

Draft Initial Environmental Examination

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NEP: Third Small Towns Water Supply and Sanitation Sector Project – for Tamsariya, Nawalparasi District

Prepared by Third Small Towns Water Supply and Sanitation Sector Project, Department of Water Supply and Sewerage, Ministry of Water Supply and Sanitation, Government of Nepal for the Asian Development Bank.

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Initial Environmental Examination (IEE)

Of

Tamsaria Small Town Water Supply and Sanitation Project

DRAFT

Submitted to

Ministry of Water Supply and Sanitation

**Government of Nepal
Singhadurbar, Kathmandu**

Submitted by

**Project Management Office
Third Small Towns Water Supply and Sanitation Sector Project
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ACRONYMS

ADB	Asian Development Bank
amsl	above mean sea level
DDC	District Development Committee
DSC	Design and Supervision Consultant
DWSS	Department of Water Supply and Sewerage
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EPR	Environmental Protection Rules
GoN	Government of Nepal
GRM	Grievance Redress Mechanism
HH	Household
lpcd	litres per capita per day
IEE	Initial Environmental Examination
MPPW	Ministry of Physical Planning and Works
MWSS	Ministry of Water Supply and Sanitation
NEA	Nepal Electricity Authority
NDWQS	National Drinking Water Quality Standard
NWSC	Nepal Water Supply Corporation
PMO	Project Management Office
REA	Rapid Environmental Assessment
RP	Resettlement Plan
SSTWSSSP	Second Small Town Water Supply and Sanitation Sector Project
TDF	Town Development Fund
TSTWSSSP	Third Small Towns Water Supply and Sanitation Sector Project
WUSC	Water User and Sanitation Committee
VDC	Village Development Committee
ES	Environmental Specialist

EXECUTIVE SUMMARY

Background

The Project Management Office (PMO) of Department of Water Supply and Sanitation (DWSS) is the proponent of the current project. The sub-project is a part of the third phase of the Small Town Water Supply and Sanitation Sector Project (STWSSSP) of the Government of Nepal which aims to construct/extend drinking water supply systems, drainage and sanitation facilities as well as provide sanitary health education to the community in the small urban towns of the country. The project embraces the community managed demand responsive approach and is being implemented under ADB finance. The proposed project will facilitate all wards of Tamsariya VDC and part of Narayani VDC Nawalparasi District.

Purpose of IEE, ADB policy, GoN Acts and Rules

The purpose of this Initial Environmental Examination (IEE) is to examine the environmental implication of proposed project and its activities to ensure that it will not damage the environment and to provide measures to remove or reduce those impacts into acceptable limits.

Law of land and ADB policy, both require that the environmental implications of individual developments are taken into account in the planning and decision making process.

The statutory requirement of the Government of Nepal, that has to be adhered to for the proposed project, is the Environmental Protection Act, 1996 and Environmental Protection Regulation, 1997 (and amendments 2007). The present IEE study fulfils the requirements pertaining to Rule 3, Annex G of Schedule 1 of EPR, 1997 (including amendments). Similarly, as per ADB Safeguard Policy Statement (SPS) 2009, the project is classified Environment Category B and IEE is required as per the checklist suggested by ADB.

Components of the project

Tamsaria Small Town Water Supply sub-project has been conceptualized as a piped water supply system considering ground water (deep tube wells Proposed at the bank of Giriwari River) as sources. The project comprises of two major components-Water supply and Sanitation.

The system also consists of water treatment facilities, ground and elevated reservoirs from where water will be distributed through distribution pipe lines. The second component is sanitation services. There has been proposal to construct a public toilet and sludge drying bed to manage separate from household septic tank. Girwari River which is about 150m wide flows down north to south, through the service area and further separating the area. Jungle area starts from few hundred meters north from East-West Highway.

Baseline information

Tamsaria is a growing town and the economy is shifting from rural agricultural to business and commercial based. The average household income of service area is estimated as Rs. 30,355 per month (HH census survey 2015), which seems satisfactory. In-migration rate and increase of rental population has resulted to high population growth. The existing water supply system has been unable to serve growing population.

As socio-economic census survey data reveals cent percent of the HHs are willing for new tap connection from proposed town project. Among them 82.37 percent are enthusiastic for yard connection, 14.25 percent prefer fully plumbed connection, and 3.38 percent prefer community

tap. Likewise, 98 percent of them showed their willingness to pay 5 percent up-front cash contribution and 95 percent of the beneficiary households are enthusiastic for 15 % contribution for sanitation improvement.

The present water supply situation is not satisfactory. Households covered by private taps and public taps are only 11.5% and 25.04 % respectively. Rest of the households are dependent upon shallow tubewells, dugwells etc. Regarding the health and sanitation condition nearly 99 percent of households have toilet facility. The service area had been declared ODF in 14 Jestha 2070 BS. However, proper human waste management system including sewerage has not been developed. As reported by Health Center the occurrence of water borne diseases is quite often. Thus intervention from well planned water supply and sanitation project is necessary in this area.

Environmental impacts, mitigation and monitoring

No remarkable significant adverse environmental impacts have been predicted and the anticipated negative impacts are of local in nature and low in magnitude. The main environmental concern for water supply system is related to construction activities ground water intake and distribution line such as unsettling of street surfaces due to excavation and trenches which could lead to soil erosion and silt run off. The mitigation measures are precautionary types such as proper back filling of the excavated trenches and avoiding cutting of vegetation. The main issues related to the sanitation component are during the operational phase such as nuisance due to blocked water and health hazard due to mosquito breeding. The mitigation measures are related to the periodic maintenance, cleaning and flushing. The locations of major structures have been acquired in consultation with the user committee and no households or community have been displaced or resettled. Therefore there are very less possibilities of adverse impacts on the biological and socio economical environment of the project area.

Monitoring is necessary to check the implementation of mitigation measures and a detailed monitoring schedule has been designed specifying the regular and periodic monitoring activities during the project construction and operation phase. Before the operation of the project, PMO will develop detailed work plan for implementing mitigation measures and monitoring plans based on Environmental Management Plan which will be incorporated into the construction and operation contracts.

Conclusion and Recommendation

Considering the nature of the project; environmental and socio-economic situation of the area and based on the detailed field survey and consultation with the relevant stakeholders, it can be concluded that the proposed project will have only minor negative impacts on the area. The impacts are mostly local in nature and can be easily and cheaply mitigated with suitable mitigation measures and regular monitoring schedules. Implementation of the project will benefit the local people with safe and sufficient supply of drinking water and improved sanitary situation thereby raising the living standard of the people in Tamsariya. If the project is properly implemented and environmental issues are duly considered, there will be a significant improvement in the health of the environment and people. Hence, IEE is sufficient and proposed project is suitable for implementation.

A. INTRODUCTION

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

Name of the Proposal

The name of the proposal is ‘Initial Environmental Examination (IEE) of Tamsariya Water Supply and Sanitation Project’ in Nawalparasi District.

Name and Address of the Proponent

The project proponent Third Small Towns Water Supply and Sanitation Sector Project (TSTWSSSP) 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.

Name of the Proponent:

Government of Nepal
Ministry of Water Supply and Sanitation
Department of Water Supply and Sewerage
Third Small Town Water Supply and Sanitation Sector Project
Project Management Office, Kathmandu

Address of the Proponent:

Panipokhari, Kathmandu, Nepal
Phone: 977 1 4423848, 977 1 4412348
Fax: 977 1 4413280
Email: info@stwsssp.gov.np
Website: www.sstwsssp.gov.np

2. Basis and Extent of IEE Study

The Government of Nepal has prepared a fifteen years development plan to implement the water supply and sanitation programmes 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 systems, drainage and sanitation facilities and providing health and hygiene education programmes. The project follows the community managed demand responsive approach where the community will be involved from the planning phase to construction, implementation and operation and maintenance phases. The project, ‘Small Town 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 3 phases. The Department of Water Supply and Sewerage (DWSS) is the implementing agency whereas the Ministry of Water Supply and Sanitation (MWSS) is the executive agency of the project.

Law of Nepal 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 carried out through the environmental assessment process, which has become an integral part of lending operations and project development and implementation worldwide.

The purpose of this Initial Environmental Examination (IEE) is to examine the proposed infrastructure components and ensure that they will not damage the environment. The IEE will also provide guidance for their planning, construction and operations of the Project. In the assessment,

potential environmental impacts are identified; their significance assessed; and strategies devised to avoid negative impacts or reduce them to an acceptable level. These strategies (called “mitigation measures”) are then carried forward into the Environmental Management Plan (EMP). The EMP assigns responsibilities; indicates timescales; and measures performance for each mitigation measure – to make sure that they are implemented and not ignored. An environmental monitoring plan also helps to provide progress on project implementation. This nominates protocols and responsibilities for checking the operation of the project to a range of relevant and agreed performance indicators.

a. ADB’s Safeguard Policy Statement, 2009

ADB’s Safeguard Policy Statement 2009 is to consider environmental issues in all aspects of the Bank’s operations. ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, financial intermediation loans and private sector investment operations.

The nature of the assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts and are assigned to one of the following categories:

Category A: A proposed project is classified as category A if it is likely to have significant adverse environment impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.

Category B: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.

Category C: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

Category FI: A proposed project is classified as category FI if it involves investment of ADB funds to or through FI (Financial Intermediaries).

The Bank has classified this sub project as of **Category B** and following normal procedures for project loans and accordingly an IEE has been conducted.

The subprojects comprise of water supply and sanitation improvement works. An initial Rapid Environmental Assessment (REA) will be undertaken and the Project classified by ADB as Category B and following normal procedures for project loans, an IEE was conducted.

The Asian Development Bank (ADB) affirms that environmental and social sustainability is a cornerstone of economic growth and poverty reduction in Asia and the Pacific region. Therefore, ADB’s Strategy 2020 emphasizes assisting developing member countries (DMCs) as they pursue environmentally sustainable and inclusive economic growth. In addition, ADB is committed to

ensuring the social and environmental sustainability of the projects it supports. The goal of the Safeguard Policy Statement (SPS) 2009 is to promote the sustainability of project outcomes by protecting the environment and people from potential adverse impacts of projects. ADB addresses the following objectives in its safeguard policy:

- To avoid adverse impacts of projects on the environment and affected people, where possible;
- To minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is impossible; and
- To help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards,
- Involuntary resettlement safeguards, and
- Indigenous Peoples safeguards.

A project's environment category is determined by the category of its most environmentally sensitive component, including direct, indirect, induced, and cumulative impacts. Each proposed project is scrutinized as to its type, location, scale, sensitivity and the magnitude of its potential environmental impacts. The level of detail and comprehensiveness of the EIA or IEE are commensurate with the significance of the potential impacts and risks.

b. National Laws, Policies, Acts, Regulations, Standards and Guidelines

i. Policy Measures

The current policies of government of Nepal (GoN) stress the importance of environmentally sound economic development and growth through economic liberalization. The proposed Water Supply Project is in line with these policy measures to the extent possible. Some of these policies relevant to the proposed project are described below.

Second Three Year Interim Plan, 2068-2071 BS (2011-2015 AD)

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.

Interim Constitution of Nepal, 2063 BS (2007 AD)

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'.

National Urban Water Supply and Sanitation Sector Policy, 2066 BS (2009 AD)

It was 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

National Policy on Rural Drinking Water Supply and Sanitation, 2004

Provides guidance on water and sanitation service provision in rural areas using community led participatory approaches. While partially relevant in 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.

ii. Acts and Regulations

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”

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.

Environmental Protection Act (EPA), 1997 & Environmental Protection Regulations (EPA), 1999 (and amendments)

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 process. 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.

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.

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 elaborates 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

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.

Solid Waste Management and Resource Mobilization Act, 1987 & Solid Waste (Management and Resource Mobilization Rules), 1990

As solid waste has direct impact on water supply system, discharge of solid waste in either public or private places have been prohibited under this Act. The rules entrusts Solid Waste Management and Resource Mobilization Centre, established under the Act, to provide necessary service to individual or institution in managing solid waste. As such any water resource projects may obtain such service and maintain the water resource clean.

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.

Land Acquisition Act, (2034 BS) 1977 & Land Acquisition Rules, 1969

These are 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.

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.

iii. Standards and guidelines

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.

National EIA Guidelines, 2050 BS (1993 AD)

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.

c. Objectives and Scope of the Environmental Study

IEE is a tool for incorporating environmental concerns at the project level and is carried out as a part of the detailed study. The objectives are:

- provide information about the general environmental settings of the project area as baseline data;
- provide information on potential impacts of the project and the characteristic of the impacts, magnitude, distribution, affected groups and duration
- provide information on potential mitigation measures to minimise the impact including mitigation costs
- assess the best alternative project with most benefits and least costs in terms of financial, social and environmental aspects
- provide basic information for formulating management and monitoring plans

The present IEE has been conducted for the water supply and sanitation subproject proposed for Tamsariya Town Project Nawalparasi District. It discusses the environmental impacts and mitigation measures relating to the location, design, construction and operation and management of the scheme.

d. Scope of the study

The scope of the study is to study and prepare the IEE report as per the format indicated by EPR 2053 BS (1997AD) together with the instructions provided by the project management office. The task during the preparation of this report included description of the project with reference to the physical, biological and social environment, and identification of potential impacts, mitigation measures and monitoring plan and related topics. However, the study does not limit itself only here, but has strived to completeness and objectiveness. The proposed sub-project is classified as environment Category B project as per the ADB's Safeguard Policy Statement (SPS) 2009 and an Initial Environmental Examination (IEE) has to be carried out.

However, after the enforcement of GoN's Environmental Protection Acts 1997 and Environmental Protection Regulation (EPR) 1997 (including amendments 1999), all projects under consideration are required to undergo either an IEE or EIA. The screening criterion for the application of IEE or EIA is clearly mentioned in the Schedule 1 and Schedule 2 of EPR.

The structural components of Sub- Project including the deep tube wells and reservoirs will be located at the land procured by the WUSC. Transmission mains and distribution network of the proposed project passes along the public land and existing road tracks. As a whole, the project does not fall in any restricted areas, places of cultural, historical and archaeologically important/monuments, conservation areas, wildlife national parks, and other places where the law of the land prohibits any construction activities. In this way, all the criteria lie within the range of schedule 1 of EPR. As per the ADB's Environmental Assessment Requirements and Environmental Guidelines for selected infrastructure Development Projects and GoN's Environmental Protection Regulation, 1997, Initial Environmental Examination (IEE) is sufficient for the proposed project.

The current study has been conducted as per the TOR approved by MoWSS (TOR approved on May 19, 2016). The environmental issues identified by the TOR have been looked into in detail by this study and EMP will be designed to address these issues. The impacts of providing infrastructure in the areas will have been assessed and the Initial Environmental Examination (IEE) Reports and Environmental Monitoring Plans produced. Studies have been conducted according to ADBs Safeguard Policy Statement 2009 and GoNs Environmental Protection Rules (1997) and amendments.

e. Relevancy of the Project

As per the TOR, it is stated that the project needs to be studied from the environmental point of view as per EPA 1996 and EPR 1997(*Amendments 1999 and 2007*). It is expected that on implementation of the project the users of the area will be able to avail adequate amount of safe drinking water and need not resort to use of unsafe open well and streams to fulfill their water needs. The project needs to go through the IEE process as stipulated in EPR 1997(*Amendments 1999 and 2007*). The proposed project shall be using surface and subsurface water sources. The project shall benefit more than ten thousand persons in the area with higher and better water services. As the proposed project falls within the definitions provided in the EPR 1997(*Amendments 1999 and 2007*) for drinking water projects; only an

IEE should be done. The regulation stated in Annex 1 (H) shall only be applicable, if the proposal does not fall under categories (A) through (H).

Below 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 would require IEE or EIA.

Table 1: Criteria for Requirement of IEE and/or EIA for Drinking Water Supply Projects as per Annex 1 and Schedule g and Schedule h of EPR, 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 this 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	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	More than 25 litre per sec		More than 25 litre per sec
7	Construction of Tunnel for Channelling Drinking Water	Tunnel construction		Not Applicable
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	Within 50,000
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	Population within 50,000
12	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 in the vicinity of the water source

S.N	Condition described in the Act and Regulations	IEE Required as per Regulation Annex 1 g	EIA Required as per the Regulation Annex 3 h	Conditions in this Project
13	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

f. Approach and Methodology

The present Initial Environmental Examination report has been prepared based on the Terms of Reference (TOR) to be approved by the Ministry of Water Supply and Sanitation, Government of Nepal. The study has followed the provisions outlined in the Environmental Protection Act, 1996 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.

i. Desk Study

Existing secondary data relevant to the proposed project was collected from various published and unpublished sources from different governmental and non-governmental organizations. All related maps, aerial photographs, newspaper articles were gathered and studied. The engineering report of the project and other relevant documents were thoroughly reviewed. Policies, legislations and guidelines relevant to the project were also referred.

The desk study also involved the preparation of questionnaires/checklists/matrices for detailed field study to collect primary data within the Zone of Influence (ZOI). In order to specify the area that would be covered by the assessment, the geographical boundary of the influence area was delineated on the topographical map. Depending upon the nature and extent of the expected impact area, the Zone of Influence (ZOI) was categorized into Direct Impact Zone (DIZ) and Indirect Impact Zone (IIZ).

Direct Impact Zone (DIZ)

The project areas directly affected by the project activities are demarcated as Direct Impact Zone. Wards no 1 -9 of Tamsaria VDC and part of Narayani VDC lie in the DIZ. DIZ can also be said to be the project area.

Indirect Impact Zone (IIZ)

The area around the DIZ that could be indirectly affected due to project construction and implementation activities such as mobility of people, equipment, vehicles, noise, dust are demarcated as the Indirect Impact Zone. Thus the area bounded by Tamsaria and Narayani VDCs are delineated as Indirect Impact Zone.

ii. Field Work

Detailed field investigations were carried out to collect baseline information on the physical, socio-economic and cultural environment of the project area. The local communities were consulted to understand the social and physical nature of the area.

Physical Assessment

Existing physical attributes of the project area were studied from topographical maps and site observation, complemented by secondary source of information from reports and interviews. Information on the location, topography, land use, geology, and soil hydrology were collected during field work and from the reports obtained from different institutions.

Biological Assessment

The ecological attributes of the area was 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 questionnaire surveys. The scientific names of the flora and fauna were later recorded referring secondary data/books.

Socio-economic Assessment

Socio-economic and cultural environment of the project such as population, community structure, distribution of income and sources of livelihood, and expected water users were obtained through various secondary and primary sources of data. These included literature review, questionnaire surveys, focus group discussions, and from suggestions and comments obtained from all relevant stakeholders through public notices and consultation processes after approval of ToR.

iii. 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.

iv. Consultation and Information Dissemination

Public consultation and information dissemination process is necessary to inform the local people and concerned agencies about the project and to obtain their concerns, issues and suggestions. The methods adopted for conducting public consultations included holding meetings with district officials, concerned departments, institutions and NGOs. Focus Group Discussions (FGDs) and meetings were also held with the stakeholders within the Zone of Influence (ZOI).

