakeholders are to be made aware of the project-specific GRM so that there is an appropriate channel of communication and a formalized procedure to settle disputes.

204. The process requires a GRM committee to be established at the local level to assure accessibility to the Affected Person or Stakeholder. The committee should consist of members with sufficient knowledge about the project, with technical know-how and expertise and someone aware about the socio-cultural dynamics of the community. The GRM requires that issues and comments are first lodged with the local level GRM committee for handling of grievances at the project site. The GRM committee should conduct their meeting within 3 weeks of receipt of complaints and solutions need to be provided at the meeting or within the very week.

205. If the grievance cannot be solved at the project level, the GRM committee needs to submit it to PMO. PMO with assistance from the Safeguard Specialists and WUSC experts should resolve the grievances. If the grievances cannot be solved by PMO, they will be referred to the VDC and district DWSS. And if the grievances cannot be resolved even by VDC and DWSS within 2 weeks, the case will be referred to the court of law to adjudicate the matter.

### 1. GRM Steps and Timeframe

206. **Informal Approach.**Informally, APs can lodge complaints directly to the Contractor during construction or Operator (WUSC) during operation. Contractor/Operator will document and screen the complaint immediately. If screening reveals the complaint as Project-related and valid, the Contractor/Operator will act on the complaint within three days from receipt of complaint. Otherwise, the Contractor/Operator will direct the AP with non-Project-related and/or invalid complaint to the PISU. The Contractor/Operator will secure a confirmation of completion of action from the AP. For at least a week after confirmation of completion, the PIU will monitor the effectiveness of the action/resolution taken. After which, PISU will secure a written confirmation of satisfaction from the AP. The Contractor/Operator shall report to the PISU all complaints received, eligible or ineligible, actions agreed on and taken and confirmation of completed action.

207. **Formal Approach.**If complaint is eligible but is not acted on within three days from receipt of complaint, or if AP is not satisfied with the resolution undertaken by the Contractor/Operator, he/she can access the formal mechanism, as follows: (Figure VIII-1)

**FirstLevel**: The access point will be the PISU. The steps are detailed below. (Figure VIII-2)

Step 1 Lodging a Complaint (Day 1)
AP lodges complaint with the PISU, verbally or in writing. PISU documents/registers lodged complaint, makes sure these are duly referenced and provides AP with a copy of referenced complaint.

Step 2 Screening of Complaint (Day1)
ESA screens the complaint if it is Project-related and valid and informs the AP immediately of the screening results. An AP with complaint screened as non-Project-related and/or invalid will be advised that he/she may raise complaint to the second level of the GRM, and PISU will forward the complaint to the GRC.

Step 3 Investigation, Discussion and Agreement (Day 1)
PISU, together with the Contractor/Operator and AP, will investigate and discuss the complaint at the site. Agreement on actions and measures and time involved will be made with the AP. Agreement will be properly documented and filed; PISU, AP, Contractor/Operator will have copies.

Step 4 Implementing the Agreed Action

- If required action is minor, i.e., not requiring further investigation and would be quick and easy to implement, the Contractor/Operator will immediately implement the agreed action. (Day 2/Day 3)
- If required action is major, i.e., requiring further investigation and/or procurement of supplies/parts, the Contractor/Operator will: (i) immediately provide the most suitable interim measure to reduce the magnitude of the impact (Day 2/Day 3); and (ii) start work on the major action within 5 days from discussion (or not later than Day 8 since receipt of complaint).
- AP will be advised by the PISU that his/her complaint may be raised to the second level of the GRM, if he/she so prefers when: (i) minor action is not implemented within 2 days from discussion; (ii) interim measure prior to major action is not implemented within 2 days from discussion; or (iii) major action is not started within 5 days from discussion.

Step 5 Confirmation of Completed Action
Contractor/Operator will secure a written confirmation of completed action from the AP and furnish the PISU a copy.

Step 6 Confirmation of Satisfaction (1 week after confirmation of completed action)
The PISU will monitor the effectiveness of the resolution for at least a week after receipt of confirmation of completed action from the Contractor/Operator. After which, PISU will secure a written confirmation of satisfaction from the AP.

**Second Level**: TheAPwillbenotifiedbythe PISU when complaint isforwardedtothe GRC. TheGRCwill call for a hearing,ifnecessary,whereAP can presenthis/herconcern/issues.TheGRCwillsuggestcorrective action/measureatthefield level and assign clear responsibilities for implementing its decision within 7 days of receipt of complaint by GRC. If GRC decision is not acceptable to the AP, if the suggested corrective action/measure is not started within 7 days, the matter/AP will be referred to the third level.

**Third Level:** The PISU will refer AP and its unresolved complaint or major issues to the PMO EO and PMC Environmental Specialist, who will act within 15 days.

**Fourth Level:** For extremely major issues that will go beyond the third level, these will be referred to the project steering committee (PSC), to be resolved within 30 days. Environmental complaints (other than those that will involve the legal system) are expected to be mainly resolved at the second level, and to a lesser extent at the third level.

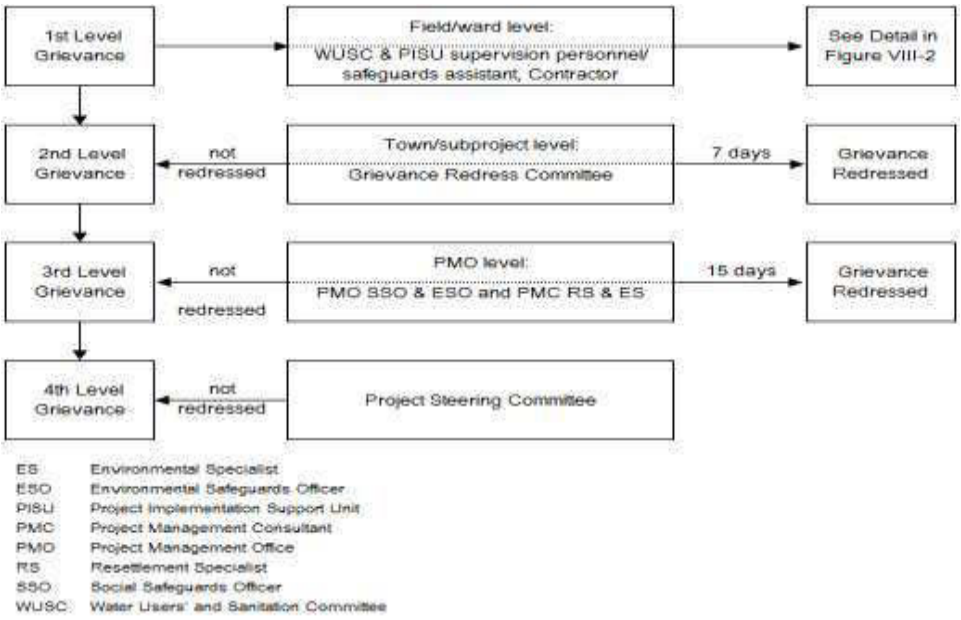
208. Despite the GRM, an AP will have access to the country's legal system at any stage. Accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB 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 the country's language. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the GRM.