Similarly information about the project was published in national newspaper giving details about the project and by inviting any comments and concerns. A copy of the publication was also displayed in the Municipality and VDC offices, health institutions and other public areas in the project and the deed of inquiry was collected. The final IEE report, after incorporating the comments from the concerned department and ADB, will be made available in their respective websites and will be made available to anyone interested upon request.

B. DESCRIPTION OF THE PROJECT

1. Existing Water Supply, Sanitation and Drainage Infrastructure

a. Water Supply

Three water supply schemes are operating in this VDC. These schemes largely supplies water to public taps almost 82 in numbers. One of the major scheme (Chulesi WUSC) supplies water to bazaar area with private and public taps. The scheme was constructed in 2057 BS (2000 AD). Another scheme constructed in 2052 BS (1995 AD) covering part of wards 1 and 2 (Basantapur area) is also in operation which is supplying water through 60 public taps.

Similarly Ward no 3 (Simreni area) uses Lajyang Khola (spring source). It is serving about 95 households with 10 numbers of public taps.

The quality of water delivered through the existing systems in the project area is not satisfactory. Treatment facilities are not provided.

A large majority of households (61.2 %) are using Dug Well or Kuwa as main source of water. Nearly 25 percent of the households are getting water from Public Tap and only 11.5 percent of them have Private Tap connection.

b. Existing Sanitation and Health Situation

The VDC had been declared as Open Defecation Free (ODF) in 14 Jestha 2070 BS. In general the overall sanitation condition of the project area was observed satisfactory. VDC has constructed solid waste pits in few places. Household solid waste is collected from major Toles by VDC and disposed at waste disposal site located in nearby Jungle area. Storm water drainage exists in core market area on both side of the road. However, sewerage system has not been developed so far. The existing drainage and sewerage facility in the service area

About 99 percent (2,627 out of 2,660) of the households have toilet. Among them 98 percent of have water seal latrine, more than 1 percent have ventilated pit latrine and less than 1 percent possess cistern flush type latrine.

There is one Health Centre located at Tamsaria Bazaar. The Health Centre has seven beds but the centre is even not able to provide basic health care facilities. Total 7 numbers of medical shops are available in this area. Most of people were found aware in health and hygiene. People are aware about hand washing before touching and eating food, and after defecation etc.

Available data from Tamsaria Health Centre shows that water borne diseases are occurred in the project area. Waterborne diseases can have a significant impact on the local economy. People who are infected by a waterborne disease are usually confronted with financial burden. This is especially the case in poor households.

c. Drainage and Waste Management

The existing solid waste management practice shows that majority of households (64.29 %) manage their solid waste by making pit near the house. Nearly 33 percent households deposit the wastes in particular public places to get collected by VDC.

Regarding the knowledge and practice of domestic waste water disposal, 87.50 percent households reported that they have managed domestic waste water by making sock pit within their house compound. Nearly 3 percent of them use the domestic waste water in kitchen garden.

The current practice of human excreta management and disposal is on-site sanitation consisting of individual household or institutional septic tanks often without a proper effluent disposal system. The sludge from the septic tank used to be periodically (5-7 year) withdrawn manually and disposed off within their backyard of the house or kitchen garden by making pits.

2. Type, Category and Need of the Subproject

The project falls in category B of ADB environmental categorization. Ground water is proposed to pump from deep tube wells proposed at the both banks of Giriwari River. One ground based reservoir, three numbers of overhead reservoirs, treatment plants and piped supply system with house connections are the major components of this project.

The existing water supply system is serving about 39 % of households. Majority of households (61.2 %) are using Dug Well or Kuwa as main source of water. Nearly 25 percent of the households are getting water from public tap and only 11.5 percent of them have private tap connection.

It is observed that the system has outreached its design capacity only minority of households are covered, and is not able to cover more areas. It has stopped providing additional connections. Other households have been depending on open wells, streams. Due to the sub-standard quality of water withdrawn from these sources, the consumers are vulnerable to epidemics of water borne diseases such as diarrhoea and dysentery, jaundice, etc.

Therefore the locals are highly enthusiastic about installing of a regular piped water supply system to supply adequate quantity of for the whole township and are ready to bear the cost and work for its construction and eventually run it. They have already formed a Drinking Water Users Group and have collected the required fund to contribute their share.

3. Size and Magnitude of Operation

Tamsaria is situated in the Nawalparasi district of Lumbini Zone in Western Development Region. It is located in the mid southern part of the Country. The location of the project area is 27°37'15"N latitude and 84°1'40"E longitude. The project town is surrounded by Argeuli VDC to the East, Mainaghat and Deurali VDCs in the North, Parsauni and Nayabilasi VDCs in the West and Narayani in the South.

The scheme is designed for the design year population of 25,693 in 4,848 households (in the year 2038). Water will be pumped from the five deep tube wells proposed at the both banks of Giriwari River. Based on the topography, settlements and existing structures decentralized distribution system is adopted and are described below:

- **Simreni Scheme:** This scheme located in the ward # 3, lies in the north tip of the service area and other side of the river Girwari. The present day households and population are just 95 and 496 respectively (census, August 2015). Simreni Tole and Bhiureni Tole are the main settlements of this ward.

- **Basantapur Scheme:** This scheme is located in the north side of East - West Highway beyond the jungle area. This will serve wards # 1, 2 and part of 4. Basantapur, Magartole, Bhuptole, Amrasa, are the few major settlements that will be served by this Scheme.
- **Bhagra – Ranitar Scheme:** This scheme is proposed at the right side of the river Girwari, serving wards 5 and 6. This scheme will serve Bhagra, Lohasedhara, Khyankala Tole, Devkota Tole, Ranitar etc.
- **Shivanagar Scheme:** This scheme is proposed at the left side of the river Girwari, covering Shivanagar, Chormara bazaar, Tadi, Purwa Tole, Pashim Tole, Baruwa and Baghkhori of Narayani VDC. This will be the largest distribution scheme of the sub-project.

Subsystems and sources have been proposed as follows:

Table 2: Size, Source and Location

S. No	Subsystem	Required safe yield from source	Proposed Boring size	Location	Remarks
1	Simreni	1.38 lps	250 x 200 mm	Basantapur Ward no 1	1 tube well to supply both the subsystems.
2	Basantapur	14.48 lps			
3	Bhagra - Ranitar	11.05 lps	250 x 200 mm	Ranitar Ward No 6	
4	Shivanagar	17.0 lps	250 x 200 mm	Shivanagar Ward No 4	

The length of transmission pipe has been estimated as 2,85 Km . Similarly the length of distribution pipe network is proposed to be 71.96 km. The cost of the Project is estimated at NRs 344,676,287.01 (water supply component only) and NRs 15,369,998.88 for sanitation component.

4. Proposed Schedule of Implementation

The work will be contracted to a contractor, the standard procedure for selection and tendering will be followed as per the norms of the Procurement Act and Regulations of Nepal. These will comprise of

- tendering and approval of contract;
- presentation of security performance,
- field mobilization of workers, technicians, and professional of the contractor;
- procurement and transportation of materials,
- installation of structural works, mechanical works, pipe works and
- finishing works.

5. Description of the Subprojects

The Tamsaria Town Water Supply and Sanitation Project has been conceptualized as a piped water supply system using ground water as source. The system has been formulated for a reliable continuous 24 hours drinking water supply in adequate quantity and quality to the consumers of the service area at the desired service level. Salient features of the town project is described in the Table 3 below.

Table 3: Salient Features of Tamsariya Town Project

S.No.	Items	Description
1	Name of the Project	Tamsaria Town Water Supply & Sanitation Project, Tamsaria , Nawalparasi
2	Type	Ground water pumping scheme
4	Location Area	
	Region	Western Development Region
	District	Nawalparasi
	VDC/Municipality	Tamsaria VDC (Now Municipality)
	Wards	Wards 1 to 9
5	Available Facilities	
	Road	East –West Highway
	Nearest Airport	Bharatpur, Chitwan district
	Existing Water Supply System	Partially covered by piped water supply system. Shallow tubewells, dugwells are used.
	Electricity	Available
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
	Bharatpur- Tamsaria distance	42 km
6	Source Characteristics	
	Source Name and Type	Ground Water (Deep Tubewells)
	Source Location	Ward No 1 Basantapur Ward No 4, Shivanagar Ward No 6 ,Ranitar
	Proposed Tapping yield (lps)	Basantapur + Simreni Scheme : (14.48+1.38)=15.86 lps Bhagra -Ranitar Scheme: 11.05 lps Shivanagar Scheme: 17 lps
	Pump type	Submersible type : Simreni: 3.7 KW Basantapur: 28KW Bhagra –Ranitar : 20KW Shivanagar: 24 KW
7	Project Components	
	Storage Tank	Simreni: 30 Cum Ground reservoir (proposed) Basantapur: 200 Cum OHT (proposed) Bhagra –Ranitar : 100 Cum OHT (proposed) Shivanagar : 450 Cum OHT (proposed) TOTAL : 780 Cum
	Valve Chamber (Nos.)	Type I (1500x900x1000) : 96 # Type 2 (900 x900x1000) : 70 # Pipe valves(150mm dia) : 75 #

S.No.	Items	Description
	Community Stand Posts	nil
	Household Connection (Nos.)	2827 (during construction phase)
	Total Length of pipe (m)	<p>Transmission Simreni : 1510 m (GI 65mm dia) Basantapur: 202 m (DI 200 mm dia) Shivanagar: 191 m (DI 200 mm dia) Bhagra-Ranitar: 954 m (DI 150 m dia)</p> <hr/> <p style="text-align: center;">Total 2,857 m</p> <p>Distribution Network Simreni : 2,985 m Basantapur: 29,434 m Shivanagar: 23,614 m Bhagra-Ranita: 15,923 m</p> <hr/> <p style="text-align: center;">Total 71,956 m</p> <p>TOTAL (transmission + Distribution): 74,813 m</p>
	Electrical	Generator-3, Transformer-3, 11 KV Transmission 1200 m ,
	Treatment Unit	Multi grade Pressure Treatment Plant with Chlorination unit 1 set each Basantapur + Simreni Scheme : 15.86 lps Bhagra -Ranitar Scheme: 11.05 lps Shivanagar Scheme: 17 lps
	Fire hydrants	33 numbers
	8 Social Status	
	Survey Year Population (2015)	15028 (permanent) 562(floating)
	Base Year Population (2018)	16,091 (permanent) 604 (floating)
	Design Year Population (2038)	25,693 (permanent) 988 (floating)
	Household Numbers (2015)	2,827
	Average Family Sizes	5.32
	9 Total Water Demand	
	Survey year 2015 (m ³ /day)	1547.77
	Base Year 2015 (m ³ /day)	1659.68
	Design year 2038 (m ³ /day)	3159.82
	10 Total Cost of the Project (NRs.)	360.046 million with 15% contingencies & 13%VAT
	Water Supply Sector	NRs 344.676 million

S.No.	Items	Description
	Sanitation Sector	NRs 15.37 million
11	Cost Sharing Arrangement for water supply component (NRs)	NRs 344.676 million
	1) GoN Grant @ 70%	Rs 241.273 million
	2) WUSC Contribution	
	a) upfront cash contribution @ 5%	Rs 17.233 million
	c) Loan through TDF @ 25%	Rs 86.169 million
12	Cost Sharing Arrangement for Sanitation Component (NRs)	15.37 million
	1) GoN Grant @ 85%	Rs 13.0645 million
	2) Local Body (WUSC, VDC & others) 15%	Rs 2.3055 million

a. Project Component

i. Water Supply System

- Water Source

The designated source to serve the service area is 5 numbers of deep tube wells to be installed in the both sides of Giriwari River. The screen of the well is proposed of Stainless steel with 22% effective opening area for better yield of water.

- Borehole platform

A RCC borehole platform will be constructed at each borehole with GI pipe gantry for the installation and removal of pumps from boreholes, if required. All the required fittings have been estimated which will be installed on the top of the boreholes.

- Water Quality Assessment / Treatment Facilities

The Nepal Environmental and Scientific Services (NESS) Laboratory was used to conduct chemical, bacteriological and physical tests of the proposed surface water. Altogether 2 different samples from deep tube wells (used for irrigation purposes) were collected on 9 August 2015 for conducting laboratory analysis to test for other physical and chemical parameters with respect to the Nepal Drinking Water Quality Standard guidelines for potable drinking water (Table 4).

Table 4: Water Quality Assessment

S.N.	Parameters	Test Methods	Tube Well No. 1	Tube Well No. 4	NDWQS , Nepal
1.	pH at 27°C	Electromeric, 4500 – H+ B, : APHA	5.9	5.5	6.5 – 8.5
2.	Electrical Conductivity, (µmhos/cm)	Conductivity Meter, 2510 B, APHA	32	18	1500
3.	Turbidity, (NTU)	Nephelometric, 2130 B, APHA	25	6	5
4.	Total Hardness as CaCO ₃ , (mg/l)	EDTA Titrimetric, 2340 C, APHA	12	5	500
5.	Total Alkalinity as CaCO ₃ , (mg/l)	Titrimetric, 2320 B, APHA	13	16	-
6.	Chloride, (mg/l)	Argentometric Titration, 4500 – Cl- B, APHA	2	2	250
7.	Ammonia, (mg/l)	Direct Nesslerization, 4500 – NH ₃ C APHA	0.21	0.06	1.5
8.	Nitrate, (mg/l)	UV Spectrophotometric Screening, 4500 – No ₃ B, APHA	6.20	0.37	50
9.	Nitrate, (mg/l)	NEDA, Colorimetric, 4500 – NO ₂ - B, APHA	N.D. (<0.02)	N.D. (<0.02)	-
10.	Calcium, (mg/l)	EDTA Titrimetric, 3500 –Ca B & 3500 –Mg B APHA	2.80	1.20	200
11.	Magnesium, (mg/l)		1.22	<0.5	-
12.	Iron, (mg/l)	Direct Air – Acetylene AAS, 3111 B, APHA	3.65	0.07	0.3
13.	Manganese, (mg/l)		N.D. (<0.02)	N.D. (<0.02)	0.2

Water from deep borings seems acidic in nature as pH value of 5.9 and 5.5 are detected in tubewell no.1 and 4 respectively. Similarly turbidity and iron content is also found not complying in sample from tubewell 1. Other parameters found comply with the NDWQS value.

Water will require treatment for the reasons to satisfy NDWQS. Similarly to make the water safe from bacteria considerations, disinfecting or killing of pathogenic bacteria is required, and therefore chlorination has been done.

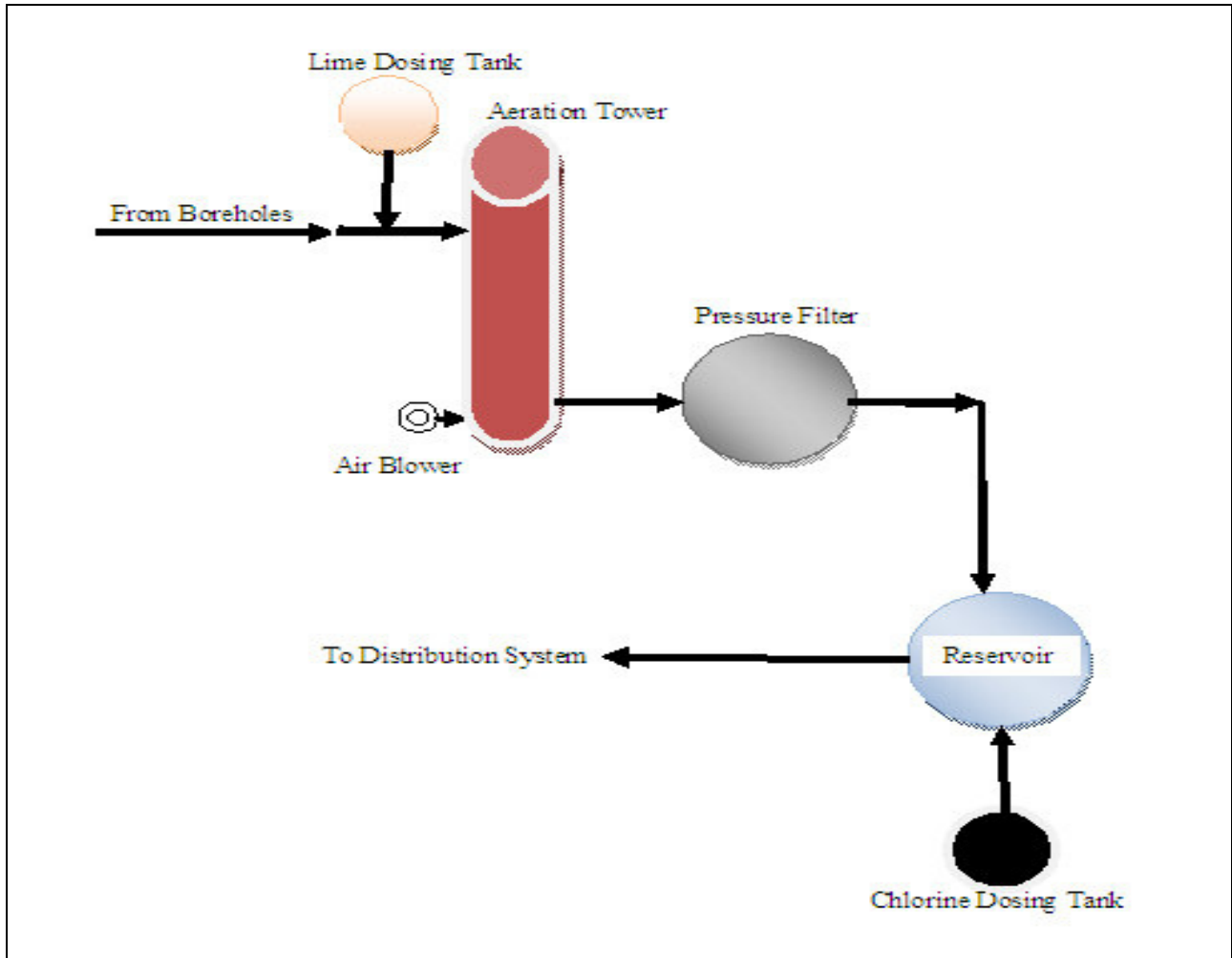


Fig 1. Proposed Water Treatment Plant

-Distribution Reservoirs

The total storage requirement for the system at the end of design period i.e. 2038 is calculated to be 780 m³. To meet this requirement additional ground reservoirs will be provided. The reservoirs will be constructed of RCC and is designed as ground based tank as the terrain suggests.

Following table summarizes the requirement of reservoir tanks.

Table 5: Requirement of Reservoir

Sub Systems	Reservoir sizes (m ³)	Remarks
Simreni	30	Proposed Ground reservoir
Basantapur	200	Proposed OHT
Bhagra Ranitar	100	Proposed OHT
Shiva Nagar	450	Proposed OHT
TOTAL	780	

-Electrical Facilities/ Pumps

11 KV line passes through near by the proposed reservoir in all the subsystems. Thus this line should be extended to the proposed location. Power required for lighting facilities and other uses are also considered. A separate 11/0.4 KV- 50 KVA step down transformers has been provided to cater the needs. A three-phase power line shall connect the control panel, which will distribute power to different power load points. A generator facility system is also included. The detailed design of the electrical system will be done during detail engineering design phase. Table 7 summarizes the electrical equipment provided in the subsystems.

Table 6: Subsystem wise transformers and Generator set

Pumping Station	Pumps (KW)	Standard Diesel Gen Set (KVA)	Standard Voltage Stabilizer (KVA)	Standard transformer (KVA)
1. a)Basantpur	28	150	100	100
b)Simren	3.73			
2. Shivnagar	24	125	75	50
3.Bhagraranitar	20	100	60	50

-Distribution Network

The distribution system comprises of a pipe network, which consists of mainly loops and branches. Distribution pipes are laid on both sides of the metalled and major roads. Single line pipes are proposed on earthen and other roads. HDPE pipes will be predominantly used. Existing pipes will not be used as these are leaking and found substandard. The total distribution pipe length of the proposed system is about 71.956 km.

-House Connections

The system has been designed, predominantly for house to house connections. The system has been analyzed for a design capacity of providing a total of 5024 house connections. However, initially during the construction phase, only 2827 house connections will be provided to satisfy the needs for the base year population.

- Generator / Operator house

Three permanent generator operator houses to accommodate the generators shall be constructed . In case of failure of power supply the generator shall be used to supply power to the pumps to deliver water. A permanent area to accommodate the pump / plant operator will be provided in this generator house. Accordingly a guard room is proposed. Refer Drawing Volume for details.

-Office Building / lab room

One office building consisting manager’s room, cash counters, meeting hall is proposed. Laboratory room is proposed beneath the 450 Cum OHT storage reservoir.

-O&M Equipments and Tools

An assessment was done for the needed items. The TSTWSSSP has also some guide lines on it. The list of tools required for the operation and maintenance has been listed in Quantity/ Cost Estimate

Volume. Besides the following equipment have been also considered in the project so that project works during construction period and for operational activities are effectively carried out.

- a) Leakage detecting equipment- 1 set
- b) Submersible sludge pump- 1 no
- c) Electro-fusion machine for joining the HDPE pipes including portable Generator - 1 set
- d) Water quality testing laboratory equipment – 1 set
- e) Other Tools and Plants like: electric pipe cutters, pipe wrenches etc.

-Community Participation

One of the major financial objectives of the project is to encourage the financial responsibility of the consumer for the improved facilities by requiring co-financing of 30% of the capital cost of water supply, with additional 35% cost recovery of the loan funds for the construction. Up front cash is 5 % of the total cost.

There are quite a few clubs and local NGOs in the project area conducting social programs. They will be effective for future use especially in awareness generating programs provided they are given training. School children and community social workers will be used in awareness generating programs. Commitment for contribution and participation is found high for the project. All the surveyed household samples are willing to contribute for the development of the water supply project. The works of collecting cash has already commenced. During the field visit, contribution aspects were also discussed. It has been said that there would not be any problem for collecting cash from the community.

-Support Activities

As described earlier, the project uses the community based approach and involves communities from the inception to project implementation. As such there is a need of a variety of trainings to water user's committee members. Besides, awareness generating programs have been identified. The project thus intends to conduct the following training and awareness generating programs in the service area.

- Health Awareness Campaign
- School Health Education Program
- Training of Community Motivators
- Training of Community Health Workers
- Training of WUSC Members
- Training of School Teachers
- Solid Waste Management Training
- Animal Waste Management Training

This is a software program in the project, which includes many training programs. The above program also includes training to WUSC on matters of financial (fixing of water tariff, collection of water revenue, accounting etc.) and purely technical aspects (water quality testing, monitoring, metering, maintenance, estimation etc.)

-Land Requirement and compensation

As per the information provided by WUSC they have selected the lands at three different sites. For Basantapur scheme almost 3 Kattha (1014 sq.m.) of Public land at Basantapur ward no-2 adjoining to Loksewa H.S.School has been chosen for the construction of OHT and treatment unit. This land is public land under the ownership of VDC (now Municipality). Additional land of area about ½ Katta (169 sq.m.) is required in nearby area for the boring.

For Bhagra-Ranitar Scheme 3 Kattha (1014 sq.m.) of Public Land at Phulbari Tole/Tareni Tole, ward no-5 has been proposed by WUSC.

For Shivanagar-Tandi Scheme almost 3 Kattha (1014 sq.m.) of land is required for construction of Boring, Office Building and Guard House. This land is available within Chulesi WUSC premise, ward no-4. The land is under ownership of Chulise Water Users Group and to use this land WUSC has to get formal approval from Chulise Water Supply Water Users Group. The table below shows the details of land requirement and land ownership.

Table 7: Details of land requirement

S.N	Scheme	Structure	Tentative Location	Land required	Land Available	Ownership	Likely Damage	Compensation	Remarks
1	Basantapur Scheme	OHT/TP -1	Basantapur, ward-2	3 Kattha (1014 sq.m.)	3 Kattha (1014 sq.m.)	Public /VDC	Permanent structure	No (public land)	Public land adjoining to Loksewa H.S.School to be obtained.
		Boring		½ Kattha (169 sq.m.)		Public		No (public land)	Public land.
2	Bhagra-Ranitar Scheme	OHT/TP/Boring-2	Phulbari Tole/Tareni Tole, ward no-5	3 Kattha (1014 sq.m.)	3 Kattha (1014 sq.m.)	Public	Permanent structure	No (public land)	Public land.
3	Shivanagar-Tandi Scheme	Boring, Office Building, Guard House	Chulesi DWS scheme premise, ward no-4	To be estimated	3 Kattha (1014 sq.m.)	Chulesi DWS scheme	Permanent structure	No	The land owned by Chulesi WUSC scheme can be used after getting consent from them
4	Distribution System Simreni		Ward No-3			Public/government	Temporary	No	
5		Transmission mains	Public Road/ trail			Public Road/	Temporary	No	
6		Distribution Line	Public Road			Public Road	Temporary	No	

C. DESCRIPTION OF THE ENVIRONMENT

1. Physical Resources

i. Topography

Tamsariya is situated in Nawalparasi district of Lumbini Zone in Western Development Region. The project town is situated at the side of East-West Highway, it is also known as Chormara. The location of the project area is $27^{\circ}35'$ to $27^{\circ}40'$ North Latitude and $84^{\circ}01'$ to $84^{\circ}03'$ East Longitude. The project town is surrounded by Argeuli VDC to the East, Mainaghat and Deurali VDCs in the North, Parsauni and Nayabilasi VDCs in the West and Narayani in the South. The altitude of the project area is varying from 150 m-200 m above the sea level.

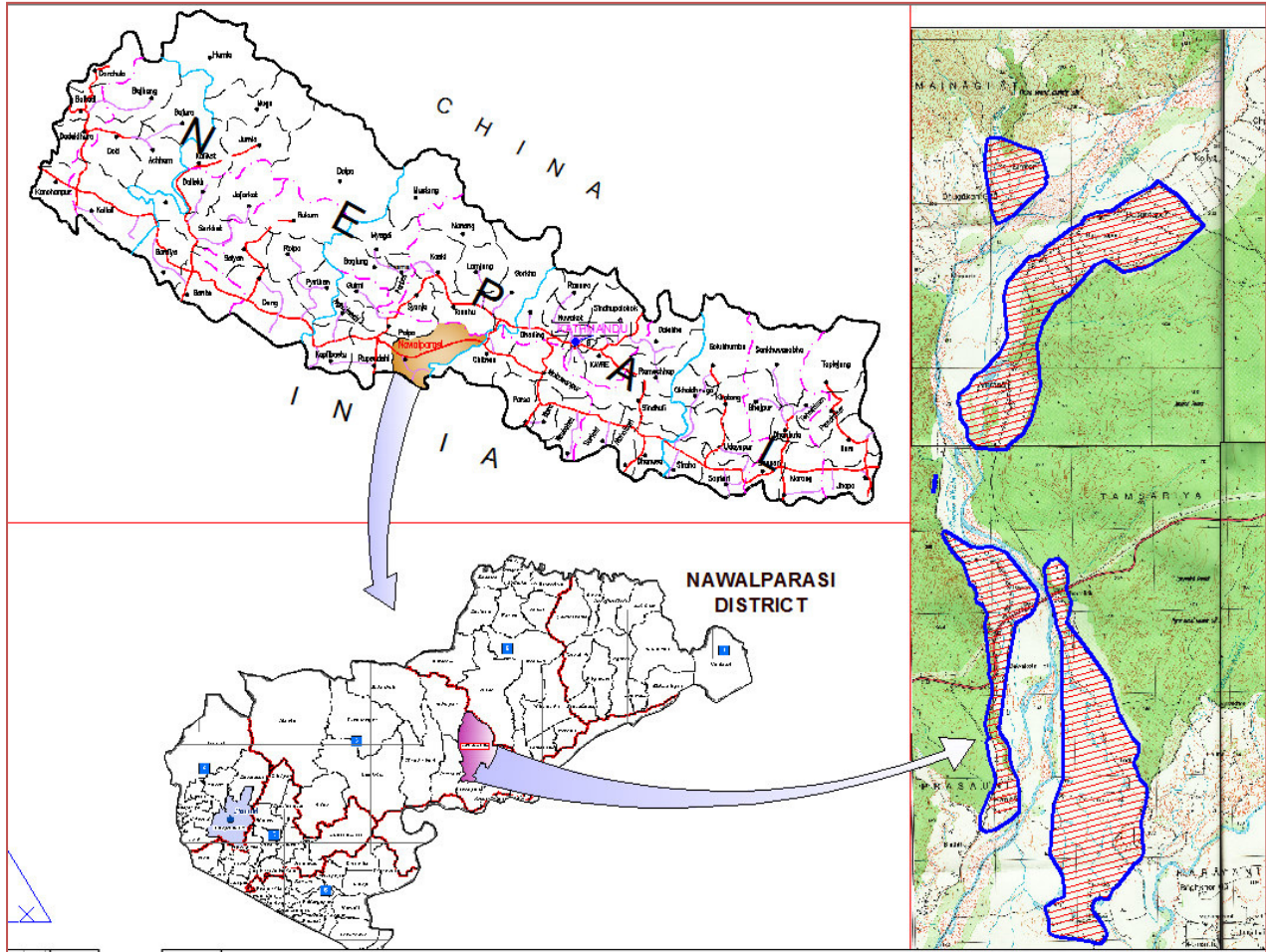


Figure 2 : Location of Tamsariya in Nepal

ii. Geology and Soils

Geologically it is situated in the foothills of Siwalik Hills of Western Development Nepal. The area consists of conglomerate, sand and sandstone. It is basically developing in the slope of the Siwalik Hills in the north and some part of it is in the flood plain of Girwari Khola.

iii. Climate

The town project area has humid type of climate. The maximum temperature varies from 32° - 37° C in summer and 4° to 18° C in the winter. The average rainfall is 2000 mm. Almost 80 percent of rainfall occurs during monsoon (June to September).

iv. Air Quality

The air quality of the area can be considered to be fair. Though numbers of vehicles can be seen, no dust particles seen due to black topped East-west highway. The topography of the area also facilitates for free air circulation.

v. Surface and Ground Water

Three sides of the northern portion of the service area are surrounded by forests and are serving as watershed area. There are quite a number of streams / kholas viz Bhutahi Khola, Gada Khola, Gadar Khola, Simreni Khola, Girwari Khola etc flow nearby the project area. Among them Bhutahi and Girwari khola are perennial type, where as discharge in other streams reduces considerably in dry season and sometimes even dry.

Four numbers of 150mm diameter tube wells are found operating for irrigation purpose (left bank of Girwari Khola) which are yielding in order of 15 liter per second of water from each tubewell. These tube wells are in operation since 1993. This depicts the flood plain bears good aquifer zone.

2. Ecological Resources

a. Forest Flora and Fauna

Deforestation has decreased the flora of the project area but since the concept of community forests has been introduced, there has been an improvement in the forest cover. Tropical Deciduous Forest area is on the south, west and north east portion of the project area.

Flora

Project area predominantly consists of Sal (*Shorea robusta*, *Acacia mangium*), Sisau (*Dalbergia sisoo*), Karma (*Syzygium aromaticum*), Shag (*Carya ovate*), Jhamun (*Mangifera indica*) and Teak (*Tectona grandis*). Most of the project area is now the agricultural farm lands. The project area has diversified vegetation even it can be found salla (*Chir pine*) and uttis (*Alnus nepalensis*) in the upper source area.

Fauna

Both large and small mammals including Leopard (*Panthera pardus*), Indian Fox (*Vulpus bengalensis*), Chitals (*Axis axis*), Deers (*Cervidae*), Wild Boar (*Sus scrofa*), Langoor Monkeys (*Trachypithecus francoisi*), Common Mongoose (*Herpestes javanicus*), Squirrel (*Sciuridae*) etc are some common names that are found in the area. In addition globally threatened bird species also inhabit vicinity of the area. Long Billed Vulture (*Gyps indicus*), White Rumped Vulture (*Gyps bengalensis*), etc are also resided besides wet land birds.

There are no protected areas in Tamsaria Project area and nearby.

3. Social and Cultural Resources

Household and Population

The proposed town project covers all Wards (Ward Nos 1-9) of TamsariaVDC and a part of Narayani VDC (Baghkhori cluster) of Navalparasi district. Major settlements / Tole of the service area as well as Ward wise Household and population are presented in Table. As the table shows the area accommodates a total population of about 15,590; of which 15,028 is permanent population and 562 is rental population.

Table-8: Households and Population

VDC	Ward No.	Tole / Settlement	HHs	Population		
				Permanent	Rental	Total
Tamsariya	1	Simanatole, Basantapur, Mainroad, Magartole, Hariyalitole, Phulbari tole	220	1,145		1,145
	2	Amartole, Bhu Pu Tole	317	1,726	19	1,745
	3	Bhiureni tole, Simarhani	95	496		496
	4	Amrasa, Sundarbasti, Sitalnagar, Sangamtole, Pragatitole, Namunatole, Milantole, Milanchowak, Madyabindutole, Kisantole, Gaharitole, Jungletole, Hariyalitole, Chormara Highway, Buddhatole, Bijayatole, Bazar area, Banktole	469	2,495	220	2,715
	5	Dankatole, Danawaritole, Vagratole, Jhayankattatole	454	2,426	61	2,487
	6	Milan Chowk, Ranitar, Tamsaria, Ranitar	245	1,313		1,313
	7	Shanti tole, Samabasitole, Saharitole, Ramailochowak, Purbitole, Milijulitole, Kusumtole, Kalikatole, Chormarabazar, Chautaritole, Bhandaritole, Akaladevitole	394	2,102	247	2,349
	8	Tadi , Naya Basti, School Tole,	374	1,957	5	1,962
	9	Baruwa, Purwatole, Pashim tole	92	483	10	493
Sub-Total			2,660	14,143	562	14,705
Narayani		Baghkhori	167	885		885
Grand Total			2,827	15,028	562	15,590

Source: Socio-economic Survey, August 2015

Among the total permanent population (1443) in the service area, 7170 are male and 6973 are female. Male population is slightly higher (50.7%) than the female population (49.30%) as in the national context. Ward wise population composition by gender is also illustrated in Figure.

Caste and Ethnicity

The proposed project service area comprises multi caste / ethnic groups. Each caste and ethnicity is characterized by its own customs, traditions, culture and nature of occupation with which they are associated. Brahmin and Chhetri, comprising 51 percent of total families, are the most prevailing group in the service area. Janagati are the next major indigenous group with 34 percent, followed by Dalit which constitutes about 14 percent

Occupation

Although, the economy of the area is gradually shifting from rural agricultural economy to business and service based, majority of the households are still dependent on agriculture. As the Figure-2.3 shows, a high of 59 percent of the head of households have agriculture as occupation. As in the other parts of Nepal remittance has been playing important role in local economy of the service area, which is the main source of income of 13 percent households. Business is another main

occupation of 10 percent head of households, followed by service (8%) and wage labor (6%). The Ward wise households by occupation are presented in Table-9 below.

Table- 9: Occupation of Head of Household

SN	Occupation	Tamsaria VDC / Ward No									Total	Percent
		1	2	3	4	5	6	7	8	9		
1	Agriculture	156	227	85	313	242	176	151	146	74	1570	59.02
2	Business	7	9		47	47	28	97	29	4	268	10.08
3	Services	15	29	5	21	53	18	62	30	3	236	8.87
4	Industry	1		2		1	3	2			9	0.34
5	Foreign Employment	28	46	1	45	68	12	47	88	10	345	12.97
6	Wages	13	4	2	26	14	7	22	76		164	6.17
7	Others		1		7			5			13	0.49
8	Dependents		1		10	29	1	8	5	1	55	2.07
Total		220	317	95	469	454	245	394	374	92	2660	100.00

Source: Field Survey, August 2015 Household's Annual Income Level

Economic Status

Economic condition of the families in service area seems satisfactory in terms of their monthly income level. The distribution of households by income range is shown in Table-2.6, which indicates that 45.79 percent of them have income range NRs. 8,001 – 20,000 per month. Likewise, 28.53 percent of households fall under the income range NRs. 20,001-50,000 category. As the data shows 16.35 percent of households have highest income level (more than Rs.50,000/month), whereas 1.54 percent of the households have lowest income level i.e. less than Rs.5,000 per month.

Table -10: Monthly Average Income Range

Income Range	Ward									Total	Percentage
	1	2	3	4	5	6	7	8	9		
<5000	7	8	1	6	3		11	4	1	41	1.54
5000-8000	20	25	7	38	14	29	19	30	10	192	7.22
8001-20000	122	119	44	190	215	166	141	203	18	1218	45.79
20001-50000	40	100	27	140	148	38	139	95	32	759	28.53
>50000	26	63	16	92	74	12	81	42	29	435	16.35
N/A	5	2		3			3		2	15	0.56
Total	215	315	95	466	454	245	391	374	90	2660	100.00

Source: Socio-economic Survey, August 2015

Land Holding Status

Even though agriculture is the main occupation of 59 percent of households, nearly 85 percent (2266 out of 2660) households have agricultural land and remaining 15 percent households do not have land for agriculture purpose. As shown in table below 56.47 percent of the households have land less than 5 Ropnai and 28.72 percent of them own land more than 5 Ropani.

Table-11: Land Holding Status

S.N.	Land Holding Category	Ward No									Total	Percent
		1	2	3	4	5	6	7	8	9		
1	More than 5 Ropani	88	127	79	165	50	4	76	103	72	764	28.72
2	Less than 5 Ropani	124	101	15	179	306	186	303	271	17	1502	56.47
3	No Agricultural Land	8	89	1	125	98	55	15		3	394	14.81
Total		212	228	94	344	356	190	379	374	89	2660	100.00

Source: Field Survey, August 2015

Physical and Cultural Heritage

Tamsaria does not have remarkable Physical and Cultural heritage sites, though few temples of religious importance are present. Radha-Krishna temple, Kali temples etc are name to few.