209. **Record keeping and disclosure.**The PMO, GRC, PISU will keep records of all lodged and documented/referenced complaints, actions/resolutions taken, AP's written confirmations of completed action and satisfaction, complaints raised to higher levels, lessons learned. The number of grievances recorded and resolved and the outcomes will be displayed at the offices of WSSDO, PISU, Town LGU, PMO and WUSC and reported in the monthly progress reports, semi-annual EMR during construction and annual EMR during operation, submitted to ADB.

210. **Periodic review and documentation of lessons learned.**The PMO EO will do periodic review of the effectiveness of the GRM in each town and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address complaints.

211. Grievance Redress Process is elaborated in flow diagram below.

**Figure VIII-1: Grievance Redress Process**




# IX. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

212. 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 impact of the project; and (iv) ensuring that safety recommendations are complied with.

213. A copy of the 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. The 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.

## A. Institutional Arrangement

214. **Executing and implementing agencies.**The Ministry of Urban Development (MUD) will be the executing agency with responsibility of subproject execution agency with responsibility of subproject execution delegated to the Department of Water Supply and Sewerage (DWSS). The Water Supply and Sanitation Division/Sub-division Office (WSSDOs) are the subproject implementing agencies. Water User's and Sanitation Committees of participating towns are the implementing agencies.

215. The key responsibilities of the executing and implementing agencies are as follows:

216. Prior to construction

- The MUD will deputize a qualified staff to act as the Environmental Safeguard Officer of the Project management office (PMO).
- The MUD will establish the grievance redress mechanism, including setting up the Grievance Redress Committee.
- The Water Supply and Environmental Division of the MUD will be responsible for reviewing the EIA Report prior to submission to the Ministry of Science, Technology and Environment (MoSTE) for reviewing and approval.
- The DWSS will review the IEE/EIA Report prepared by the Design and Supervision Consultant's Team's Environmental Safeguard Expert (DSMC-ESE) prior to forwarding this to MUD.
- The DWSS will prepare the ToRs for the Environmental Safeguard Specialist that will engage to support the PMO and for the Environmental Safeguard Specialists of the two Design and Supervision Consultants that will be appointed to prepare the subprojects.

217. During construction and operation

**B. Safeguard Implementation Arrangement**

218. **Project Management Office (PMO).** The safeguard officers (environmental safeguard officer and social safeguard officer) of the PMO will receive support from safeguards experts (environmental and social) of the Project Management Consultants (PMC) as specified below:

(i) Confirm existing IEEs/EMPs are updated based on detailed designs and that new IEEs/EMPs are prepared in accordance with the EARF and government rules;
(ii) Confirm whether EMPs are included in bidding documents and civil works contracts;
(iii) Provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by regional project management offices (Eastern RPMO and Western RPMO) and contractors;
(iv) Establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the EMP;
(v) 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;
(vi) Supervise and provide guidance to the RPMOs to properly carry out the environmental monitoring and assessments as per the EARF;
(vii) Review, monitor and evaluate the effectiveness with which the EMPs are implemented, and recommended necessary corrective actions to be taken as necessary;
(viii) Consolidate monthly environmental monitoring reports from RPMOs and submit semi-annual monitoring reports to ADB;
(ix) Ensure timely disclosure of final IEEs/EMPs in project locations and in a form accessible to the public; and
(x) Address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.

219. **Regional Project Management Offices (Eastern and Western RPMOs).**The regional DWSS engineers and social development officers of the RPMOs will receive support from; (i) the PMO safeguards officers (environmental and social); and (ii) the safeguards specialists (environmental and social), the social mobilizers and environmental

management plan (EMP) monitors of the design, supervision and management consultant (DSMC) teams as specified below:

(i) Prepare new IEEs/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.

220. **Civil Works Contracts and Contractors.**EMPs are to be included in bidding and contract documents and verified by the PMO and RPMOSs. 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, on (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste, and on (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. Contractors will only start the civil works activities in communities surrounding the project site. Contractors will only starts the civil works activities in the section/subproject sites that has IR/IPP impacts upon the completion of RP/IPP implementation and after receiving clearance from the WUSC and endorsed by RPMO's SDO.

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

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

223. Prior to construction

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

- Participate in the capacity development program.

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

225. During operation
    - Implement the 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.

226. **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.