Land Use

Major chunk of land is used for agricultural purpose. The service area is surrounded by fertile land and is good for cultivation of many crops. In Bazaar area grid pattern roads are found. Further no planned land use has been observed. There are a few small scale industries as rice mills and furniture making.

Transportation

Tamsaria lies in the East –West highway. Bazaar area bears metalled road network. Others internal roads are semi metalled and earthen type.

Electricity

The project area has electricity facilities and is connected to the 132 KV sub-station.

Communication

The project area is found to have good facilities of telephone and cell phone of all networks.

D. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The potential impacts of the proposed Tamsaria town water supply and sanitation project are physical, biological, and socio-cultural in nature. They can occur at various phases of the project such as design, preconstruction, construction and operation and maintenance phases. The magnitude of the impacts can be small, moderate, or high depending upon its severity, and can be temporary or long term, reversible or irreversible, local or wide. The impacts need not necessary be limited to negative ones but can be positive as well. The objective of Environment Management is to attempt to augment positive impacts and to minimize negative impacts by sustainable mitigation measures.

1. Beneficial Impacts and Augmentation Measures

a. Construction Phase

i. Employment Generation and Increase in Income

One of the major direct beneficial impacts of the water supply and sanitation project at construction stage is the creation of employment opportunity to the local community. The amount of money that is earned by the wages will directly enhance various economic activities and enterprise development with multiplier effect in Tamsaria. In order to augment the impact, the local people particularly poor; Dalits, ethnic minority and women will be given priority for employment and on job trainings.

ii. Skill Enhancement

Although many people in the project area are found unskilled at present, the construction of the water supply system and the distribution network is likely to enhance their skills in plumbing, fittings and other construction works. Furthermore, the project will also give on job practical training to the workers which will enhance their technical skills. The skill and knowledge acquired from the project during construction will enhance employment opportunities of local people who can earn livelihoods from similar projects in the future.

Workers especially pipe laying persons will be given on the job training on plumbing bathroom fittings, and other construction activities in order to augment the impact.

iii. Enterprise Development and Business Promotion

During the construction period, different types of commercial activities will come into operation in order to cater the demand and requirement of workers. As money flow begins, they will regularly demand different food items, beverages and other daily needs. To meet these demands, small shops and restaurants around the vicinity of the construction sites are likely to open. Various farm based enterprises including wide range of agricultural and livestock products will also gain momentum as a result of increased demand by labors during the construction period. This will increase local trade and business in the area.

b. Operation and Maintenance Phase

i. Improvement in health and saving of time

After the water supply and sanitation project is complete, the people living within the project area will benefit from the supply of sufficient quantity and good quality water and improved sanitary conditions. Women and girl child will be directly benefited as they have to spend less time in fetching water and thus have more time for study, other household and income generating activities.

The impact will be augmented through regular maintenance of the water supply and sanitation system by the users group (WUSC).

ii. Development of Market center

The availability of good supply of drinking water will accelerate the rate of development of Tamsaria as a leading market centre. In order to promote the development of a market centre, VDC shall ensure planned growth with required infrastructure facilities for healthy and hygienic environment in the market areas and regular operation and maintenance of the water supply and sanitation system will be ensured.

iii. Appreciation of Land Value

One of the major benefits of the project is that land price will increase due to the availability of reliable safe drinking water and sanitation system. Tamsaria has fertile land and has irrigation facilities too. The unavailability of good drinking water could be one of the reasons for some persons to opt for conducting their business in the project area. Upon completion of the present project, migration from nearby hills is expected. In order to promote land development in the area, the local people will be aware that high value lands are acceptable to the banks and microfinance institutions to provide loans for them to start their own economic/social ventures.

iv. Women Empowerment

Women will largely benefit from this project, as they are the ones who spend a great deal of time in fetching water. With the operation of the water supply scheme, time will be saved. As contaminated water can lead to diseases the women of the family also have to spend a good deal of their time to care for the sick family members. With the improvement of water supply, there will be marked reduction in the occurrence of infectious disease in the area. This will provide more time to spend on other economic and social activities leading to empowerment. In order to augment the impact, the water supply system will be regularly maintained so that it operates smoothly and health and awareness programmes will be given to the local people.

v. Quality of Life Values

The project is not expected to adversely affect any cultural or recreational resources but will increase the existing quality of life values due to improvement in personal, household and community hygiene practices and health. The project may help to enhance the quality of life of people by many ways, like by providing opportunities for jobs, providing good quality water, improved sanitation etc.

2. Adverse Impacts and Mitigation Measures

a. Pre-construction Phase

The pre-construction works involves field survey and investigation, development of design & detailed drawings, carrying out cost estimate etc. This also includes discussion with WUSC and revision of design if necessary. WUSC already has acquired land required for the construction of structures.

As the works involve review of design, estimate, discussions with concerned stakeholders and bidding processes and no construction activities involved; there will be no adverse impacts.

b. Construction Phase

i. Physical Environment

Erosion and land surface disturbance

Excavation and digging of trenches during construction may lead to erosion and caving thereby causing soil erosion, silt runoff, and unsettling of street surfaces. Haphazard disposal of the excavated earth can disturb the road surface. The activity as such will be a nuisance and discomfort to the road users and inhabitants.

During construction, precautionary measures will be taken, proper backfilling of excavated trenches will be done and the excavated soil will be stacked properly. Construction activities will be, as far as possible, avoided during the rainy season.

Topsoil conservation

Formation of topsoil is very long natural process and is the most fertile portion of the soil. Efforts should be made to safe guard the topsoil. The topsoil of about 20cm thick should be placed at a separate place and the remaining excavation should be done. After placing the pipes in trenches and backfilling with other soil and compaction, the topsoil should be replaced to its original position and compacted.

Damage to the Existing Facilities

During the construction time, while excavating the earth, existing water supply distribution pipe lines and telecommunication cable may get damaged in few places particularly in the bazaar area in spite of great care. A repair team will be on standby for the repair of water supply pipe line for immediate repairs.

To avoid damage to telephone/ telecom line coordination with the telecom office will be set up. Layout drawing should be at the site to avoid possible damage.

Air and Noise pollution

The construction activity will comprise of construction, transmission and distribution pipeline layout, construction of storage reservoirs, transport and installation of pumps. Other works do not involve heavy machines which will produce some extent of noise for a certain period of time. There will be some activities such as transportation, loading/unloading of construction materials such as sand and aggregates, quarrying operations and operation of crushers, stockpiling of construction waste and construction materials and earthworks. These will cause some deterioration of air quality due to dust generation and vehicular emission as well as noise pollution.

Use of power horns and movement of heavy vehicles can cause a serious disturbance to the community, educational institutes, hospitals/health posts and residences etc.

Mitigating measures to reduce air and noise pollution are:

- Provide information to the public about the work schedule
- Allow the use of vehicles only complying with NVMES 2069 or vehicles having green stickers meeting Vehicle Emission Standards 2057 during the project construction period
- Limit the speed of vehicles.
- Ban the use of power horns.
- Regular maintenance of equipment and vehicles.

- Prohibit the operation of plants and construction vehicles between 7 PM to 6 AM in residential areas.
- Avoid working at sensitive times (during religious festivals in the area)
- Increase the work force in sensitive areas so as to finish the work quickly
- Impose a ban on burning of solid wastes particularly in workers camp and construction sites
- Ban the use of firewood as fuel in the worker's camp.

Impact on water bodies

There will be some impacts on water bodies located within the project area during the construction phase. Possible activities, which may influence the water quality, are listed below.

- Haphazard disposal of solid waste in the vicinity of water bodies
- Sediment and excavated materials may be transported to the water bodies due to rain.
- Leakage and disposal of oil and grease from construction equipment.

The worker's camp should not be located at the vicinity of water bodies. Waste generated from the workers' camp should be properly disposed off. Organic waste like food waste and others should be properly buried. Inorganic waste should be collected in a bin and properly disposed off. Regular monitoring of the workers camp should be done.

Excavated soil should be stacked. Back filling of trenches should be done before the rainy season. A separate area shall be allocated for the stacking and collection of construction wastes.

Waste Management and Disposal

Proper waste management and disposal system should be done during the construction period. Temporary sanitary toilets for the workers should be installed before starting the work. Waste like excess grease, lubricants will be collected in plastic containers and will be sold to scrap dealer. Solid waste and other construction waste will be deposited near by the labour camp and will be cleared after the completion of the construction works.

ii. Biological Environment

The project area falls in a built up area with agricultural land without any forests. Only scattered plants of local species and fruit plants are available within the sub-project area and thus minor impacts are anticipated only during the construction period. Most of the pipe lines pass along the roadside and only a few numbers of plants and bushes have to be cleared up within the transmission pipe line stretches. The impacts to human settlement including villages, cattle sheds and farmlands will be very low.

The potential environmental impacts of the project on local flora and fauna during construction and post construction phases will be low as it involves no tree felling along the distribution line, minimum loss of grazing land, and no loss of agriculture lands. Some of the impacts that may likely to occur are described below:

Loss of vegetation cover

The loss of vegetation cover and species diversity due to earthwork primarily in the direct impact area of the deep well site will be minimized as it is located on open grass land within the reservoir premises. During the construction, there will be only a loss of herbs and shrubs cover.

Some of the topsoil and vegetation may also be lost during pipe laying works. No pipeline passes through the forest area. To protect the topsoil and vegetation, the topsoil should be kept separately and replaced in its original position after laying the pipes.

The project components require a very small area of land for implementation and environmental impacts on the vegetation and natural eco-system do not seem to be significant.

Impact on Fauna

The project site is within the built up area. Population dynamics of resident and migratory birds and reptiles at the project site may be affected during the construction period due to various construction activities. But these effects will be of temporary in nature. The condition will be normal after construction is over. The workers should not be allowed to hunt birds.

Impact on aquatic life

Some of the construction activities and protection works are proposed at the bank of the river. These construction activities will physically disturb the water quality for a certain period of time and may cause adverse impact on aquatic life. But these effects will be temporary in nature. Fishing in the river should not be allowed.

iii. Socio-economic Environment

Disturbance to the community activities

Construction activities, particularly construction works on roads will cause disturbances to the community activities, festivals and social events. The free movement of vehicular traffic and pedestrians will be affected. Noise produced due to the operation of machines may disturb the neighbourhood in construction areas.

In order to minimize the disturbance to the community activities, a detailed Traffic Management Plan will be developed by Contractor during the early stage of construction phase for areas along the construction works to minimize traffic flow interference from construction activities. Advance local public notifications of construction activities, schedules, routings, and affected areas including road closures will be made. Signage in Nepali and English languages will be erected. The residents will be consulted and informed about the disturbances in advance.

Social Dispute and Dissatisfaction

There is a possibility of influx of outside workforce and with them money from the construction work and unwanted communities can cause problems with the local community. The local population may not get employment benefits from the project causing dissatisfaction and conflicts in the area. There is a possibility of social dispute in the community due to irresponsible behaviour of the workers such as gambling and drinking.

An employment policy will be prepared so that the local people may not be deprived of employment opportunities. Local people and women above the age of 16 will be given preference for employment. Wages will be settled based on DWEC (District Wage Evaluation Committee) with the list of employees.

Occupational health and safety (OHS)

- Life and health of workers particularly of those involved in concreting, trench cutting, formwork and rebar fixing in the overhead tank is of prime concern. To mitigate or minimize the hazards adequate safety instructions should be provided to the contractor and monitored by the project.
- Health and hygiene in the camp site (against unsafe working conditions, accidents, transmission of communicable diseases etc.) will be given top priority.
- Regular health checkups, proper sanitation and hygiene, health care will be provided. Awareness programs concerning human trafficking and the possibility of spread of STDs and HIV/AIDS will be conducted during focus group discussions.
- Personal protection equipment (PPE) eg, safety helmets, safety belt, boots, gloves will be provided to all construction workers.
- The loss of life or any type of injuries will be compensated and insurance to the workers will be provided. First aid kits, standby vehicle, and fire extinguishers will be provided in camp sites.
- To avoid risks from accidents on site due to the movement of the public and workers, health and safety measures of the contract will also prohibit entry at construction sites to the public and the area will be barricaded and warning signs will be placed.

c. Operation & Maintenance Phase

Chemical hazard

- Chlorine and Bleaching Powder are toxic and the workers will have to deal with it during the operation of the system. Ingestions, inhalations, application to body parts, especially to the eyes, nose, and mouth are of extreme hazard to the workers handling chlorine and bleaching powder.
- The storage procedures, in-plant handling and dosages of chlorine (bleaching powder) will be addressed. Procedures and guidelines will be developed for its handling and first aid measures will be introduced for emergencies. Training on the handling and on dosage of the chemicals will be given to the staff.

Impact on water bodies and aquatic life

- The effluent produced from the periodic backwashing of the filter plant, if discharged directly to the river course may cause harm to the water bodies and aquatic life especially during the dry season when the flow will be less.
- As the backwash water mainly contains suspended solids a small pond of 20,000 litre capacity will be constructed for decantation and will be drained of to the river/ stream course.
- To avoid the impact to aquatic life, the effluent and sludge should be disposed off only in designated areas and regular monitoring of the river or stream water quality should be done.
- Haphazard disposal of effluents and sludge from the treatment plant will not only be a nuisance to the public but also affect the aquatic life by eventually finding its way to nearby water bodies.

d. Resettlement, relocation and compensation issue

The major structures are to be constructed on the land belonging to WUSC. Similarly, the distribution system network follows within the public property line. Therefore resettlement or relocation is not required.

Table 9: Impacts and Mitigation Measures for Water Supply

Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
Detailed Design			
Incorporation of sloped areas in project design	Soil erosion and slope instability	<ul style="list-style-type: none"> • Incorporate measures and sites for handling excessive spoil materials • Incorporate drainage plan in final design 	DSMC/PMO
Manual preparation	Health and safety of community and workers	<ul style="list-style-type: none"> • Prepare training manuals in Nepali with sketches on community health and safety at potential occupational health and safety 	DSMC/PMO
Construction of reservoirs in high earthquake zone	Cracking of structure leading to facility failure and hazard to public	<ul style="list-style-type: none"> • Design all reservoirs and structures under the project to for appropriate seismic resistance 	DSMC/PMO
Location of pipes and photographs of sites and existing utilities prior to construction, particularly in heritage areas	False claims from people; water quality changes due to construction. Interference with other utilities and photo record of existing character of heritage areas to avoid impacts to heritage structures during construction	<ul style="list-style-type: none"> • Place water pipes away from existing utilities during design • Provide budget for restoration/replacement of damaged utilities • Avoid placing alignment near heritage buildings • Photograph all sites within heritage areas to enable before and after comparison (note: all roads are to be reinstated to original character especially in heritage areas) • Ensure compliance with any Department of Archaeology (DOA) rules during design period including preparation of Archaeological Impact Assessment, or other agreed document by DOA if required. 	DSMC/PMO /Contractor
Construction of test tubewells	Risk of pollution of raw water supply (deep tube well water)	<ul style="list-style-type: none"> • Safe intake sites with minimum risk of pollution shall be selected. • Adequate source and intake protection measures shall take place • The well point should be located at a slightly higher elevation from a drainage point of view. • The annular space between the drilled hole and well casing should be sealed off and provision for grouting the well casing - the depth would depend on the hydro-geological conditions encountered during construction - should be made. • After completion of the construction, the well should be capped tightly 	DSMC

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Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
		<ul style="list-style-type: none"> • The deep well bored should be well protected with a concrete platform so the surface water does not enter the well. • It should be made sure that once the boring is completed, the well must be chlorinated according to the standards so as to disinfect the pipes and screen that have been placed underground. 	
Abstraction of groundwater	Risk of inadequate yield of the aquifer; excessive abstraction could deplete aquifer and cause ground subsidence and shortage of well water	<ul style="list-style-type: none"> • A program for yield monitoring shall be designed. (The abstraction percentage of the dry season flow.) • Redesign project with alternative water source if proposed abstraction rate exceeds sustainable yield. • Extraction of the new well will be limited to 20 l/s. This way the interference with the existing tube wells will not be a serious concern. 	DSMC/Municipality
Sludge disposal	Inadequate disposal of sludge from reservoirs and treatment plant will cause nuisances to affected properties	<ul style="list-style-type: none"> • Design of sludge disposal sites should be made at designated sites approved by the municipalities. 	DSC/Municipality
Pre- construction			
Apply for relevant permits	Delay in project due to absence of necessary statutory permits and approvals	<ul style="list-style-type: none"> • Apply for all tree cutting, Archaeology, road cutting, etc. required. This is to be done early in the design period. • Consult relevant authorities and submit applications to get approvals. Submit such agreement and permits to DSC for official information. Obtain Letters of Approval and agreement for: <ul style="list-style-type: none"> (i) temporary acquisition/easements of land and properties; (ii) disruption of water supply and other utilities; (iii) required permits from relevant authorities (e.g., National Park, Department of Forest, Department of Archaeology, etc.) prior to construction works; (iv) permission/approval from Department of Archaeology prior to construction works in Patan and Darbar Squares; and (v) avoid tree cutting, and if necessary, cut only trees that are marked and have been agreed relevant authorities for removal and plant and rear tree saplings at the rate of 25 saplings for each felled tree. 	DSMC/PMO
Utilities	Telephone lines, electric poles and wires, water lines within	<ul style="list-style-type: none"> • Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of 	DSMC

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Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
	proposed project area	services during construction phase <ul style="list-style-type: none"> • Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services 	
Pegging of the land area (permanent and temporary) and right of way required by the project	Illegal occupation/encroachment of property	<ul style="list-style-type: none"> • Ensure community consultations prior to the commencement of civil works • Delineate project land and prepare the list of project affected people and resources • Prepare resettlement plan for any foreseen income losses during construction • Provide compensation as per resettlement plan • Maintain records of trees and other properties likely to be affected • Avoid tree cutting, and if necessary, cut only trees that are marked and have been agreed relevant authorities and plant and rear tree saplings at the rate of 25 saplings for each felled tree. • Obtain necessary forest tree permits 	ICG / WUSC / Contractor/DSMC
Identify the temporary areas required by the project and locate them with proper marking	May result in social tensions	<ul style="list-style-type: none"> • Prepare the details of contractor's temporary land use and other private properties and discuss with owners Submit to DSMC • Temporary easements should avoid displacement or resettlement impacts. • Follow resettlement plan, where applicable. • Ensure community consultations prior to the commencement of civil works 	ICG / RPMO/WUSC / Contractor/DSMC
Construct workforce camp	Haphazard camps resulting in social stress and degradation of local environment	<ul style="list-style-type: none"> • Establish workforce camps in designated sites only and in consultation with local community. All camps are to include sanitary facilities for men and women. 	Contractor/DSMC
Make employment policy for local and affected people	Local people may be deprived of opportunities, minors may be employed	<ul style="list-style-type: none"> • Employ local people (and women in jobs and follow core labor standards) 	Contractor/DSMC