**Environmental Management Plan (EMP)**

**Tablel IX-1: Environmental Management Plan: Matrix**

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| Impacts/Issues/Concerns and Mitigation Measures during Construction | | | | | | |
| Legal complications | Non-Compliance with Relevant Environmental Legislation | • capacity strengthening of the PMO Environmental Officer and his/her counterpart at the subproject level; and<br>• (ii) ensuring the necessary additional approval/permit/registration is obtained should subproject have major change. | PMO,RPMOS,& DSMC | Compliance with existing legal provisions | Once during construction | NA |
| Erosion Hazards | Potential erosion may occur when moderately to highly sloping terrains are disturbed for the installation of transmission mains and distribution pipes. | (i) confining terrain disturbance according to a Staking Plan and Excavation Segmentation Plan and implement Erosion Control Plan that should all be part of the Contractor's EMP (C-EMP) and should have considered the surface drainage routes and patterns; (ii) keeping pipe laying works as close as possible to excavation works and vice versa; (iii) stabilizing disturbed slopes immediately after installation and backfill and use erosion control blankets or re-vegetate and use vegetation promotion blankets; and (iv) control water at the top of the site by diverting the flow far elsewhere. | O,RPMOS,& DSMC | Status of debris and quarries, no of trenches, date of trenching and backfilling, | Once prior to trenching and once after backfilling. | Included in Civil works contract |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| Air Quality | Dust due to: (i) earthworks such as clearing, grubbing, excavations and drilling; (ii) demolition works; (iii) stockpiling of natural aggregates, excavated materials and spoils; (iii) transport, loading and unloading of natural aggregates; (iv) movement of construction-associated vehicles; and (v) on-site rock crushing, cement mixing, borrowing | (i) confining earthworks according to a Staking Plan and Excavation Segmentation Plan that should be part of the C-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) hoarding active work sites in populated areas; (vi) requiring trucks delivering aggregates and cement to have tarpaulin cover and maintain a minimum of 2' freeboard; and (vii) limiting speed of construction vehicles in access roads and work sites to maximum of 30 kph. | O,RPMOS,& DSMC | Air Quality: PM10, | Once during construction period | Included in civil works contract |
| | Odor and gas emissions during demolition of existing public toilet and septic tank at the bus park | (i) clean and disinfect the existing public toilet well; (ii) pump septic tank empty of liquids and solids and dispose of the pumped out materials properly; (iii) Open break the bottom of the emptied septic tank and fill with granular material and leave it that way permanently (if to abandon it in place); (iv) If to remove the septic tank and soak pit, remove also the surrounding soil and haul and dispose of it accordingly. | O,RPMOS,& DSMC | Public response | Once during the demolition of public toilets. | Civil works contract |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| Noise | Noise due to earthworks, rock crushing, concrete mixing, demolition works, movement and operation of construction vehicles and equipment, and loading and unloading of coarse aggregates | (i) using equipment that emit 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 schedule of material, spoil and waste transport; and (v) minimizing drop heights when loading and unloading coarse aggregates. | O,RPMOS,& DSMC | Noise Quality, Equivalent Sound Pressure Level. | Once during construction period | Included in Civil works contract |
| Impacts on Water Resources | Impacts on Surface Water Quality.Some sections of the distribution pipeline will cross water bodies, exposing these resources to risks of pollution caused by: (i) poorly managed construction sediments, wastes and hazardous substances; and (ii) poor sanitation practices of construction workers. 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. | (i) disposing of spoils or excess soils as free filling materials as soon as possible; (ii) locating temporary storage areas on flat grounds and away from main surface drainage routes; (iii) shielding temporary storage areas with sandbags &/or silt fence; (iv) implementing an eco-friendly solid and hazardous waste management, disposing them promptly; and (v) providing adequate water supply and sanitation facilities at work sites. | O,RPMOS,& DSMC | Water Quality Test (National Drinking Water Quality Standard Parameters) | Once during construction period | Included in civil works contact |
| | Impacts on River Morphology and Hydrology | Coordinate with MoSTE and local authorities regarding restrictions in quarrying from Sharda River<br>An Aggregates Management Plan should be part of the C-EMP<br>. Contractor's should be required to obtain aggregates only from sources | O,RPMOS,& DSMC | Source and management of aggregates | Once during construction period | Included in civil works contract |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| | | with environmental clearance and license to operate and that still have a high ratio of extraction capacity over loss of natural state. | | | | |
| | Impacts on the Quality of Groundwater Resource. caused by the use of dirty or contaminated drilling equipment. To mitigate: (i) ensure drilling equipment is cleaned well and will be free of contaminants such as grease, sewage and chemicals, prior to drilling; and (ii) dispose of spoils and wastes at the end of each day's work. | (i) ensure drilling equipment is cleaned well and will be free of contaminants such as grease, sewage and chemicals, prior to drilling; and (ii) dispose of spoils and wastes at the end of each day's work. | PMO,RPMOS,& DSMC | Cases of mixing of contaminated water/ public reporting | Every month during construction period. | Included in civil works contract |
| | Impacts on stored water in adjacent ground reservoir tanks (RVTs). | Construction of new ground reservoir tanks will potentially exposed the water stored in adjacent existing RVTs | PMO,RPMOS,& DSMC | Cases of mixing of contaminated water/ public reporting | Every month during construction period. | Civil contractor's responsibility |
| Impacts on Flora and Fauna | Haphazard site clearing, parking and movement of construction vehicles and equipment, stockpiling, and Illegal harvesting of community forest resources as fuel for cooking by workers will result in unnecessary loss of vegetation beyond Subproject footprints. | (i) physically and clearly marking limits of subproject footprints and work easements; (ii) installing clear signage and markers to direct traffic movement in sites; (iii) designating stockpiling areas; (iv) replanting at least 5 trees in the vicinity for every tree cut and taking care of the newly planted seedling during the construction period; (v) re-vegetating disturbed slopes and grounds, as applicable.; and providing alternative fuel to workers for cooking. | PMO,RPMOS,& DSMC | No. of trees felling, no of forest encroachments recorded. | Once a month | Included in civil works contract |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| Impacts on the Socio-Economic Environment and Resources | Slow mobility in the core areas, blocked accesses to properties and work sites, local flooding, utility service disruptions. | (i) preparing a traffic management scheme jointly with local authorities; (ii) posting of traffic flagmen during the entire working hours; (iii) providing safe success to affected properties; (iv) managing stockpiling; (v) leading pumped water from excavations to drains or storing in drums for use in watering dry surfaces; (vi) coordinating the relocation of affected power supply poles, embedded private water hoses prior to excavation; and (vii) in case of accidental damage to existing utilities, advise concerned authority at once | PMO,RPMOS,& DSMC | Compliance with proposed mitigation measures. | Every month during the construction. | Included in civil works contract,, contractor's responsibility |
| | Community health and safety hazards | (i) Contractor's implementation of the ADB-cleared C-EMP; (ii) adequate lighting, temporary fence, reflectorized barriers and signage at active work sites; (iii) Contractor's preparedness in emergency response; and (iv) adequate dissemination of the GRM and Contractor's observance/implementation of the GRM | PMO,RPMOS,& DSMC | Compliance with proposed mitigation measures. | Every month during the construction. | Included in civil works contract |
| 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 in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures | Comply with requirements of Labor Act of GoN and standards on workers' health and safety (H&S).<br>Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear.<br>Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (vests/cloths | Contractor | Site –Specific H&S plan<br>Equipped first-aid stations<br>Medical insurance coverage for workers<br>Number of accidents<br>Records of supply of uncontaminated water<br>Condition of eating areas of workers<br>Record of H&S orientation trainings<br>Use of personal protective equipment<br>% of moving equipment outfitted | Visual inspection by RPMOS (monthly) and DSMC-ESS on weekly basis.<br>Frequency and sampling sites to be finalized during detailed design stage and final location of sub project components | Included in civil works contract |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| | | with reflectors, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training4 for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.<br>Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances<br>Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps.<br>Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times.<br>Provide medical insurance coverage for workers;<br>Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection , and preventing injuring to fellow workers;<br>Provide visitor orientation if visitors to the site can gain access to areas where hazardous condition or substances may be present.<br>Ensure also that visitor's do not enter hazard areas unescorted;<br>Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; | | with audible back-up alarms<br>Permanent sign boards for hazardous areas<br>Signage for storage and disposal areas<br>Condition of sanitation facilities for workers | | |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| | | Ensure moving equipment is outfitted with audible back-up alarms;<br>Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors and the general public as appropriate; and<br>Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively | | | | |
| Environmental legislation compliance | Lack of awareness amongst project managers and WUSC in operating systems as per required legislation and IEE requirements | Capacity strengthening of the WUSC and continuing capacity strengthening of Project staff; and ensuring compliance with NDWQS, applicable conditions in IEE approvals and license for use of water resource. | PMO, RPMOs, DSMC and WUSC | Monitoring reports and checking operations against O&M manuals and permits/clearances | After commissioning of systems and semi annually | N/A |
| Impacts/Issues/Concerns and Mitigation Measures during Operation | | | | | | |
| Drinking water supply system | Delivery of unsafe Water | The operations and maintenance plan and training for staff will cover; (i) competent/cautions handling and storage of calcium Hypochlorite and qualified persons to implement/oversee disinfection and treatment; (ii) providing safe storage for chemicals; (iii) ensure capacity of WUSC to implement quick response to hazardous substance/waste spills; (iv) implement SPS-complaint EMP | PMO, RPMOs, DSMC and WUSC | Water Quality reports WTP records in the log book | During O&M of the system Quarterly monitoring | Responsibility of WUSC |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| | | and a water safety plan; and (v) monitor water quality. | | | | |
| Submission of EMP implementation Report | Unsatisfactory compliance to EMP | Appointment of environment supervisor to ensure EMP implementation<br>Timely submission of monitoring reports including pictures. | Contractor | Availability and competency of appointed supervisor<br>Monthly report | Monthly monitoring report to be submitted by RPMOS to PMO<br>PMO to submit semi-annual monitoring report to ADB | N/A |
| 3. Post Construction Activities | Damage due to debris, spoils, excess construction materials | Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and<br>(All excavated roads shall be reinstated to original condition.<br>All disrupted utilities restored<br>All affected structures rehabilitated /compensated<br>The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up.<br>All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area hall be top soiled and regressed using the guidelines set out in the revegetation specification that forms part of this document.<br>The contractor must arrange the cancellation of all temporary services.<br>Request PMO/PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work. | Contractor | RPMOS/PMO report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory. | Prior to turn-over of completed works to WUSC | responsibility of contractor |
| Sanitation facilities | Contamination to land or | The subproject incorporates a pilot for | WUSC, DSMC, | Sanitary inspection | During O&M of the | WUSC |