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Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
		<ul style="list-style-type: none"> Equal pay for men and women 	
Prepare traffic management plans	Traffic congestion and public annoyance	<ul style="list-style-type: none"> Prepare and implement traffic plans to prevent traffic jams and annoyances to the public in coordination with relevant local authorities and communities. 	ICG /WUSC/ DSMC /Contractor
<ul style="list-style-type: none"> Construction phase: Physical environment 			
Disposal of excess materials in designated area. Apply bio-engineering for controlling of erosion	Soil erosion, and slope instability due to topsoil stripping and excavation for trenches. Surface water discharges to local drainage from trench construction. Runoff from construction areas including stockpiled materials. Excavation and laying of pipeline at river crossings could impact the river water quality and ecosystem. Interception and interference with localized groundwater flows due to deep excavations.	<ul style="list-style-type: none"> Separate stockpiling of topsoil for further use; spoil disposal at designated and stabilized sites; excavated areas backfill to be compacted and include replacement of topsoil; adopt cut and fill approach; avoid work during the rainy season as much as possible; mulching to stabilize exposed areas; use bioengineering techniques (e.g. revegetating areas promptly); provide channels and ditches for post-construction flows; lining of steep channels and slopes (e.g. use of jute matting); prevent offsite sediment transport using settlement ponds, silt fences. Use of settling basins at reservoir sites; use of straw for filtering of small discharges; routine inspection and monitoring of larger discharges to water courses. Excavation dewatering to use settlement tanks Use of temporary bunds; use of catchment basins. Soil / sand stockpiles to be graded to prevent erosion. Use of river diversions with bundings Local wells, springs and irrigation canals to be bunded from temporary spoil dumps; local wells and spring fed spouts or kuwas to be monitored particularly downhill of reservoir excavations plus temporary supply provided if flow is affected; permeable base and side backfill required at deeply excavated reservoir sites or an alternate source of drinking water provided at the existing location. 	Contractor/DSMC
Quarrying from river bed	Change in river hydrology and morphology	<ul style="list-style-type: none"> No quarrying/mining activities in river/streams 	Contractor/DSMC

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Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
Dumping of waste in the river Construction of toilets in the camps Storing of materials in the project area Handling of toxic materials Dumping of excess material	Water and land pollution	<ul style="list-style-type: none"> • Provide designated areas with collection bins for wastes. • Provide toilet facilities and prohibit open defecation. • Prohibit washing of vehicles next to rivers and streams. Proper storage of construction aggregates, hazardous and toxic materials, lubricating oils and used batteries in safe areas and the proper segregation and disposal of chemical containers, packaging materials, plastic bags etc. • Provide training to workforce on safe handling of toxic materials and OHS measures during construction. 	Contractor/DSMC
Quarrying operations Movement of vehicles Operation of crusher Earthworks Stockpiling of construction waste and construction materials	Air quality deterioration	<ul style="list-style-type: none"> • Dust suppression on roads or at open sites by sprinkling water as required at regular intervals. • Cover earth stockpiles using plastic sheets or cement jute bags. • Routine monitoring of dust (total suspended particulates) to meet air quality standards. • Limit vehicle speed. • See that vehicles comply with the National Vehicle Mass Emission Standards, 2056 BS. • Regular maintenance of vehicles. • Provide proper ventilation in confined working areas. 	Contractor/DSMC
Movement of vehicles Operation of crusher Operation of construction machineries and equipment Horn honking	Noise and vibration	<ul style="list-style-type: none"> • Monitoring of noise levels regularly at site to meet the noise standards. • Fit mufflers in vehicles to control noise. • Limit the speed of vehicles. • Regular maintenance of equipment. • Compensate and repair the damages caused by vibration if caused by construction activities. 	Contractor/DSMC
Construction phase: Biological environment			
Vegetation clearance	Vegetation clearance	<ul style="list-style-type: none"> • Avoid tree cutting, • Obtain necessary tree cutting permits • Cut only trees that are marked and have been confirmed by the 	Contractor/DSMC

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Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
		Department of Forestry. <ul style="list-style-type: none"> • Plant and rear tree saplings at the rate of 25 saplings for each felled tree. • Stockpile the felled trees and take permission from concerned authority for its use • Compensate all private trees and community forests affected 	
	Damages to fisheries and aquatic ecology of riverbeds and habitats.	<ul style="list-style-type: none"> • Dry season construction only and use of river diversions and bunding off of work sections 	Contractor/DSMC
Construction phase: Socioeconomic environment			
Laying of pipes on narrow roads or outside carriageway	Temporary easements and impacts to business activity including temporary relocation of vendors.	<ul style="list-style-type: none"> • Prior to construction, hold community meetings to inform them of construction works. Distribute project information. Advanced notice should be provided at least 1-2 weeks in advance. • Place WUSC phone hotline on signs in visible areas. Make community fully aware of grievance mechanism and provide contact info of ICG and RPMO/PMO offices. • Maintain access to avoid disturbance to residents and businesses by providing planks and leaving spaces for businesses and residents to maintain access. • Manage traffic flows, conduct work at night where possible. • Trenches open for only 1-3 days and works should be quickly completed. • Avoid full street closure to fullest extent possible. • Businesses losing income due to disturbance are compensated as per the resettlement plan. • Avoid involuntary displacement • Temporary sites to be restored to natural and stable conditions as per agreement with land owner • Proponent report in writing that temporary areas have been vacated and restored to pre-project conditions before acceptance of the works • Provide employment opportunity to the affected people to extent possible 	RPMO/ICG Contactor/DSC/Grievance Redress Committee

Initial Environmental Examination (IEE) of Tamsariya Water Supply and Sanitation Project

Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
		<ul style="list-style-type: none"> Assist vendors in shifting prior to construction and to return to original location when construction is complete in relevant sections 	
Reinstatement of damaged community services and infrastructures	Reinstatement of community services and infrastructures	<ul style="list-style-type: none"> Compensate or reinstate/relocate community assets that are disturbed such as irrigation canals, electricity poles, telephone lines, drinking water pipes, sewerage lines, roads, etc. to the satisfaction of the people. Avoid disturbance to any historic/heritage buildings or structures by taking necessary precautions (work away from any heritage buildings, hand digging, no heavy equipment, etc.) 	ICG/RPMO/ Contactor/DSMC
Influx of outside workforce, money and unwanted activities	Increase in crime and community stress	<ul style="list-style-type: none"> Prohibit gambling and alcohol consumption in contractors' campsites. Instruct the outside workforce to respect the local cultures, traditions, rights etc. Provide security in contractors' camps. 	KVWSMB/KUKL/ Contactor
Project activities relating to health and safety issues at work areas	Health and hygiene (unsafe working conditions, accidents, fire hazard, transmission of communicable diseases etc.)	<ul style="list-style-type: none"> Ensure measures (fencing and/or barriers) to protect public from construction site Provide regular health check-ups, proper sanitation and hygiene, health care, and control of epidemic diseases to the workforce. Launch awareness programs concerning human trafficking and the possibility of spread of STDs and HIV/AIDS using brochures, posters, and signboards Make available first aid kits, ambulance and fire extinguishers in campsites Make available protection gears to all construction workers and compensate for the loss of life or any type of injuries Provide insurance to the workers and training in OHS and community health and safety. Ensure all work areas are clearly demarcated and marked and protect public from getting near to the trenches. 	ICG/RPMO/ Contactor

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Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
		<ul style="list-style-type: none"> • Provide alternate potable water supply during maintenance works and notify the public in advance. 	
Work in archaeological and/or heritage areas	Loss of archaeological and cultural sites Finding of any archaeological artefact during excavation works. Heritage buildings and character of heritage areas	<ul style="list-style-type: none"> • Inform Department of Archaeology of plans and submit application for permission • Conduct Archaeological Impact Assessment, or other agreed document approved by DOA, if required • Ensure compliance with any Department of Archaeology (DOA) rules based on ongoing consultations with DOA during construct period including on-site field inspector • Protect archaeological and heritage sites, use manual digging and avoid heavy equipment during the digging of trenches for the laying of pipes • In case of a chance find the DOA has to be immediately notified. Appropriate action is to be taken either to relocate the artifact if situation permits as per the directions of the department or work at the location has to be abandoned and alternate plan has to be executed. 	PMO/RPMO/ICG /DSMC Contactor
Traffic management at construction sites	Traffic congestion (temporary disruption to local access due to open trenches, excavation across roads or road closures due to construction).	<ul style="list-style-type: none"> • Develop and implement a traffic plan and road safety plan to minimize traffic flow interference from construction activities • Coordinate with local authorities (police, VDC, local area committees, etc.) to manage traffic during construction period • Provide advance public awareness and public notification of construction activities, schedule, routing, and affected areas including road closures • Erect alternative routing signage in Nepali and English. • Use of steel plates or other temporary materials across trench facilities in key areas such as pedestrian access and sidewalks and parking areas • Arrange for night time construction for activities in congested/ heavy daytime traffic areas • Arrange for onsite "grievance handling" through use of liaison 	Contactor / DSMC

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Project Activity	Potential Environmental Impact	Proposed Mitigation Measures	Responsibility
		officers <ul style="list-style-type: none"> Undertake trench closure and facilitate surface rehabilitation or paving as quickly as feasible 	
<ul style="list-style-type: none"> Operational phase 			
Project activities relating to health and safety issues at work areas	Health and hygiene (unsafe working conditions, accidents, fire hazard, transmission of communicable diseases etc.)	<ul style="list-style-type: none"> Provide regular health checkups, proper sanitation and hygiene, health care, and control of epidemic diseases to the workforce. Make available first aid kits, ambulance and fire extinguishers in camp sites. Make available protection gears to all construction workers and compensate for the loss of life or any type of injuries. Provide insurance to the workers and training in OHS and Community Health and Safety. Provide alternate potable water supply during maintenance works and notify the public in advance 	WUSC/PMO
Water quality	Water quality does not meet national drinking quality standards	<ul style="list-style-type: none"> Conduct regular monitoring of water quality from treatment plants to ensure water delivered to public meets national standards 	WUSC/ PMO

ICG + Implementation Core Group, DSMC = Design and Supervision and Management Consultants, EMP = Environmental Management Plan, HIV = Human Immuno Deficiency Virus, PMO = Project management Office , RPMO = Regional Project Management Office, WUSC = Water Users and Sanitation Committee. , OHS = occupational health and safety, PID = Project Implementation Directorate, STD= sexually transmitted disease.

3. Implementation of Mitigation Measures

Most of the mitigation measures specified are part of the contractual obligations during the project construction and therefore will be integrated into the project design and tender documents. By including mitigation measures in the contract monitoring and supervision of mitigation implementation will be covered under the normal engineering supervision provisions of the contract. The mitigation measures implementation elaborated in Table 9 will be monitored through direct observation, records of contractors, consultation with people etc weekly or daily as required.

a. Project Design

For most of the adverse environmental impacts likely to occur during project construction and operational phase, mitigation measures will be integrated in the design of the project itself so as to strengthen the benefits and sustainability of the project. This will enhance the mitigation measures in terms of specific mitigation design, cost estimation of the mitigation measure, and specific implementation criteria. The proponent will ensure that the mitigations measures are included in the design of the project.

b. Project Contract

The project contract will clearly specify the mitigations measures that are part of the project construction and the contractor will be bound by the parameters identified in the environmental assessment pertaining to specific mitigation measures. The proponent will ensure the compliance of the proposed measures from the contractor and the final acceptance of the completed work will not occur until the environmental clauses have been satisfactorily implemented.

c. Bill of Quantities

The tender instruction to the bidders will explicitly mention the site-specific mitigation measures to be performed, the materials to be used, labour camp arrangements, and waste disposal areas, as well as other site specific environmental requirements.

E. ANALYSIS OF ALTERNATIVES WITH AND WITHOUT PROJECT

The alternatives analysis of the project in terms of project location, technology, implementation procedures, and the raw materials used have been studied and analyzed. Similarly, comparison between with and without project or the "No action option" is also studied and analyzed.

1. Alternative in Design

Following three options were studied

Option I: All four independent subsystems as mentioned below:

- a) **Simreni subsystem as separate system** with source as dug well at the west bank of Girwari River, Dugwell protection works
Slow sand filter and Disinfection unit
Electrical works, 110m of 11 KV transmission line, Transformer
Standby Generator
Reservoir: 30 Cum, Distribution system
11 KV line river crossing to Simreni
- b) **Basantapur sub-system**
Ground water (deep tube well) as source
Pressure Filter and Disinfection works
Electrical works, 100m of 11 KV transmission line, Transformer
Standby Generator
Reservoir: Over head reservoir (200 Cum), Distribution system
- c) **Bhagra Ranitar sub-system**
Ground water (deep tube well) as source
Pressure Filter and Disinfection works
Electrical works, 400m of 11 KV transmission line, Transformer, Standby Generator
Reservoir: Over head reservoir, Distribution system
- d) **Shivanagar sub-system**
Ground water (deep tube well) as source
Pressure Filter and Disinfection works
Electrical works, 300m of 11 KV transmission line, Transformer, Standby Generator
Reservoir: Over head reservoir (450 Cum), Distribution system

Preliminary costing of the Option I: 363.274 million

Option II: (Simreni + Basantapur with same tube well, river crossing to Simreni , Bhagra-Ranitar and Shivanagr as separate subsystems)

- a) **Simreni + Basantapur sub-system**
Ground water (deep tube well) as source
Pressure Filter and Disinfection works
Electrical works, 100m of 11 KV transmission line, Transformer
Standby Generator

Reservoir: Over head reservoir (200 Cum), Distribution system
Reservoir: 30 Cum (for Simreni)
65mm pumping main pipe River crossing to Simreni

b) Bhagra Ranitar sub-system

Ground water (deep tube well) as source
Pressure Filter and Disinfection works
Electrical works, 400m of 11 KV transmission line, Transformer
Standby Generator
Reservoir: Over head reservoir, Distribution system

c) Shivanagar sub-system

Ground water (deep tube well) as source
Pressure Filter and Disinfection works
Electrical works, 300m of 11 KV transmission line, Transformer
Standby Generator
Reservoir: Over head reservoir (450 Cum), Distribution system

Preliminary costing of the Option II: 344.676 million

Option III: (Simreni + Basantapur with same tube well, river crossing to Simreni , Bhagra-Ranitar and Shivanagr from same tubewell)

a) Simreni + Basantapur sub-system

Ground water (deep tube well) as source
Pressure Filter and Disinfection works
Electrical works, 100m of 11 KV transmission line , Transformer, Stand by Generator
Reservoir: Over head reservoir (200 Cum), Distribution system
Reservoir: 30 Cum (for Simreni)
65mm pumping main pipe River crossing to Simreni

b) Bhagra –Ranitar & Shivanagar sub-system

Ground water (deep tube well) as source
Pressure Filter and Disinfection works
Electrical works, 300m of 11 KV transmission line, Transformer, Stand by Generator
Reservoir: Over head reservoir (450 Cum)
Ground reservoir 100 Cum, Distribution system
(Ideal Distribution pipelines 300 mm DI)

Preliminary costing of the Option III: 357.951 million

Personnel cost will be higher in the Option I than the both the cases. The low cost option is Option II and thus Option II is selected.

2. Alternative in Project Site/ Location

No significant adverse environmental impacts are found with present location of project. The deep wells and reservoirs sites have been proposed in consultation with the user group and technically

best suited location where no or minimum environmental effects will be seen. The alignments of pipelines are also fixed with minimum impacts on environment.

The designated source to serve the service area is the five numbers of deep tubes wells located at both banks of Giriwari River. The location of these new drill sites were finalized on the basis of geo-hydrological requirements.

The location of structures especially the elevated reservoirs, borehole, and distribution pipe line will be retained as decided during interaction with WUSC and beneficiaries. Therefore, the proposed location of the project has no alternatives.

3. Alternative in Technology, Implementation Procedure and Raw Materials

Most of the technologies proposed in the project are labour intensive. A minimum of mechanical equipment will be used during construction work. Reservoir construction, drilling well and pipeline excavation and backfilling works are some of the major components of project. These works will be done manually without any mechanical equipment except in the construction of deep tube wells during which noise pollution may occur. That may affect the workers and operator exposed to construction machine. Precautions will be taken and adequate protective measures will be applied for the working persons at and nearby the deep tube well construction sites. Remaining other work is labour intensive.

The working procedures proposed are participatory one. The beneficiaries will be participating actively in all activities of the project. The project will use the local raw materials as far as possible. Except for some mechanical equipment necessary for pipe fitting materials, most of the construction materials will be local.

4. No Project Option

The analysis has also been done with and without the project. Implementation of the proposed project will create a lot of positive impacts on health and hygiene, environment and improve the socio-economic status of community as well. Provision of good quality water and sanitation facilities will help to enhance the quality of life of the people in the project area. The project will also help to create job opportunities to a considerable number of people. The implementation of the proposed project will produce only negligible and insignificant environmental impacts.

On the other hand, if the project is not implemented, the people of the project area will have to continue to suffer from various problems they are facing currently. There is a deficiency of drinking water in the project site. People are forced to use polluted ground water using hand pumps and shallow dug wells.

F. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

1. Public Consultation

In order to ensure public involvement, the following procedures followed during the IEE report preparation:

- A 15 days public notice was published 15 June 2016 in the national daily newspaper seeking written opinions from concerned VDCs, DDCs, schools, health posts and related local organizations and concerned people.
- A copy of the public notice was also affixed in the notice boards of the above mentioned organizations in the project area and a deed of enquiry (*muchulka*) will be collected.
- The IEE team discussed with the local communities and related stakeholders like Village Development Committee, WSSDO Nawalparasi *etc* during the field survey to collect their concerns and suggestions.
- A meeting was held in Tamsaria regarding the project activities. DSC members explained about the project and the probable environmental impacts.
- The minutes of meeting regarding the same will be attached in final IEE report .

2. Information Disclosure

The draft IEE will be kept at the information centre of Tamsaria VDC, Nawalparasi for public disclosure. Information will also be disseminated through person to person contacts and interviews and group discussions. Available institutions at the local level will also be informed through notices pasted on notice boards of the concerned ward offices, schools, health posts and public places. The approved IEE report will be accessible to interested parties and general public through websites www.sstwsssp.gov.np. Following offices will get the IEE report:

- Tamsaria Village Development Committee, Tamsaria , Nawalparasi
- Water Supply and Sanitation Divison Office (WSSDO) Nawalparasi
- Ministry of Water Supply and Sanitation, Kathmandu
- Asian Development Bank, Nepal Resident Mission

G. GRIEVANCE REDRESS MECHANISM

A grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of affected people's concerns, complaints, and grievances about the social and environmental performance of the project. The GRM aims to provide a trusted way to voice and resolve concerns linked to the project, and to be an effective way to address affected people's concerns. The GRM for the project is outlined below, and consists of three levels with time-bound schedules and specific persons to address grievances.

First level of GRM

The first level and most accessible and immediate contact for the fastest resolution of grievances are the contractors and supervision consultants on site. Prior to construction of any works, the community awareness consultants, DSMC, and contractors are to hold local community meetings to notify the local residents and businesses of the temporary disturbance, and to inform them of the project. If a local area committee (LAC) exists, they should also be informed. If any complaints arise, the contractors, DSMC, and PMO can immediately resolve the complaint on site. The PMO regional units viz RPMO; can also be involved in grievance redress at this stage. The DWSS hotline and PMO office phone number will be posted in public areas within the project area and construction sites. Any person with a grievance related to the project can contact the project to file a complaint. The RPMO is staffed with a consumer relations officer to field and resolve complaints. The consumer relations officer or branch manager will document the complaint, and immediately address and resolve the issue with the contractor within 1-2 days, if the complaint remains unresolved at the field level. The branch manager may seek the assistance of the DSMC safeguards specialists (the environmental specialist or social safeguards specialist) to help resolve the issue. The consumer relations officer or branch manager will notify the PMO safeguards unit that a complaint was received, and whether it was resolved. The branch manager will fully document the following information: (i) name of the person, (ii) date complaint was received, (iii) nature of complaint, (iv) location, and (v) how the complaint was resolved.

Second level of GRM

Should the grievance remain unresolved; the branch manager will forward the complaint to the PMO safeguards unit. The person filing the grievance will be notified by the consumer relations officer or Branch Manager that the grievance was forwarded to the PMO safeguards unit. For resettlement issues, the resettlement officer will address the grievance; for environmental issues, it will be the environmental officer. Grievances will be resolved through continuous interactions with affected persons, and the PID will answer queries and resolve grievances regarding various issues, including environmental, social, or livelihood impacts. Corrective measures will be undertaken at the field level by the PID safeguards staff within 7 days. The relevant safeguards unit staff will fully document the following information: (i) name of the person, (ii) date complaint was received, (iii) nature of complaint, (iv) location, and (v) how the complaint was resolved.

Third level of GRM

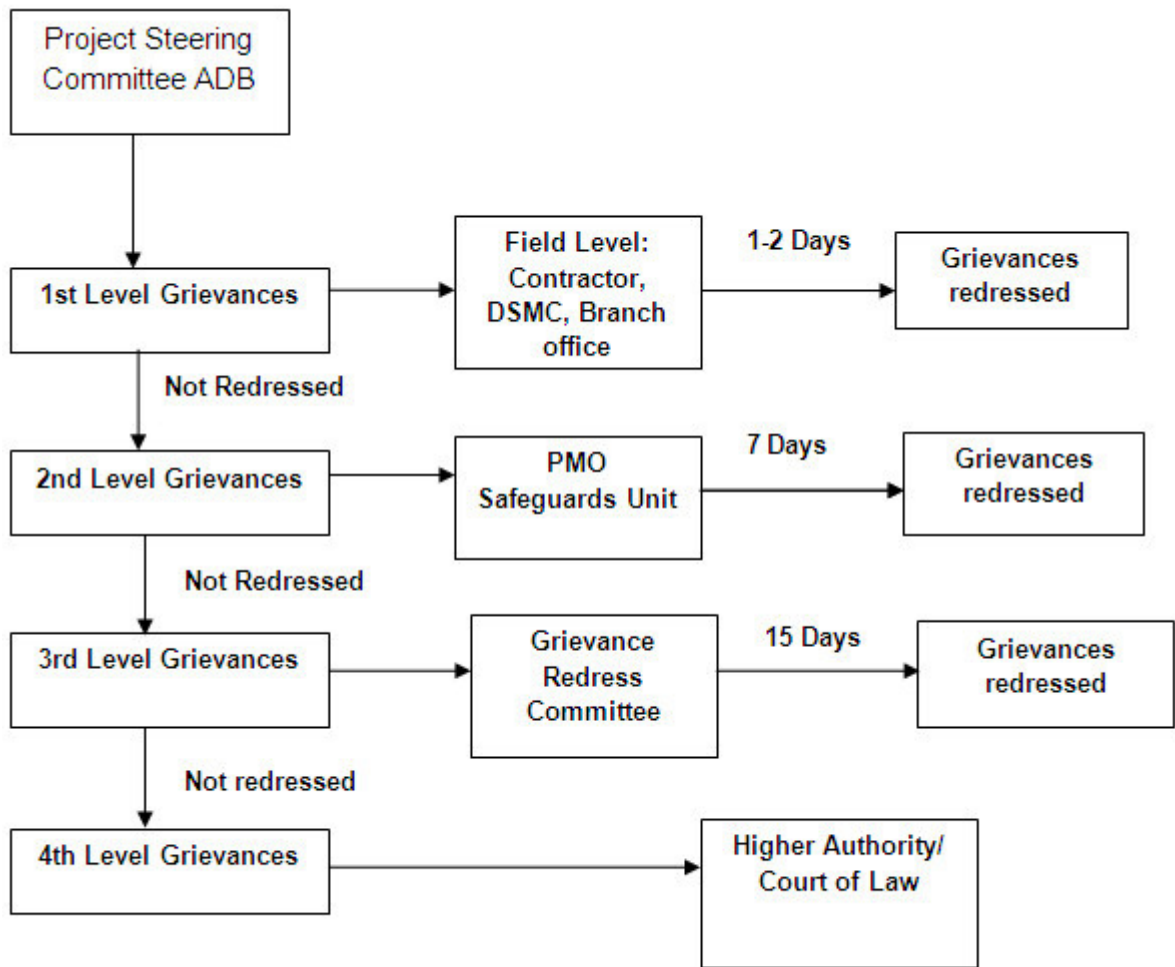
Should the grievance remain unresolved, the PMO 's project director will activate the third level of the GRM by referring the issue (with written documentation) to the local Grievance Redress Committee (GRC) of the DWSS , who will, based on review of the grievances, address them in consultation with the PMO safeguards unit, project director, and affected persons. The local GRC will consist of members of the PMO, affected persons, and local area committee, among others determined to provide impartial, balanced views on any issues. The GRC should consist of around five persons. A hearing will be called with the GRC, if necessary, where the affected person can

present his or her concern/issues. The process will promote conflict resolution through mediation. The local GRC will meet as necessary when there are grievances to be addressed. The local GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within 15 days. The functions of the local GRC are as follows: (i) to provide support to affected persons on problems arising from environmental or social disruption, asset acquisition (if necessary), and eligibility for entitlements, compensation, and assistance; (ii) to record grievances of affected persons, categorize and prioritize them, and provide solutions within 15 days; and (iii) to report to the aggrieved parties developments regarding their grievances and decisions of the GRC. The PMO safeguards officers will be responsible for processing and placing all papers before the GRC, recording decisions, issuing, minutes of the meetings, and taking follow-up action to see that formal orders are issued and the decisions carried out.

Fourth level of GRM

In the event that a grievance is not addressed by the contractor, DSMC, RPMO, PMO or GRC, the affected person can seek legal redress of the grievance in the appropriate courts, the fourth level of the GRM, which is the formal legal court system. The grievance redress mechanism and procedure is depicted in Figure 3.

Figure 3: Grievance Redress Mechanism (GRM)



DSMC= design and supervision management consultant, PMO = Project Management Office

H. ENVIRONMENT MANAGEMENT PLAN

1. Environment Management Plan and Objective

The basic objectives of the EMP are:

- to ensure that all mitigation measures and monitoring requirements will actually be carried out at different stages of project implementation and operation - pre-construction, construction and operation and maintenance;
- recommend a plan of action and a means of testing the plan to meet existing and projected environmental problems;
- establish the roles and responsibilities of all parties involved in the project's environmental management;
- describe mitigation measures that shall be implemented to avoid or mitigate adverse environmental impacts and maximizing the positive ones;
- ensure implementation of recommended actions aimed at environmental management and its enhancement; and
- ensure that the environment and its surrounding areas are protected and developed to meet the needs of the local people, other stakeholders and safeguard the interests of the common people.

A Safeguard Unit within the project should be established and be headed by a senior environmental expert, a sociologist and a legal expert with adequate support staff.

2. Mitigation and Monitoring

The Environmental Monitoring Plan (EMP) shall be implemented in such a way that the contractor is monitored during the construction phase. The EMP also requires regular monitoring of the actual environmental impacts during project operations over the years following project completion. These impacts that have been monitored should be compared with the anticipated impacts at the time of the preparation of the project and the effectiveness of the mitigation measures taken.

In order to promote monitoring activities as an integral part of the project, types of monitoring its indicators schedules and responsible agencies are given below:

- Baseline monitoring
- Compliance monitoring
- Impact monitoring

Baseline monitoring aims to identify collect and verify the additional environmental base line data, which is scientific or sociological in nature and needed to augment information on baseline conditions initially generated during IEE. In case of a water supply sub-project most of the baseline data have already been collected and there is very little chance for changes till the implementation phase. Hence it will not be necessary to repeat it unless some striking new scenarios in terms of physical or socioeconomic conditions emerge.

Compliance monitoring is essential in order to encourage and promote the proponent to comply with the requirements as listed in the mitigation measures and any condition set forth during the

project approval. Hence it is desirable to ensure the integration of mitigation measures in the document, if any, which should fully reflect environment obligation to be complied with by the proponent or the contractor.

Impact monitoring is necessary in order to know the actual level of impact in the field during the construction and operation of the project in the alignment as the environmental impacts are predicted based on value judgment through with some valid assumptions.

The Monitoring Plan will be designed in a way that the contractor is monitored to ensure that the mitigation measures are followed during the construction period. It also requires regular and periodic monitoring of the actual environmental impacts during the project operation over the years following project completion. A detailed monitoring plan giving the mechanisms of monitoring for the environmental impact and the mitigation measures are given in the following table.

Table 10: Construction Environmental Monitoring Program

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/Standards	Frequency	Responsible for Monitoring
Sources of materials	Quarries and sources of materials	Construction contractor	Construction contractor documentation	(i) Checking of records; (ii) visual inspection' of sites	(i) Sites are permitted; (ii) report submitted by construction contractor monthly (until such time there is excavation work)	Monthly submission for construction contractor as needed for PMO/RPMO	RPMO/ ICG /DSMC
Air quality	Construction sites and areas designated for stockpiling of materials	Construction contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices; (iv) ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); (v) vehicular emissions such as sulfur dioxide (SO ₂), nitrous oxides (NO _x), carbon monoxide (CO), and hydrocarbons (HC)	(i) Checking of records; (ii) visual inspection of sites	(i) Stockpiles on designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) air pollution control devices working properly; (iv) Government of Nepal Ambient Quality Standards for ambient air quality; (v) Government of Nepal Vehicular Emission Standards for SO ₂ , NO _x , CO and HC.	Monthly for checking records	RPMO/PMO in coordination with Ministry of Environment/DSMC

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Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/Standards	Frequency	Responsible for Monitoring
Surface and ground water quality	(i) Construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials;	Construction contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii) records of surface and ground water quality inspection; (iv) Effectiveness of water management measures; (v) for inland water: suspended solids, oil and grease, biological oxygen demand (BOD), and coliforms.	Visual inspection	(i) Designated areas only; (ii) silt traps installed and functioning; (iii) no noticeable increase in suspended solids and silt from construction activities (iv) Government of Nepal Standards for inland waterways	Monthly	RPMO in coordination with Ministry of Environment/DSMC
Noise levels	(i) Construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night time noise levels	(i) Checking of records; (ii) visual inspection	(i) Complaints from sensitive receptors satisfactorily addressed; (ii) silencers in noise-producing equipment functioning as design; and (iii) sound barriers installed where necessary	Monthly	RPMO in coordination with Ministry of Environment/DSMC
Existing utilities and infrastructure	Construction sites	Construction contractor	(i) Existing utilities contingency plan	(i) Checking of records; (ii) visual inspection	Implementation according to utilities contingency plan	As needed	RPMO /DSMC
Landscape and aesthetics	(i) Construction sites; (ii) areas for stockpiles,	Construction contractor	(i) Waste management plan; (ii) complaints from	(i) Checking of records; (ii) visual	(i) No accumulation of solid wastes on-site; (ii) implementation of Waste Management Plan;	Monthly	RPMO /DSMC

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Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/Standards	Frequency	Responsible for Monitoring
	storage of fuels and lubricants and waste materials; (iii) work camps		sensitive receptors; (iii) PID to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	inspection	(iii) Complaints from sensitive receptors satisfactorily addressed.		
Accessibility	(i) Construction sites; (ii) traffic haul road	Construction contractor	(i) Traffic Management plan; (ii) Complaints from sensitive receptors; (iii) Number of signages placed at project location.	Visual inspection	(i) implementation of Traffic management plan, if required; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) signages visible and located in designated areas	Monthly	RPMO /DSMC
Socioeconomic-income	Construction sites	Construction contractor	(i) Complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at project location.	Visual inspection	(i) Complaints from sensitive receptors satisfactorily addressed; (ii) walkways, ramps, and metal sheets provided (iii) signages visible and located in designated areas	Quarterly	RPMO /DSMC
Socioeconomic-employment	Construction sites	Construction contractor	(i) Employment records; (ii) records of sources of materials	Checking of records	High number of employees from local area workforce	Quarterly	RPMO /DSMC
Occupational health and safety	Construction sites	Construction contractor	(i) Site-specific Occupational Health and safety (OHS) Plan; (ii) Equipped first-aid stations;	(i) Checking of records; (ii) visual inspection	(i) Implementation of OHS plan; (ii) number of work-related accidents; (iii) Percentage usage of personal protective	Quarterly	RPMO /DSMC

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Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/Standards	Frequency	Responsible for Monitoring
			(iii) Number of accidents; (iv) Supplies of potable drinking water; (v) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vi) record of OHS orientation trainings (vii) personal protective equipment; (viii) percentage of moving equipment outfitted with audible back-up alarms; (ix) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.		equipment; (iv) number of first-aid stations, frequency of potable water delivery, provision of clean eating area, and number of sign boards are according to approved plan; (v) Percentage of moving equipment outfitted with audible back-up alarms		
Community health and safety	Construction sites	Construction contractor	(i) Traffic management plan; (ii) complaints from sensitive receptors (iii) barriers around trenches and tubell drilling sites (iv) signage (v) KUKL hotline posted at site	Visual inspection	(i) Implementation of traffic management plan; (ii) complaints from sensitive receptors satisfactorily addressed	Quarterly	RPMO /DSMC
Work camps	Work camps	Construction contractor	(i) Complaints from sensitive receptors; (ii) water and sanitation facilities for	Visual inspection	(i) Designated areas only; (ii) complaints from sensitive receptors satisfactorily	Quarterly	RPMO /DSMC

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Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/Standards	Frequency	Responsible for Monitoring
			employees; and (iii) PID report in writing that the camp has been vacated and restored to pre-project conditions		addressed		
Chance finds	Construction sites	Construction contractor	Records of chance finds	Checking of records	Implementation of chance finds Protocol	As needed	RPMO /DSMC

3. Environmental Monitoring Cost

Monitoring cost has been estimated for two years of construction period. The monitoring will be conducted on physical, biological and socio-economic aspects. During the post construction phase, monitoring will be done on water quality, maintenance system and outbreak of diseases.

Most of the monitoring cost for the proposed project is related to the expenses for experts for observation and monitoring during construction and operation phases of the project. The following monitoring costs are to be incurred by the project.

Table 22: Monitoring Costs

Item	Duration (Month)	Rate	Cost
Environmental Management Specialist	2.5	75,000	187,500
Sociologists	1.5	50,000	75,000
Support Staff	2	20,000	40,000
Cost for monitoring by MoUD / DWSS		LS	250,000
Transportation		LS	40,000
Miscellaneous		LS	30,000
Total			622,500.00

4. Environmental Procedures and Institutions

Institutions have a crucial role to play during monitoring. There should be firm institutional commitment by the agencies responsible for monitoring. The Ministry of Population and Environment (MOPE) is in charge of environmental control and management for all sector agencies. The Ministry of Water Supply and Sanitation (MWSS) will have overall responsibility for environmental monitoring of all water supply and sewerage projects.

The different agencies involved in the Tamsaria Town Water Supply and Sanitation Project are as explained in the following table.

Table 23: Institutions Involved in the Proposed Project

S.N	Organization	Roles and Responsibilities
1.	Ministry of Water Supply and Sanitation (MOWSS)	It is the executing agency for the implementation of Third Small Town Water Supply and Sanitation Sector Project (TSTWSSSP). It is responsible for monitoring of project design, construction and operation activities according to the approved IEE report. It is also responsible for approving the Terms of Reference (TOR) for the IEE and approving the IEE studies.
2.	Department of Water Supply and Sewerage (DWSS)	DWSS is the implementing agency for the TSTWSSSP. It is responsible for ensuring that all the environmental measures to be adopted during different phases of project implementation and operation have been fully adhered to. It is also responsible for water quality monitoring.

S.N	Organization	Roles and Responsibilities
3.	Water Supply and Sanitation Division Office (WSSDO)	WSSDO is responsible for assisting WUSC. It is responsible for ensuring the implementation of environmental measures recommended especially during the construction and operation phase.
4.	Project Management Office (PMO)	PMO under DWSS implements the project. It ensures that all the mitigation measures prescribed by approved IEE have been fully adopted. It acquires permits and approval for project construction and assists WUSC on source registration and transfer of land ownership. It also ensures that responsibilities of other stakeholders are incorporated as per agreements.
5.	Town Development Fund (TDF)	TDF provides funding to the WUSC. It ensures that necessary environmental screening and assessments have been carried out during the funding decisions.
6.	Water User and Sanitation Committee (WUSC)	WUSC is responsible for forming member based water user group and registering it. It is responsible for ensuring the implementation of environmental measures recommended especially during the construction and operation phase. Activities such as public awareness on sanitation and maintaining record of the water quality data are some of its responsibilities.
7.	Design Supervision and Management Consultant (DSMC)	DSMC is responsible for conducting the feasibility study and detailed design and construction supervision. It ensures that all the mitigation measures are incorporated in the final design of the system and the environmental prescriptions are being met by the construction contractor.
8.	Contractor	It is responsible to ensure that the mitigation measures are specified during the construction

Apart from the above mentioned agencies, there are other institutions that are directly and indirectly involved in the project and during the IEE studies. Local bodies such as District Development Committee and Tamsaria VDC help in disseminating information about the project to local people and related stakeholders and in giving permits to conduct the IEE studies.

5. Reporting Procedure

The contractor has a crucial role in ensuring that the mitigation measures are implemented during the project construction phase. The contractor will develop an Environmental Mitigation Execution Plan (EMEP) based on EMP. The contractor has to report weekly about the progress of its work together with day-to-day practical aspect of project implementation to the DSC. It is suggested that a team comprising of WUSC member and contract workers be established at the onset of the project to make periodic reporting to the DSMC.

The DSMC then is responsible for ensuring that all the procedures and final design that includes the mitigation measures are followed. DSMC is responsible to check the weekly progress report of the contractor and field verify whether the implementation of mitigation measures have been conducted as decided in the EMEP or not.