| Field | Impacts | Mitigations Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| (toilets and septage disposal site) | water ways due to overflow of septic tanks and/or uncontrolled dumping of septage | controlled disposal of septage. This is to reduce the likelihood of uncontrolled septage disposal to land and local water ways (nallas) which is currently practiced.Further septic tanks will be designed to ensure maximum retention is achieved and will be emptied at the required frequency (min every 3 years).Households will be educated on the above to further reduce the likelihood of septic tank overflows and uncontrolled dumping of septage . | RPMOs and PMO for education campaign | reports. Water quality re[orts from test pits near tube well sites | system. | |

## C. Environmental Monitoring Program

227. Environmental monitoring will be done during construction on three levels:

(i) Monitoring development of project performance indicators by the PMO-ESS;
(ii) Monitoring implementation of mitigation measures by the Contractor; and
(iii) Overall regulatory monitoring of environmental issues by the PMO.

228. In addition to regular monitoring onsite (at town level) by the PISU and DSC-ESS on the EMPimplementation of the mitigation measures, monitoring of key environmental parameters is proposed. Table IX-5 presents the indicative environmental monitoring plan for the subproject which includes relevant environmental parameters, with a description of the sampling stations, frequency of monitoring, applicable standards, and responsible agencies. This will be updated during detailed design to ensure EMP and monitoring program is commensurate to the impacts of the subproject.

**Table IX-2: Environmental Monitoring Program**

| Field | Stage | Parameters | Location | Frequency | Standards | Responsibility |
|---|---|---|---|---|---|---|
| Air quality | • Prior to construction to establish baseline<br>• Construction phase | SPM<br>PM2.5<br>PM10<br>SO2<br>NOx<br>CO | • PTWs location<br>• OHT location<br>• Along water transmission main 1-km interval from PTWs<br>• Construction campsite locations | • 24-hour monitoring once in a season (except monsoons) for the construction period | • National Ambient Air Quality Standards, 2003 | Contractor |
| Noise and vibration levels | • Prior to construction to establish baseline<br>• Construction phase | Equivalent day and night time noise levels | • PTWs location<br>• OHT location<br>• Along water transmission main 1-km interval from PTWs<br>• Construction campsite locations | • Once in a season (except monsoons) for the construction period | • National Noise Standard Guidelines, 2012 | Contractor |
| Water quality | • Prior to construction to establish baseline<br>• Construction phase | TDS, TSS, pH, hardness, BOD, fecal coliform, total nitrogen, total phosphorus, heavy metals, temperature, DO, hydrocarbons, mineral oils, phenols, cyanide, temperature | • Along khals adjacent to construction sites (to be identified by the and (provide if PMC or DSC)) | • Twice a year (pre-monsoon and post-monsoon) for the entire period of construction | • National Drinking Water Quality Standards, 2006 | Contractor |

| Field | Stage | Parameters | Location | Frequency | Standards | Responsibility |
|---|---|---|---|---|---|---|
| Survival rate of landscaping, tree plantation | • O&M phase | Survival rate | • In the areas where re-plantation/ landscaping proposed | • Twice a year for 2 years | • None | WUSC |

## D. Institutional Capacity Development Program

229. 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.

230. WUSC does not have the capacity to monitor the quality of supplied water as prescribed in the NDWQS and its Directives. Albeit monitoring kits and laboratory rooms will be provided, this would not guarantee WUSC can handle monitoring appropriately. DWSS has five regional laboratories; however some are not functioning fully due to lack of manpower. 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 the WUSC actively participating to develop WUSC capacity. The conduct of 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 capacity of the WUSC is sustained. The cost for monitoring during operation is based on the assumption that a licensed laboratory will be engaged for both the monitoring requirements and to train the WUSC. A Water Safety Plan is included in subproject design and will oblige the operator to carry out water quality monitoring accordingly. The amount of NPR 500,000 will be provided annually to implement the Plan. There will be sufficient fund to include training by the licensed and accredited lab, while monitoring water quality.

231. The PMO-ESS will be responsible for trainings on environmental awareness and management in accordance with both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project along with the frequency of sessions is presented in Table IX-3.

**Table IX-3: Training Program for Environmental Management**

| Items | Pre-construction/prior to construction | Construction | |
|---|---|---|---|
| Training Title | Orientation workshop | Orientation program/ workshop for contractors and supervisory staffs | Experiences and best practices sharing |
| Purpose | To aware the participants of the environmental safeguard requirements of ADB and GOB and how the project will meet these requirements | To build the capacity of the staffs for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and GOB | To share the experiences and best practices aimed at learning lessons and improving implementation of EMP |
| Contents | **Module 1: Orientation**<br>• ADB Safeguards Policy Statement<br>• Government of Bangladesh Environmental Laws and Regulations<br>**Module 2: Environmental Assessment Process**<br>• ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements<br>• Review of environmental assessment report to comply with ADB requirements<br>• Incorporation of EMP into the project design and contracts | • Roles and responsibilities of officials/contractors/consultants towards protection of environment<br>• Environmental issues during construction<br>• Implementation of EMP<br>• Monitoring of EMP implementation<br>• Reporting requirements | 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, PIUs, and (provide if PMC or DSC) |
| Participants | Executing and implementing agencies, PMO, and PMO staffs (technical and environmental) involved in the project implementation | PMO<br>PIUs<br>Contractors | PMO<br>PIUs<br>Contractors |

## E. Staffing Requirement and Budget

232. 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.

233. The infrastructure involved in each scheme is generally straightforward to build. Environmental monitoring during construction will also be straightforward and will involve periodic site observations and interviews with workers and others, plus checks of reports and other documents. This will be conducted by PMO-ESS assisted by the PMO environmental safeguard officer. Therefore, no separate budget is required for the PMO-ESS.