DSMC then will prepare an environmental monitoring report based on the weekly progress report of the contractor. DSC will report the status of the project and the monitoring report to the PMO for its review. PMO will then forward the monitoring report to review by the Environmental Specialist of the DSC. 10 copies of the reports will be submitted to PMO every month, which will be distributed to the responsible agencies for review. The Environmental Specialists of the DSMC will then review the comments and suggestions from the various authorities and act accordingly.

Monthly progress reports, including bi-annual and annual reports on the implementation of EMP will be produced on a regular basis. The report will contain information of all the activities conducted within the given time including the cases of non-compliance. A feedback mechanism of reporting will be developed and based on the results of monitoring; the Environmental Management Plan will be adjusted accordingly.

6. Procurement Plan and Cost Estimates

Cost of mitigation measures directly linked to the construction activities (such as erosion control measures) are not included in the cost estimates as most of these are already included in the construction and operation and maintenance cost of the project.

7. Project Implementation Schedule

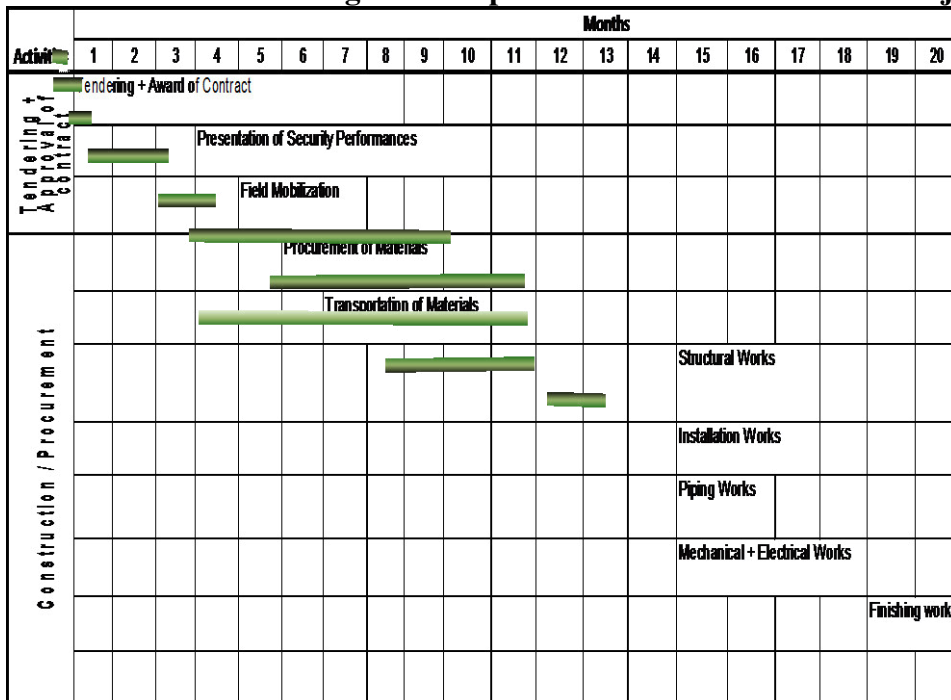
During the design phase PMO/RPMO and the DSMC will ensure that mitigation measures are included in the design and contract documents in compliance with Environment Protection Act and Regulations.

During the construction phase the parties involved will ensure that all mitigation measures and precautions that are required to be taken by the contractor are written explicitly SPSC and WUSC will be responsible to see that works carried out by the contractor are according to the contract documents and mitigation measures are taken accordingly with the overall guidance of the DWSS and the PMO.

During the operation phase, WSSDO, and WUSC will monitor the system for leakage, water quality, pump maintenance and disease outbreak etc. and prepare a monthly report to be sent to PMO via RPMO.

The EMP implementation schedule is given in following figure for a period of 20 months.

Figure 4: Implementation Schedule of the Project



I. CONCLUSIONS AND RECOMMENDATIONS

- As the proposed water supply system is on community based approach, the present WUSC needs to be strengthened in terms of community mobilization lead persons in individual wards and communities.
- It is expected that the planned water supply and sanitation project for Tamsaria VDC will have only minor adverse impacts on the environment which can be mitigated easily with low cost through adequate mitigation measures and regular monitoring.
- Because of this Project, there will be significant improvement in personal, household and community hygiene practices, and environmental sanitation thereby increasing the quality of life and community health.
- From this IEE, it can be seen that no adverse or harmful impacts of any significance are expected and a full scale EIA is not required. The project lies under Category B (no major environmental impacts expected) for which this IEE has been carried out.

Approved Terms of Reference

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ANNEXES

Annex A: RAPID ENVIRONMENTAL ASSESSMENT (REA) and GENERAL SOCIO ECONOMIC CHECKLIST FOR IEE STUDY

ANNEX B : DRAWINGS/ PROJECT LOCATION

1.0 NAME AND ADDRESS OF THE INDIVIDUAL OR INSTITUTION PREPARING THE REPORT

1. The Environmental Protection Regulation 1997 (amended in 2007) mentions that a Terms of Reference (TOR) for an Initial Environmental Examination (IEE) is required.

2. This Terms of Reference (TOR) has been prepared in order to carry out an IEE for Tamsaria Town Water Supply and Sanitation Sector Project in Nawalparasi District. The proposed proponent is the Project Management Office (PMO), Third Small Towns Water Supply and Sanitation Sector Project (TSTWSSSP) of Department of Water Supply & Sewerage, Ministry of water supply and sanitation, Government of Nepal is responsible for the preparation of IEE report. Name and address of the proponent is given below:

Name of the Proponent:

Project Management Office
Tamsaria Town Water Supply and Sanitation Sector Project
Third Small Towns Water Supply and Sanitation Sector Project
Department of Water Supply and Sewerage
Ministry of water supply and sanitation
Government of Nepal

Address of the Proponent:

Panipokhari, Kathmandu, Nepal
Phone: 4423848, 4412348
Fax: 4413280
Email: info@stwsssp.gov.np
Website: www.sstwsssp.gov.np

2.0 DESCRIPTION OF THE PROPOSAL

2.1 General Introduction

3. The Small Towns Water Supply and Sanitation Sector Project is designed with the principle of community management, making it demand responsive, and adopting participatory approach. Participatory approach aims for greater community participation in planning, implementation along with their O & M activities. Demand responsiveness is demonstrated by willingness to pay for improved service delivery and ultimately aims at 30% cost recovery. Community management is essential for making the community empowerment so that the community could take full responsibilities on financial, technical and managerial aspects on operation & maintenance activities.

4. In terms of financing, 70% of the cost will be contributed by GON. In regard to cash contribution to be made by WUSC, the initial cash contribution of WUSC should be minimum 5% of the civil works contract in the form of upfront cash contribution. The remaining 25 % to be borrowed from the TDF as a loan at an interest rate not exceeding 5% per annum with a maturity of 25 years including a grace period of five years. The project ensures full participation of Water Users and Sanitation Committee in the formulation, implementation and operation and maintenance of water supply, sanitation and drainage facilities.

5. The main objectives of the project are to

- i. Improve water supply and sanitation facilities and provide a health and hygiene education program in each town.
- ii. Support community participation in the development of water supply and sanitation facilities, and
- iii. Facilitate Sustainable development of the facilities thereby help/ improve health and quality of life of the people living in the project area.

6. Tamsaria is situated in Nawalparasi district of Lumbini Zone in Western Development Region. The project town is situated at the side of East-West Highway, it is also known as Chormara. The location of the project area is 27⁰35' to 27⁰40' North Latitude and 84⁰01' to 84⁰03' East Longitude. Refer figure in Annex for location of the project area. The project town is surrounded by Argeuli VDC to the East, Mainaghat and Deurali VDCs in the North, Parsauni and Nayabilasi VDCs in the West and Narayani in the South.

7. Tamsaria is one of the emerging towns of Nawalparasi district, and the clusters/settlements of the town are located on the both side of East - West Highway. The town is about 41 km west from Narayangarh. Parasi is the district headquarter which lies 60 km south west to the town.

8. The service area of Tamsaria Water Supply and Sanitation Sector Project is strip with extended to 11 km southward. Breadth of the service area is quite narrow, less than 2 km in northern part.

9. Girwari River which is about 150m wide flows down north to south, through the service area and further separating the area. Jungle area starts from few hundred meters north from East-West Highway. This jungle separates northern settlement to the Highway. Thus considering the topography, land use, settlement pattern 4 separate distribution schemes are proposed.

10. The socio-economic survey of Tamsaria covers ward no. 1 to 9 and part of Narayani VDC within the net works of Tamsaria VDC, Nawalparasi district. Total household and population of Tamsaria and Narayani VDCs has been found 15,590 total population. Furthermore the water needs treatment to qualify with Nepal Drinking Water Quality Standards (NDWQS) guideline values.

2.2 Project Description

11. Tamsaria Town Water Supply and Sanitation Sector Project has been conceptualized as a piped water supply system considering ground water source. Based on the topography, settlements and existing structures decentralized distribution system is adopted and are described below:

12. **Simreni Scheme:** This scheme located in the ward # 3, lies in the north tip of the service area and other side of the river Girwari. The present day households and population are just 95 and 496 respectively (census, August 2015). SimreniTole, BhiureniTole are the main settlements of this ward.

13. **Basantapur Scheme:** This scheme is located in the north side of East - West Highway beyond the jungle area. This will serve wards # 1, 2 and part of 4. Basantapur, Magartole, Bhuptole, Amrasa, are the few major settlements that will be served by this Scheme.

14. **Bhagra – Ranitar Scheme:** This scheme is proposed at the right side of the river Girwari, serving wards 5 and 6. This scheme will serve Bhagra, Lohasedhara, KhyankalaTole, DevkotaTole, Ranitar etc.

15. **Shivanagar Scheme:** This scheme is proposed at the left side of the river Girwari, covering Shivanagar, Chormara bazaar, Tadi, PurwaTole, PashimTole, Baruwa and Baghkhora of Narayani VDC. This will be the largest distribution scheme of the sub-project.

WATER SOURCE

16. Ground water as source is proposed. Deep tube wells are proposed to install in the both banks of GirwariKholra. Subsystems and sources have been proposed as follows:

17.

Table 1: Source Location

S. No	Subsystem	Required safe yield from source	Proposed Boring size	Location	Remarks
1	Simreni	1.38 lps	250 x 200 mm	Basantapur Ward no 1	1 tube well to supply both the subsystems.
2	Basantapur	14.48 lps			
3	Bhagra - Ranitar	11.05 lps	250 x 200 mm	Ranitar Ward No 6	
4	Shivanagar	17.0 lps	250 x 200 mm	Shivanagar Ward No 4	

18. Major components of the water supply scheme are briefly described below:

Transmission Main

19. **Pumping Main:** Pumping main of 810m is estimated to pump water from deep tube wells to the respective storage tank. Thus to keep velocity within permissible range (0.5 m/s) DI pipes of 150 mm diameter is selected.

20. For the pumping of water to Simreni reservoir from sump well of Basantapur, GI pipes of 65 mm diameter is selected.

Water Quality and Treatment Units

21. Altogether 2 different samples from existing deep tube wells (used for irrigation purposes) were collected on 9 August 2015 for conducting laboratory analysis to test for other physical and chemical parameters with respect to the Nepal Drinking Water Quality Standard guidelines for potable drinking water.

Table 2: Existing Water Quality of Sources

S.N.	Parameters	Test Methods	Observed Values		NDWQS, Nepal
			Tube Well-1 Basantapur	Tube Well-4 Basantapur	
1.	pH at 27°C	Electromeric, 4500 – H ⁺ B, : APHA	5.9	5.54	6.5 – 8.5
2.	Electrical Conductivity, (µmhos/cm)	Conductivity Meter, 2510 B, APHA	32	18	1500
3.	Turbidity, (NTU)	Nephelometric, 2130 B, APHA	25	6	5
4.	Total Hardness as CaCO ₃ , (mg/l)	EDTA Titrimetric, 2340 C, APHA	12	5	500
5.	Total Alkalinity as CaCO ₃ , (mg/l)	Titrimetric, 2320 B, APHA	13	16	-
6.	Chloride, (mg/l)	Argentometric Titration, 4500 – Cl ⁻ B, APHA	2	2	250
7.	Ammonia, (mg/l)	Direct Nesslerization, 4500 – NH ₃ C APHA	0.21	0.06	1.5
8.	Nitrate, (mg/l)	UV Spectrophotometric Screening, 4500 – No ₃ B, APHA	6.20	0.37	50
9.	Nitrite, (mg/l)	NEDA, Colorimetric, 4500 –NO ₂ ⁻ B, APHA	ND<0.02	ND<0.02	-
10.	Calcium, (mg/l)	EDTA Titrimetric, 3500 –Ca B & 3500 –Mg B APHA Direct Air – Acetylene AAS, 3111 B, APHA	2.80	1.2	200
11.	Magnesium, (mg/l)		1.22	<0.5	-
12.	Iron, (mg/l)		3.65	0.07	0.3
13.	Manganese, (mg/l)		N.D. (<0.02)	N.D. (<0.02)	0.2

22. Water from deep borings seem acidic in nature as pH value of 5.9 and 5.5 are detected in tubewell no1 and 4 respectively. Similarly turbidity and iron content is also

found not complying in sample from tubewell 1. Other parameters found comply with the NDWQS value.

23. Water will require treatment for the reasons to satisfy NDWQS. Similarly to make the water safe from bacteria considerations, disinfecting or killing of pathogenic bacteria is required, and therefore chlorination has been done.

24. The Town project is conceptualized to use ground water sources. Pressure Treatment Plants are proposed to treat water.

Reservoir / Overhead Tank

25. The total storage requirement for the system at the end of design period i.e. 2038 is calculated as 780 m³. The provision of this quantity has been fulfilled by providing additional ground reservoirs.

26. The reservoirs will be constructed of RCC and is designed as ground based tank as the terrain suggests.

27. The following table summarizes the requirement of reservoir tanks subsystem wise.

Table 3: Required Reservoirs Size

Sub Systems	Reservoir sizes (m ³)	Remarks
Simreni	30	Proposed Ground reservoir
Basantapur	200	Proposed OHT
BhagraRanitar	100	Proposed OHT
Shiva Nagar	450	Proposed OHT
TOTAL	780	

Electrical Facilities/ Pumps

28. 11 KV line passes through near by the proposed reservoir in all the subsystems. Thus this line should be extended to the proposed location. Power required for lighting facilities and other uses are also considered. Separate 11/0.4 KV- 50 KVA step down transformers are proposed to cater the need of the proposed project. A three -phase power line shall connect the control panel, which will distribute power to different power load points. Generator facility system is also included. Detailed Design of the electrical system will be done during detail engineering design phase. Following table summarizes the electrical equipment provided in the subsystems.

Table 4: Required Generators and Transformer

Pumping Station	Pumps(KW)	Standard Diesel Gen Set (KVA)	Standard Voltage Stabilizer (KVA)	Standard transformer (KVA)
1. a)Basantpur	22.3	150	100	100
b)Simren	3.73			
2. Shivnagar	18.65	125	75	50
3. Bhagraranitar	15	100	60	50

Distribution Networks

29. The distribution system comprises of pipe network, which consists of mainly loops and branch in very few places. This network is analyzed using EPANET 2, a design analytical software tool. Distribution pipes are laid both sides of the all metalled and major roads. Single line pipes are proposed in earthen and other roads. HDPE pipes are predominantly used. Pipe class & size lesser than 6 kgf and 50 mm are not proposed to use. Existing pipes will not be used as these are leaking and found substandard (class of 4 kgf).

30. The total distribution pipe length of the proposed system is about 74.47 km.

Table 5: Required Pipes and Pipelength

S. No	Pipe type	Length of Pipes (m)
1	DI pipes	2861.85
2	GI pipes	1764.45
3	HDPE pipes	69,846.00
TOTAL		74,472.30

House Connections

31. The system has been designed, predominantly as house to house connections. The system has been analyzed for a design capacity of providing a total of 5024 house connections. However, initially during construction phase, only 2827 house (survey year households) connections are provided to satisfy the need for the base year population.

Appurtenances

32. These will primarily comprise of valve chambers or connector boxes to house in flow control valves for controlling flow in the pipeline and to the community taps etc. Altogether 65 valve chambers are expected in the system. Other appurtenances as air valves, scour valves, fire hydrants will be provided at suitable locations. Some road crossing has been initially provided. This will also facilitate for less road cuttings during the operational phase.

Generator/Operator house

33. Three permanent generator houses to accommodate the generators shall be constructed. In case of failure of power supply the generator shall be used to supply power to the pumps to deliver water. A permanent area to accommodate the pump / plant operator will be provided in this generator house. Accordingly a guard room is proposed.

Office Building and Laboratory Building

34. One office building consisting manager's room, cash counters, meeting hall , lab room , is proposed.

Capital Cost of Water Supply Facilities

35. The total project cost (water supply component only) for the proposed water supply project has been estimated as Rs. **313,553,454.61** Contingency @15% and VAT @13% are all included. The cost has been based on district rate of Nawalparasi (FY 072/73).