234. The cost of mitigation measures and surveys during construction stage will be incorporated into the contractor's costs, which will be binding on him for implementation. The surveys will be conducted by the contractors.

235. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of the WUSC. All monitoring during the operation and maintenance phase will be conducted by WUSC. The Water Safety Plan, included in each subproject design, will allocate NPR 500,000 annually for operation and maintenance particularly water quality monitoring. If a licensed laboratory will be engaged for the first 2-3 years of operation for training purposes, the cost can be accommodated under the Water Safety Plan.

236. The indicative costs of EMP implementation are shown in Tables IX-7 and IX-8 (by source of funds).

**Table IX-4: Indicative Cost of EMP Implementation**

| | Particulars | Stages | Unit | Total No. | Rate (NPR) | Cost (NPR) | Cost covered by |
|---|---|---|---|---|---|---|---|
| A. | Mitigation Measures | | | | | | |
| 1. | Compensatory plantation measures | Construction | Per tree | | | | Civil works contract |
| B. | Monitoring Measures | | | | | | |
| 1. | Air quality monitoring | - Pre-construction<br>- Construction | Per location | 3 | 150000.00 | 450,000.00 | Civil works contract |
| 2. | Noise levels monitoring | - Pre-construction<br>- Construction | Per location | 3 | 30000.00 | 90,000.00 | Civil works contract |
| C | Capacity Building | | | | | | |
| 1. | (i) Orientation workshop for officials involved in the project implementation on ADB Safeguards Policy Statement, Government of Bangladesh environmental laws and regulations, and | Module 1 – immediately upon engagement of the (provide if PMC or DSC) environmental specialists<br><br>Module 2 – prior to award of civil | lump sum | 1<br><br>8 | Module 1 – 300000.00<br>Module 2 – 100000.00<br>Module 3 – 200000.00 | 300,000.00<br>800,000.00<br>200,000.00 | Covered under PMC or DSC contract |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | environmental assessment process; (ii) induction course contractors, preparing them on EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation; and (iii) lessons learned information sharing | works contracts (twice a year for 4 years)<br><br>Module 3 – prior to start of Phase 2 and upon completion of the project | | | | | |
| D. | Manpower Costs | | | | | | |
| 1 | PMO Environment Safeguards Officer | Construction phase | 1 | 20 | 65000.00 | 1,300,000.00 | Budget covered through PMC |
| 2 | PISU Environment Safeguard Assistants | Construction phase | 2 | 20 | 25000.00 | 1,000,000.00 | Budget covered through DSC |
| 3 | PMO Environmental Safeguard Specialist | Responsible for environmental safeguards of the project at PMO level | person months (spread over entire project implementation period) | 24 person months | 350000.00 per person month | 8,400,000.00 | Remuneration and budget for travel covered in the PMC contract |
| 4 | DSC Environmental Safeguard Specialist | Responsible for environmental safeguards of the project at PIU level | person months (spread over entire project implementation period) | 20 person months | 300000.00 per person-month | 6,000,000.00 | Remuneration and budget for travel covered in the DSC contract |
| E. | Administrative Costs | | | | | | |
| 1. | Legislation, permits, and agreements | Permit for excavation, tree-cutting permits, etc. | Lump sum | | XXX | XXX | These consents are to be obtained by contractor at his own expense. |
| | | Environmental assessment and environmental clearances as per EPA 1996 and EPR, IEE presentation at review committee | Lump sum | 1 | 50000.00 | 50000.00 | 50000.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | related expenses | | | | | |
| F. | Other Costs | | | | | | |
| 1. | Public consultations and information disclosure | Information disclosure and consultations during preconstruction and construction phase, including public awareness campaign through media | As per requirement | Lump sum | | 350000.00 | Covered under DSC contract |
| 2. | GRM implementation | Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information dissemination) | | Lump sum | | 200,000.00 | PMO cost |
| 3. | Any unanticipated impact due to project implementation | Mitigation of any unanticipated impact arising during construction phase and | | Lump sum | Contractor's liability | As per insurance requirement | Civil works contract – contractor's insurance defect liability period |
| TOTAL | | | | | | 19,140,000.00 | |

## X. MONITORING AND REPORTING

237. RPMO will monitor and measure the progress of EMP implementation. The monitoring activities will correspond with the project's risks and impacts, and will be identified in the EIAs/IEEs for the projects. In addition to recording information on the work and deviation of work components from original scope PMO, PIUs, and (provide if PMC or DSC) will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome.

238. RPMO will submit monthly monitoring and implementation reports to PMO, who will take follow-up actions, if necessary. PMO will submit semi-annual monitoring reports to ADB. The suggested monitoring report format is in **Annex G**. Subproject budgets will reflect the costs of monitoring and reporting requirements. For projects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis. Monitoring reports will be posted in a location accessible to the public.

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

240. ADB will review project performance against the MUDs 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 EAs to ensure that adverse impacts and risks are mitigated, as planned and as agreed with ADB;
(iv) Work with EAs 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.

## XI. CONCLUSION AND RECOMMENDATION

241. The proposed subproject is not an environmentally critical undertaking. The IEE indicates that:

- The proposed subproject, its components, are not within or adjacent to environmentally sensitive areas.
- The extent of adverse impacts is expected to be local, confined within the subprojects' main areas of influence, quarry or borrowing sites, waste disposal sites, and the routes to and from these sites. Except during windy days and heavy rainfall, fugitive dust, fine aggregates, sediments and/or wastes would not be the transported beyond the aforementioned sites. With mitigation measures in place and ensuring that the bulk of earthworks are completed prior to the onset of the rainy season, the potential adverse impacts during construction would be highly/more site-specific.
- 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 period). These will not be sufficient to threaten or weaken the surrounding resources. The preparation and implementation of a Contractor's EMP that would address as minimum the requirements of the SPS-compliant subproject EMP will mitigate the impacts and lower their residual significance to acceptable levels. Simple/uncomplicated mitigation measures, basically integral to socially and environmentally responsible construction practices, are commonly used at construction sites and are known to Contractors. Hence, mitigation measures would not be difficult to design and institute.
- During operation, the potential delivery of unsafe water can be mitigated with good operation and maintenance, prompt action on leaks, and complying with the required quality monitoring of supplied water as prescribed in the National Drinking Water Quality Standards Directives.

- The proposed subproject 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 public health, improved quality of life and safe communities as outcomes.

242. Based on the above findings, the classification of the 3rdSTWSSSP as Category B is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with the Safeguard Policy Statement of the ADB. The Government of Nepal EIA will incorporate the findings and recommendations of this IEE and prescribed environmental management in the EMP.

**Table XI-1: Environmental Management Implementation Schedule**

| Activity | | Indicative Time Frame |
|---|---|---|
| **SUBPROJECT IMPLEMENTATION** | | |
| 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 |
| **ENVIRONMENTAL MANAGEMENT** | | |
| **Overall** | | |
| 1 | Project Management Consultant (PMC)-Engagement of Environmental Specialist | Starting Q4 Y0 (5 yrs of intermittent inputs) |
| 2 | PMO's submission of Environmental Monitoring Report (EMR) | |
| | - Monthly EMR for subproject's Monthly Progress Report | - 8th day after effective month |
| | - Semi-Annual EMR during construction for submission to ADB | - 8th day after effective 6-mo. period |
| | - Annual EMR for submission to ADB | - 8th day after effective year |
| **Prior to Construction Mobilization** | | |
| 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 &it's EMP) | Q4 Y0 |
| 5 | Establishment of baseline data (as set out in the EMP) | Q4 Y0 (shall have been done prior to award of contract) |
| 6 | Preparation of C-EMP by selected Contractor, review of C-EMP against SPS-compliant EMP. | Q4 Y0, before Notice to Proceed isgiven |
| **Construction Period** | | |
| | Mobilization to Demobilization | |
| 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 (EMR) | Q4 Y0 – Q4 Y2 |
| | - Monthly, by Contractor | 5th day of the month following the effective month |

| | | |
|---|---|---|
| | - Quarterly, by Contractor or by Licensed Laboratory | 3rd 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 | 5thday of the month following the effective month |
| | - Quarterly, by Operator or (if applicable) by Licensed Laboratory | 3rd day of the month following the effective quarter |

**Table XI-2: Proposed Topics for Capacity Building/Training**

| | Topic | Target Participants | Timing |
|---|---|---|---|
| **1** | **By Environmental Specialists** | | |
| 1.1 | Legal Framework | DWSS, PMO, | Early stage |
| | • Relevant national laws, regulations & standards on environmental Assessment & management | WSSDO, PISU, RMSO, WUSC | of Output 2 |
| | • ADB SPS 2009 | (15-18) | |
| | • Environmental assessment & 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 | DWSS, PMO, | Early stage |
| | • Institution arrangements & responsibilities | WSSDO, PISU, | of Output 2 |
| | • Environmental quality monitoring | RMSO, WUSC, | |
| | • Emergency response | (15-18) | |
| 1.5 | EMP Implementation, part 2 | | |
| | • Performance monitoring & indicators | | |
| | • Environmental monitoring report | | |
| **2** | **By External Experts** | | |
| 2.1 | Other relevant topics, such as: | MUD, DWSS, | During |
| A | Good engineering and construction practices as mitigation measures | PMO, PISU, | Project's |
| B | Climate change adaptation (applicable to eligibleactivities/works under the Project) | WSSDO, DMSO, DSC | Capacity Devt. |
| | B.1 Climate change impacts on infrastructure | -30 | Program |

| | | |
|---|---|---|
| | B.2 Climate-proofing of infrastructures | |
| C | Strategic environmental assessment of WSS sector policy, development plans and programs | |
| D | Other relevant topics that may be suggested by MUD, DWSS, PMO, PISU & WSSDO | |

## XII. REFERENCES

Environmental Protection Act, 1996

Environment Protection Regulations, 1997

Environmental Protection Rules, 1997, and as amended in 1999 and 2007

Final Feasibility Study of Musikot Khalanga Town Water Supply and Sanitation Project

Final Detailed Engineering Study of Musikot Khalanga Town Water Supply and Sanitation Project

Initial Environmental Examination on Musikot Khalanga Town Water Supply and Sanitation Project

The Updated Fifteen-Year Development Plan for Small Towns' Water Supply and Sanitation Sector, 2009

## Annex A. Rapid Environmental Assessment (REA) Checklist for Musikot Khalanga Town Sub projects and Preliminary Climate Risk Screening Checklist for Sample Sub Project Towns

**Instructions:**

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.

(ii) 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.

(iii) 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: Third Small Towns Water Supply and Sanitation Sector Project**

**Sector Division:** **Musikot Khalanga Town Water Supply and Sanitation Subproject**

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| A. Project Siting<br>Is the project area: | | | |
| ▪ Densely populated? | √ | | Densely populated in market area and others are scattered and rural in character |
| ▪ Heavy with development activities? | | √ | Only small developmental activities like building construction and so are going on |
| ▪ Adjacent to or within any environmentally sensitive areas? | | √ | No such areas in and around project site |
| ▪ Cultural heritage site | | √ | No cultural heritage site within or nearby the project area |
| ▪ Protected Area | | √ | No any protected area within or nearby the project area |
| ▪ Wetland | | √ | No wetland area within or nearby the project area |
| ▪ Mangrove | | √ | No mangrove area within or nearby the project area |
| ▪ Estuarine | | √ | No estuarine area within or nearby the project area |
| ▪ Buffer zone of protected area | | √ | No buffer zone within or nearby the project area |
| ▪ Special area for protecting biodiversity | | √ | No special area for protecting diversity within or nearby the project area |
| ▪ Bay | | √ | No any bay within or nearby the project area |
| B. Potential Environmental Impacts<br>Will the Project cause… | | | |

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| ▪ Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff? | √ | | Since the abstraction of raw water being surface water, there may be possibilities of pollution due to community and soil erosion but not from industries, agriculture etc as the source is very far and isolated |
| ▪ Impairment of historical/cultural monuments/areas and loss/damage to these sites? | | √ | All pipes will pass through road side and no any industrial/cultural monuments/area will be damage by the project within the project area. |
| ▪ hazard of land subsidence caused by excessive ground water pumping? | | √ | Surface water is used, no ground water |
| ▪ social conflicts arising from displacement of communities? | | √ | Communities will not be displaced |
| ▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters? | | √ | Not anticipated. Water quantity is sufficient. |
| ▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)? | | √ | Water quality after treatment, meeting with NDWQS standard will be supplied |
| ▪ delivery of unsafe water to distribution system? | | √ | Treatment facility is provided to ensure quality of supplied water |
| ▪ inadequate protection of intake works or wells, leading to pollution of water supply? | | √ | Treatment facility is protected to ensure quality of supplied water |
| ▪ over pumping of ground water, leading to salinization and ground subsidence? | | √ | No groundwater being used only surface water will be used. |
| ▪ excessive algal growth in storage reservoir? | | √ | Only treated water will be collected and reservoir will be cleaned periodically |
| ▪ increase in production of sewage beyond capabilities of community facilities? | | √ | Most of the household have their own toilet and not connected to drain. Conceptual design of waste water management has been prepared |
| ▪ inadequate disposal of sludge from water treatment plants? | | √ | As water quality is as per NDWQS standard only minor sludge will be produced |
| ▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? | | √ | As the system is gravity type there is no need to operate pumps |
| ▪ impairments associated with transmission lines and access roads? | | √ | Transmission line passes through roads |
| ▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals. | | √ | Trained manpower will be used to receive, store and handling of chlorine. Adequate measures will be taken to store it properly. |
| ▪ 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? | | √ | Only chlorine will be used as disinfectants. Required training will be provided to handle it properly and trained manpower will be deployed Therefore health and safety hazard to workers will not arise |
| ▪ dislocation or involuntary resettlement of people? | | √ | No resettlement of people required |
| ▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? | | √ | All households will have their own private tap. Besides this, these people will get opportunity to work and earn during project implementation |
| ▪ noise and dust from construction activities? | √ | | During construction some noise may be created and some dust may be produced but this will be managed to minimize using appropriate construction practices |

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| ▪ increased road traffic due to interference of construction activities? | √ | | During excavation and back filling of pipe trench traffic interference may occur for short period. Traffic management will be taken care of |
| ▪ continuing soil erosion/silt runoff from construction operations? | √ | | The project area being hilly one, usually during excavation of pipe trench, soil erosion may occur but in small quantity. This will be taken care of during construction. |
| ▪ 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? | | √ | Regular monitoring of plant operation will be carried out. Trained manpower will be deployed through users committee for O&M of the project. One well equipped lab will be established to check water quality on regular basis. Hence this type of problem does not arise. |
| ▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals? | | √ | Regular monitoring of plant operation will be carried out. Trained manpower will be deployed through users committee for O&M of the project. One well equipped lab will be established to check water quality on regular basis. Hence these type of problem do not arise |
| ▪ accidental leakage of chlorine gas? | | √ | Chlorine gas is not being used |
| ▪ excessive abstraction of water affecting downstream water users? | | √ | Only required quantity of water will be abstracted and the quantity of water to be abstracted is very little in comparison to the water available at source. |
| ▪ competing uses of water? | | √ | Not applicable |
| ▪ increased sewage flow due to increased water supply | | √ | Most of HHs have their own toilet and conceptual design of structures for waste water management has been done |
| ▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant | | √ | Volume of sullage and sludge may increase in small quantity. It may not cause serious problems |
| ▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? | √ | | Population will be increased as per the anticipated population growth rate. No need to hire people from outside during construction period. Local people will be used as far as possible. Skilled manpower if not available locally may be hired from outside. |
| ▪ social conflicts if workers from other regions or countries are hired? | | √ | Since local people will be used for the implementation of the project as far as possible, such conflict may not arise |
| ▪ 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? | | √ | No need to use explosive and other danger chemicals. Fuel will be properly stored. |
| ▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? | | √ | Proper safety measures and precaution will be adopted during construction period. The project structures will be made inaccessible providing compound wall and fencing or few structure underground |

**Preliminary Climate Risk Screening Checklist for Sample Sub 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 sub projectwons 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 below ground 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 | Note likely.<br>Surface water from stream and spring will be the source of water for the subproject towns. 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 metrological parameters ) affect the selection of project inputs over the life of project outputs (i.e. construction materials) | 0 | |
| 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. Safe yield from surface water source for the water supply system will be used. 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

## Annex B. Relevant Environmental Quality Standards

### B.1 Ambient Air Quality Standards

| Parameter | Averaging Period | Nepal's Ambient Air Quality Standard ($\mu g/m^3$) * | WHO Air Quality Guidelines ($\mu g/m^3$) ** | |
|---|---|---|---|---|
| | | | Global Update 2005 | Second Edition ^ 2000 |
| TSP | Annual | - | - | - |
| | 24-hour | 230 | - | - |
| $PM_{10}$ | Annual | - | 20 | - |
| | 24-hour | 120 | 50 | - |
| $PM_{2.5}$ | 1-year | - | 10 | - |
| | 24-hour | - | 25 | - |
| $SO_2$ | Annual | 50 | - | |
| | 24-hour | 70 | 20 | - |
| | 10-minute | - | 500 | - |
| $NO_2$ | 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 (dB) | | WHO Guideline Values for Noise Levels Measured Out of Doors * (One Hour $L_{Aeq}$ 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.

## 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 natilonal 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.

## Annex C. People's Contacted for Consultations

| S. N. | Name | Designation | Address |
|---|---|---|---|
| 1 | Mr. Mahendra K C | Chairman, WUSC | |
| 2 | Mr. MeghBdr. B.C | Co- Chairman, WUSC | |
| 3 | Mr. Kedar Singh Gautam | Secretary, WUSC | |
| 4 | Mr. PrabinDangi | Treasurer, WUSC | |
| 5 | Ms. Bijaya Sharma | Member, WUSC | |
| 6 | Mr. TikramKhatri | Member, WUSC | |
| 7 | Mr. Toparam Nepali | Member, WUSC | |
| 8 | Ms. Janaki K.C | Member, WUSC | |
| 9 | Ms. TulashaBista | Member, WUSC | |
| 10 | Mr. ShekharGiri | Adviser, WUSC | |
| 11 | Mr. NiranjanKhanal | DE, WSSDO, Rukum | |
| 12 | Ms. PimkalaGiri | Community Mobilizer | |
| 13 | Mr. Bharat Kumar Sharma | Local Development Officer, Rukum | |
| 14 | Mr. Man BahadurKhatri | HealthpostIncharge | |
| 15 | Mr. Tejbahadur | VDC Secretory | |
| 16 | Mr. DhanbirOli | Local Leader | |
| 17 | Mr. Manbahadur Nepali | Local Leader | |
| 18 | Mr. Hari Prasad Sharma | Local Leader | |
| 19 | Ms. SumitraKhadka | | |
| 20 | Mr. ChintamadiDahal | Programme Officer, DDC Rukum | |
| 21 | Mr. Basanta Pun Magar | FNCCI Representative | |
| 22 | Mr. NawarajGautam | Civil Society Rukum | |
| 23 | Mr. DevilalGautam | Advisor | |
| 24 | Mr. Tukraj Sharma | NGO Team Leader | |
| 25 | Mr. HariGautam | Journalist | |
| 26 | Mr. DeepakrajKhadka | Businessmen | |
| 27 | Mr. Gobind K.C. | Beneficiary | Khalanga-1 |
| 28 | Mr. JokhBahadurKhadka | Beneficiary | Khalanga-1 |
| 29 | Mr. GovindKhatri | Beneficiary | Khalanga-8 |
| 30 | Mr. Hast Bahadur Nepali | Beneficiary | Khalanga-3 |
| 31 | Mr. YajjyaBahadurPariyar | Beneficiary | Khalanga-3 |
| 32 | Mr. Mohan BahadurBohara | Beneficiary | Khalanga-1 |
| 33 | Mr. KedarGautam | Beneficiary | Khalanga-4 |
| 34 | Mr. Yagga Kumar Sharma | Beneficiary | Khalanga-3 |
| 35 | Mr. Dal BahadurKhadka | Beneficiary | Khalanga-8 |
| 36 | Mr. KashiramKhatri | Beneficiary | Khalanga-8 |
| 37 | Mr. Bog BahadurKhadka | Beneficiary | Khalanga-9 |
| 38 | Ms. DeumatiThapa | Beneficiary | Khalanga-2 |
| 39 | Ms. SitaBohara | Beneficiary | Khalanga-2 |
| 40 | Mr. Bivek K.C. | Beneficiary | Khalanga-5 |
| 41 | Mr. PurnaBahadurKesari | Beneficiary | Khalanga-5 |
| 42 | Mr. SharkiBudathoki | Beneficiary | Khalanga-2 |
| 43 | Mr. TekBahadurKhatri | Beneficiary | Khalanga-5 |

## Annex D. 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><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:** | |
| **Whether Action Taken Disclosed:** | Yes<br>No |
| **Means of Disclosure:** | |

## Annex E. 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.

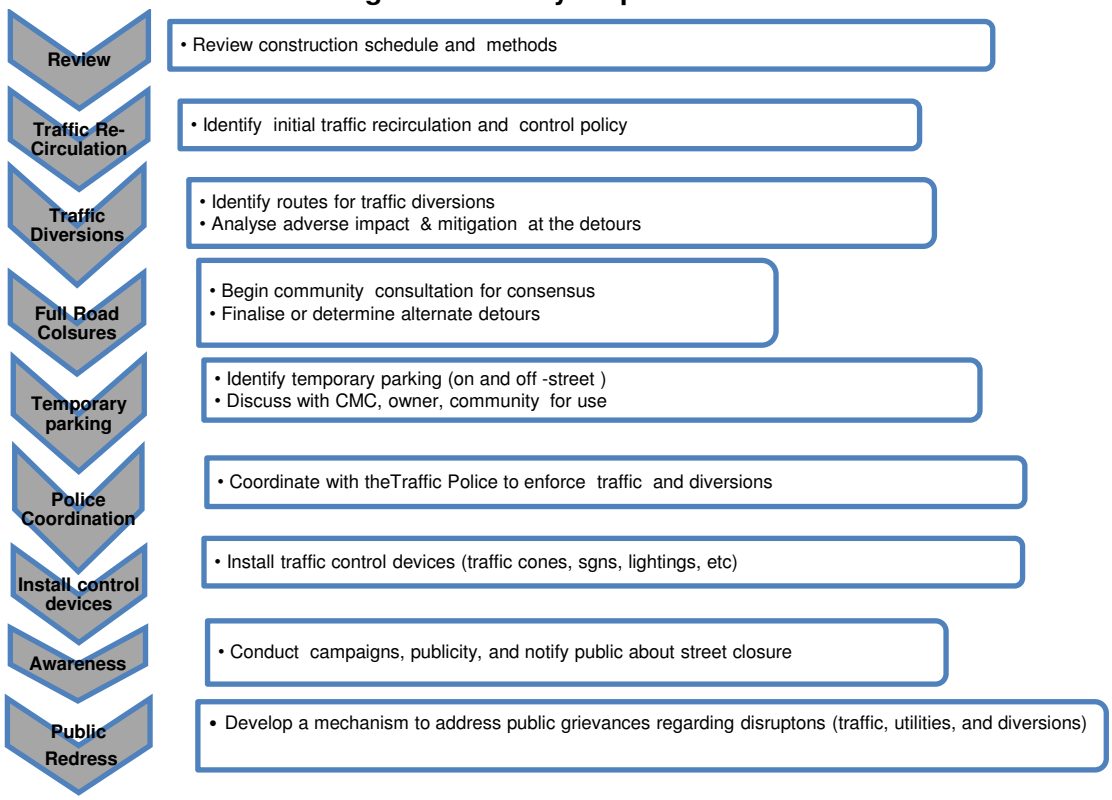
### C. Analyze the impact due to street closure

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 PISU, 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
(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 PISU 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 behaviour 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 PISU, 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 behaviour 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").

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 PISU 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.

## Annex F. 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
- Mange 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 |

**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, mud 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 cliental approval should be obtained to use it as spoil disposal area. The local administration must be consulted and if required permission should be obtained from them.

**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 DSC 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

## ANNEX G. 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.*

### XIII. INTRODUCTION

- Overall project description and objectives
- Description of sub-projects
- Environmental category of the sub-projects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and sub-project progress and status

| No. | Sub-Project Name | Status of Sub-Project | | | | List of Works | Progress of Works |
|---|---|---|---|---|---|---|---|
| | | Design | Pre-Construction | Construction | Operational | | |
| | | ☐ | ☐ | ☐ | ☐ | | |
| | | ☐ | ☐ | ☐ | ☐ | | |
| | | ☐ | ☐ | ☐ | ☐ | | |

### XIV. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS

| No. | Sub-Project Name | Statutory Environmental Requirements | Status of Compliance | Action Required |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

### XV. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

| No. (List schedule and paragraph number of Loan Agreement) | Covenant | Status of Compliance | Action Required |
|---|---|---|---|

### XVI. 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 muddy water was escaping site boundaries or muddy 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;
    - 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 (List from IEE) | Mitigation Measures (List from IEE) | Parameters Monitored (As a minimum those identified in the IEE should be monitored) | Method of Monitoring | Location of Monitoring | Date of Monitoring Conducted | Name of Person Who Conducted the Monitoring |
|---|---|---|---|---|---|---|
| Design Phase | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Pre-Construction Phase | | | | | | |
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| Construction Phase | | | | | | |
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| Operational Phase | | | | | | |
| | | | | | | |
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| | | | | | | |

**Overall Compliance with CEMP/EMP**

| No. | Sub-Project Name | EMP/CEMP Part of Contract Documents (Y/N) | CEMP/EMP Being Implemented (Y/N) | Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory) | Action Proposed & Additional Measures Required |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

## XVII. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

- Brief description on the approach and methodology used for environmental monitoring of each sub-project

## XVIII. 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
- 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 (µg/m3) | SO2 (µg/m3) | NO2 (µg/m3) |
| | | | | | |
| | | | | | |
| | | | | | |

| Site No. | Date of Testing | Site Location | Parameters (Monitoring Results) | | |
|---|---|---|---|---|---|
| | | | PM10 (µg/m3) | SO2 (µg/m3) | NO2 (µg/m3) |
| | | | | | |
| | | | | | |
| | | | | | |

**Water Quality Results**

| Site No. | Date of Sampling | Site Location | Parameters (Government Standards) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | pH | Conductivity (µS/cm) | BOD (mg/L) | TSS (mg/L | TN (mg/L) | TP (mg/L) |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| Site No. | Date of Sampling | Site Location | Parameters (Government Standards) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | pH | Conductivity (µS/cm) | BOD (mg/L) | TSS (mg/L | TN (mg/L) | TP (mg/L) |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**Noise Quality Results**

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

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

## Annex H.SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

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

WEATHER CONDITION:
_____

INITIAL SITE CONDITION:_____

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory_____ Incident_____ Resolved _____ Unresolved _____

INCIDENT:
Nature of incident:
_____

Intervention Steps:
_____

Incident Issues

Resolution

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

**Inspection**

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

Site Restored to Original Condition Yes ☐ No ☐

Signature
_____

**Sign off**

_____ _____
**Name** **Name**
**Position** **Position**