Salient Features of the proposed Project

36. Salient features of the town project is summarized in the table below.

Table 5: Salient Feature of the proposed Project

S.No.	Items	Description
1	Name of the Project	Tamsaria Town Water Supply & Sanitation Sector Project, Tamsaria, Nawalparasi
2	Type	Ground water pumping scheme
3	Study Level	Feasibility Study Report
4	Location Area	
	Region	Western Development Region
	Zone	Lumbini
	District	Nawalparasi
	VDC/Municipality	Municipality (Tamsaria and part of Narayani VDC -two)
	Wards	Tamsaria 1-9
5	Available Facilities	
	Road	East-West Highway
	Nearest Airport	Bharatpur
	Existing Water Supply System	Partially covered by piped water supply system. . Shallow tubewells, dugwells are used
	Electricity	Available
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
	Bharatpur- Tamsaria distance	42 km
6	Source Characteristics	
	Source Name and Type	Ground Water/ Deep Tubewells
	Source Locations	Ward No 1, Basantapur Ward No 4, Shivanagar Ward No 6, Ranitar
	Proposed Tapping yield (lps)	Basantapur + Simreni Scheme (14.48 + 1.38=) 15.86lp[s Bhagra + Ranitar Scheme: 11.05 lps Shivanagar Scheme : 17 lps
	Pump type	Submersible type : Ward No 1, Simreni: 3.7 kW Ward No 1, Basantapur: 22 kW Ward No 6, Bhagra- Ranitar: 15 kW Ward No 4, Shivanagar: 18.50 kW
7	Project Components	
	Storage Tank	Simreni: 30 Cum Ground water reservoir Basantapur: 200 Cum OHT Bhagra- Ranitar: 100 Cum OHT Shivanagar: 450 Cum OHT
	Valve Chamber (Nos.)	Type I (1500x900x1000) : 96 Nos Type 2 (900 x900x1000) : 147 Nos

S.No.	Items	Description
		Pipe valves(125mm dia) : 375 Nos
	Community Stand Posts	nil
	Household Connection (Nos.)	2827 during construction phase
	Total Length of pipe (Km)	Transmission DI- 150 mm dia: 810m GI (65mm dia) : 1500m Distribution DI : 2861 m GI : 1764 HDPE :69,847 m TOTAL: 76,782m
	Electrical	Generator-3, Transformer-3, 11 KV Transmission 800 m ,
	Treatment Unit	Multi grade Pressure Treatment Plant with Chlorination unit 1 set each Basantapur + Simreni Scheme : 15.86 lps Bhagra -Ranitar Scheme: 11.05 lps Shivanagar Scheme: 17 lps
	Fire hydrants	16 numbers
	8 Social Status	
	Survey Year Population (2015)	15028 (permanent) 562(floating)
	Base Year Population (2018)	16,091 (permanent) 604 (floating)
	Design Year Population (2038)	25,693 (permanent) 988 (floating)
	Household Numbers (2015)	2,827
	Average Family Sizes	5.31
	9 Total Water Demand	
	Base year 2015 (m ³ /day)	Total 1659.68
	Design year 2038 (m ³ /day)	Total 3159.82
	10 Total Cost of the Project (NRs.)	323.56 million with 15% contingencies & 13%VAT
	Water Supply Sector	NRs 313.533 million
	Sanitation Sector	NRs 10.027 million
	11 Cost Sharing Arrangement for water supply component (NRs)	NRs 313.533 million
	1) GoN / ADB Grant @ 70%	Rs 219.473 million
	2) WUSC Contribution	
	a) upfront cash contribution @ 5%	Rs 15.677 million
	c) Loan through TDF @ 25%	Rs 78.383 million
	12 Cost Sharing Arrangement for Sanitation Component (NRs)	10.027 million

S.No.	Items	Description
	1) GoN / ADB Grant @ 85%	Rs 8.52 million
	2) Local Body (WUSC, Municipality/ VDC & others) 15%	Rs 1.50 million
13	Per capita Investment (for water supply sector)	a) Survey Year : 20,136.00 b) Base Year : 18,780.05 c) Design Year : 11751.17

Physical Environment of the Project area

Topography, Geology and Climate:

37. The town project area has humid type of climate. The maximum temperature varies from 32⁰-37⁰ C in summer and 4⁰ to 18⁰ C in the winter. The average rainfall is 2000 mm. Almost 80 percent of rainfall occurs during monsoon (June to September). The altitude of the project area is varying from 150 m-200 m above the sea level.

38. Geologically it is situated in the foothills of Siwalik Hills of Western Development Nepal. The area consists of conglomerate, sand and sandstone. It is basically developing in the slope of the Siwalik Hills in the north and some part of it is in the flood plain of GirwariKhola.

Surface and Ground Water:

39. Three sides of the northern portion of the VDC are surrounded by forests and are serving as watershed area. There are quite a number of streams / kholas viz BhutahiKhola, GadaKhola, GadarKhola, SimreniKhola, GirwariKhola etc flow nearby the project area. Among them Bhutahi and Girwarikhola are perennial type, where as discharge in other streams reduces considerably in dry season and sometimes even dry.

Geo Hydrology

40. Geologically it is situated in the foothills of Siwalik Hills of Western Development Region of Nepal. The area consists of conglomerate, sand and sandstone. It is basically developing in the slope of the Siwalik Hills in the north and some part of it is in the flood plain of GirwariKhola. (Source: Department of Mines and Geology).

Ecological Profile

Flora, Fauna and Protected Areas:

41. Deforestation has decreased the flora of the project area but since the concept of community forests has been introduced, there has been an improvement in the forest cover. Tropical Deciduous Forest area is on the south, west and north east portion of the Project area, and predominantly consists of Sal (Shorearobusta, Acacia mangium), Sisau (Dalbergiasisoo), Karma (Syzygiumaromaticum), Shag (Carya ovate), Jhamun (Mangiferaindica) and Teak (Tectonagrandis). Most of the project area is now the agricultural farm lands. The project area has diversified vegetation even it can be found salla (Chir pine) and uttis (Alnusnepalensis) in the upper source area.

42. Both large and small mammals including Leopard (Pantharapardus), Indian Fox (Vulpusbengalensis), Chitals (Axis axis), Deers (Cervidae), Wild Boar (Susscrofa), Langoor Monkeys (Trachypithecusfrancoisi), Common Mongoose (Herpestesjavanicus), Squirrel (Sciuridae) etc are some common names that are found in the area. In addition globally threatened bird species also inhabit vicinity of the area. Long Billed Vulture

(Gyps indicus), White Rumped Vulture (Gyps bengalensis), etc are also resided besides wet land birds.

43. There are no protected areas in Tamsaria Project area and nearby.

Human and Economic Development

Population, Communities and Occupation:

44. The socio-economic survey of Tamsaria covers ward no. 1 to 9 of Tamsaria VDC, Nawalparasi district. There are total 2660 households in the service area of Tamsaria VDC with an average household size of 5.32 Ward no. 4 is densely populated with 2495 population living in 469 households and Ward no 9 has least number of households (92) with 483 population. Among the total permanent population (1443) in the service area, 7170 are male and 6973 are female. Male population is slightly higher (50.7%) than the female population (49.30%) as in the national context.

Health and Sanitation:

45. The access of household to toilet facility is about 99 percent (2627 out of 2660) of the households have household toilet.

46. Among the households with toilet facility, 98 percent of them have water seal latrine, more than 1 percent have ventilated pit latrine and less than 1 percent possess cistern flush type latrine.

Economic Characteristics:

47. Tamsaria is a growing town with semi urban and rural setting . Economic condition of the families in service area seems satisfactory in terms of their monthly income level. The distribution of households by income range is 43.72 percent of them have income range NRs. 20,001 – 50,000 per month. Likewise, 19.14 percent of households fall under the income range NRs. 5,000-11,000 category, followed by 18.68 percent households with income range of NRs. 11,001-20,000. As the data shows 16.35 percent of households have highest income level (more than Rs.50,000/month), whereas 1.54 percent of the households have lowest income level i.e. less than Rs.5,000 per month.

Infrastructural Facilities:

48. TamsariaTown Water Supply & Sanitation Project lies in the foothills of the Siwalic range. The project area falls on East-West Highway. Around 128 shops are in the Chormara (Shivanagar) Bazaar area supplying necessary daily needs, cosmetics, electronics and construction materials etc. Six hotels/ lodges are also in operation in the bazaar area. Regarding the availability of financial institutions, branches of 8 commercials and development banks are in operation. Similarly 7 cooperative institutions are also serving people.

Threshold Limits for Conducting IEE

49. For Drinking Water Supply Project ,according to Environmental Protection Guidelines, 2054 BS, First Revised (2055 BS) Schedule -1 (Clause G. Drinking Water), IEE is required for following condition :

Particulars	Status for proposed Tamsaria Town Project
1) Collection of rain- water in not more than 200 hectares, and use of water sources (springs and wetlands)	Not applicable

located within the same area.

- | | |
|---|--|
| 2) Surface water sources with not more than 1 cubic ft. safe yield and supply of not more than 50 percent of the water during the dry season. | Not applicable |
| 3) Processing of water at the rate of 10 to 25 liters per second. | Four independent Schemes each falling within range |
| 4) Recharging up to 50 percent of the total aquifer for the development of underground water source. | Not applicable |
| 5) Construction of not more than one kilometer long tunnels for carrying water | Not applicable |
| 6) Displacement of not more than 100 persons for operating a water supply scheme. | Not applicable |
| 7) Settlement of not more than 500 persons on the upper reaches of water sources | Not applicable |
| 8) Supply of drinking water to population ranging between 2000 and 20000 | Within limits |
| 9) Supply of drinking water to a population ranging between 10,000 and 100,000 upon connecting new sources. | Within Limits (25,693 permanent and 988 floating in total 26,681 population) |
| 10) Installation of more than 20 kilometers long electricity transmission lines for pumping or processing water and consumption of more than one MW of electricity. | Not applicable |
| 11) River training and diversion activities over an area of more than one kilometer. | Not applicable |

50. For Drinking Water Supply Project: IEE is required for the water supply scheme having population between 10,000 –100,000. Population of the project falls in the strata. Further this is an upgrading of existing system. Service areas have been added and new sources are to be tapped. Further no people will be displaced with the construction / operation of the project. Thus the IEE study has to be carried out.

2.3 Impact area delineation:

Direct Impact Zone (DIZ)

The project directly affected by the project activities are demarcated as Direct Impact Zone. DIZ can also be said to be the project area. Tamsaria Town Water Supply and Sanitation Sector Project has been conceptualized as a piped water supply system considering ground water source, Proposed Deep tube well site of GiribariKholra drains, all the wards in Tamsaria VDC and part of Narayani VDC area were delineated as Direct Impact Zone.

Indirect Impact Zone (IIZ)

The area around the DIZ that could be indirectly affected due to project construction and implementation activities such as mobility of people, equipment, vehicles, noise, dust are demarcated as the Indirect Impact Zone. Thus area bounded by Tamsaria and Narayani VDCs are delineated as Indirect Impact Zone.

2.4 Relevancy of the Proposal

51. Any development project has some environmental implication, whether beneficial or adverse. Therefore, it is pertinent to identify the complications/changes apparent in the environmental condition along with the favorable or adverse impacts resulting from the activities associated with the project over the physical, biological, socio-economic and cultural environment of the project area. Similarly the assessment of the magnitude of the impacts is also equally important. The assessment techniques and methods to be adopted may however vary depending upon the nature of the project.

52. In recent years, environmentally sustainable development has become one of the major challenges faced by different development institutions. Accordingly, the Ministry of Environment, Science and Technology, GoN has introduced a variety of instruments into the country's development activities. IEE is one of the tools for the environmentally sustainable development.

53. Taking in view of the statutory requirement of GoN, adhered to for the environmental assessment of any development projects under EPA-2053 & EPR-2054, an IEE study is necessary and thus TOR is prepared. The Schedule – 1 of EPR states to conduct IEE Study:

2.5 Objectives of Terms of Reference (ToR)

The primary objective of the ToR is to guide the IEE study to the relevant areas of environmental resources whose environmental baseline and implications of the project activities on the resources are not well understood for making decision. It further defines the scope of the study, study area, human and financial resources, and timeframe required for the accomplishment of the study.

2.6 Objectives of the IEE Study

IEE is a tool for incorporating environmental concerns at the project level and is carried out as a part of the detailed study. The objectives are:

- provide information about the general environmental settings of the project area as baseline data;
- provide information on potential impacts of the project and the characteristic of the impacts, magnitude, distribution, affected groups and duration
- provide information on potential mitigation measures to minimise the impact including mitigation costs
- assess the best alternative project with most benefits and least costs in terms of financial, social and environmental aspects
- provide basic information for formulating management and monitoring plans

1. The present IEE has been conducted for the water supply and sanitation subproject proposed for Tamsariya Town Project of Tamsariya Nawalparasi District. It discusses the environmental impacts and mitigation measures relating to the location, design, construction and operation and management of the scheme.

3.0 PROCEDURE TO BE ADOPTED WHILE PREPARING THE REPORT

2. Initial Environmental Examination report will be based on this Terms of Reference to be approved by the Ministry of Urban Development, GON. The general methodology to be used in the preparation of IEE report will be as follows:

Desk Study and Literature Review

3. A desk review will be carried out with the following steps:

- Collection and review of secondary information from various sources
 - Initial interaction and consultation with the local community and district level stakeholders
 - Delineation of geographical boundary of the influence area on the topographical map
 - Preparation of sub-project specific checklist
 - Collection and review of secondary sources of information from various sources
 - Secondary information will be collected through published and unpublished reports and interpretation of maps and photographs.
 - Delineation of the geographical boundary of the Zone of Influence area on the topo-map
 - Preparation of a project specific checklist
 - A checklist is prepared to collect physical, biological, socio-economic and cultural environment-related information in the field, In addition, a Zol household survey questionnaire will be used to collect socio-economic information of the households.
- a. **Physical-** Topography, Land Use, Air Noise and water Quality, Geology, Hydrology Soil Type etc.
- b. **Biological-** Flora/Fauna, Endangered Species, NTFPs etc
- c. **Socio-Economic-** Population, Ethnicity, Existing Infrastructure, Health Facility, Public utilities, Economic status etc

• Impact Identification

4. In order to identify the impact a preliminary exercise to solicit information from planners, policy makers, project components, concerned authorities and the user community will be conducted.

5. Similarly, the reports on hydrology and geo-hydrology, meteorology, geology and others related to the environment will also be reviewed.

• Impact Prediction

6. The consultant shall address the impact details by furnishing information on environmental Physical, Biological, Socio-economic and Cultural Environments. A description of relevant parts of the project, using maps with appropriate scale and photographs and aerial photographs, where necessary, including the following information: location, alignment, alternatives, design, standards, pre-construction, construction and post -construction activities, work schedule, staffing and support facilities and services shall be determined.

- **Impact Evaluation**

7. To evaluate the occurrence of the impact, information on mitigation; costs associated with construction activities (during design, construction and operation and maintenance activities) shall be included.

- **Public Consultation Program and Public Notice:**

8. Public consultation program in the project area will be organized to inform the broader communities and to collect the feedbacks and suggestions regarding the issues. This program mainly focus on the awareness about the project plans and programs, building of mutual consensus about the implementation of the project, identification of the key issues to be considered during IEE study and project design.

9. The proponent will affix a notice in the office of Tamsariya VDC/municipality and concerned ward offices, Office of the DDC, schools at project area , hospitals, health post requesting the concerned authorities and individuals to offer their written opinion and suggestions within fifteen days with regard to the possible impact of the implementation of the proposal on the environment. The notice will also be published in the national daily newspaper. Deeds of the fixing of notice from the concerned offices will be collected and included within the report.

- **Data Analysis and Report Preparation:**

10. The data collected shall be analyzed to identify both the negative and positive impacts of the project on the existing environment. During this stage, the socio-economic profile prepared by the NGO shall also be considered for further verification before finalization and identifying and predicting the possible impacts both the adverse and beneficial. The consultant will submit the IEE Draft report within 45 days after approval of TOR. The draft IEE report will be presented to WUSC, local body representative etc. The consultant will incorporate the comments and suggestion made by PMO and WUSC. The consultant will submit the final IEE report within 7 days after receiving comments from PMO.

11. The proponent shall submit fifteen copies of the proposal to the concerned Ministry (MoWSS) in accordance with Rule 10 of the EPR, 1997 for the approval of the proposal.

- **Identification, Prediction and Evaluation of Impacts and Documentation**

12. Considering the proposed project actions/ activities in terms of construction and operation stages of the project shall carry out the identification and prediction of impacts. The impacts of the activities will be on biophysical, social, economic, and cultural resources in a defined Zone of Influence (Zol). The impacts will be classified in terms of extent (site specific, local, and regional), magnitude (low, medium, and high) and duration (short term, medium term and long term) as well as reversible, irreversible, severe, moderate, and significant. The likely impact will be assessed covering both adverse and beneficial ones. The likely impacts of the proposed road construction and operation are described in the following sections. Identified impacts depicted in this proposal are indicative and may alter during the accomplishment of the proposed IEE study.

13. All the physical, biological, socio- economic and cultural information and data collected from both secondary and primary source will be analyzed. These tools and techniques include checklists (simple, descriptive, scaling or questionnaire), interaction matrix (simple, Leopold, modified graded or impact matrix) and network methods. If required, expert judgment, GIS tools, Delphi and experience from the past projects shall

also be employed for the prediction of potential impact. An IEE report will be prepared in accordance with the content given in schedule 5 of the EPR '97, and the final report will be prepared after incorporating all the relevant comments and suggestions on the draft report.

4.0 POLICIES, LAWS, RULES AND MANUALS TO BE TAKEN INTO ACCOUNT WHILE PREPARING THE REPORT

14. The IEE should also be conducted in compliance with the following Policies, laws, Acts, Regulations , Standards and Guidelines :

Constitution

Constitution of Nepal 2072

Acts

- National Park and Wild Life Conservation Act 2030 BS (1974 AD)
- Child Labour prohibition and Regulation Act 2056 BS (2001 AD)
- Soil and watershed Area Conservation Act 2039 BS (1983 AD)
- Labour Act 2048 BS (1992 AD)
- Water Resources Act, 2049 BS (1992 AD)
- Forest Act 2049 BS (1992 AD)
- Environmental Protection Act, 2053 BS (1996 AD)
- Local Self Governance Act 2055 BS (1999 AD)
- Aquatic Animals Protection Act 1961 and First Amendment 2055 BS (1999 AD)
- Land Acquisition Act 2034BS (1978 AD)

Rules and Regulation:

- Forest Regulations 2050 BS (1993 AD)
- Environmental Protection Regulation, 2054 BS (with Amendment)
- Local Self Governance Regulations 2056 BS (2000 AD)
- Water Supply and Sanitation Regulation 2062 BS (2005 AD)

Plan and Policies:

- Rural Water Supply and Sanitation National Policy, Strategy and Action Plan 2060 B.S. (2004 AD)
- Water Supply and Sanitation National Policy and Strategy 2060 B.S. (2004 AD)
- Urban Water Supply and Sanitation Policy 2066 B.S. (2009 AD)
- ADB's " Safeguard Policy Statement (SPS) " 2066 BS (2009 AD)

Standards , Guidelines and Strategies

- National EIA Guidelines 2050 B.S. (1993 AD)
- National Drinking Water Quality Standards 2062 B.S. (2005 AD)
- Water Resources Strategy , 2055 B.S. (2002 AD)

5.0 PREPARING THE REPORTS

5.1 Time

15. Time schedule envisaged for the IEE study is as follows

Duration: Within Two months of the approval of TOR.

Proposed Schedule of work for IEE Report Preparation

S.No	Activities / Week	1 wk	2 wk	3 wk	4 wk	5 wk	6 wk	7 wk	8 wk
1	TOR Approval								
2	Public Notification	■	■						
3	Field investigation, experts view / focus group session and collection of public opinion			■	■				
4	Preparation and submission of Draft Report					■	■		
5	Collection of comments and suggestions							■	
6	Preparation and submission of Final Report								■

5.2 Estimated Budget

Estimated budget for this IEE study is Rs. 8,00,000.

Following inter-disciplinary human resources will be engaged with the co-ordination of team leader. The team mainly consists of:

- Environmental safeguard specialist
- Water Supply Engineer
- Sociologist.
- Geo-hydrologist
- Botanist

6.0 X..... (Deleted by the first amendment)

7.0 SPECIFIC IMPACT OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT AND MITIGATION MEASURE

16. A distinction shall be made between the potentially significant positive and adverse impacts and immediate and long term impacts. Impacts that are unavoidable or irreversible shall be identified. Where ever possible, the significant impacts shall be quantified in terms of environment costs and benefits.

17. The impacts shall be identified mainly for the activities pre-construction and post construction (O&M) phase on the existing physical, biological and socio-economic resources.

18. As a part of the study, enhancement of the positive impacts shall also be carried out. The potential impacts that shall be assessed are grouped into three major impacts as follows:

1. Beneficial Impacts

a. Construction Phase

i. Employment Generation and Increase in Income

19. One of the major direct beneficial impacts of the water supply and sanitation project at construction stage is the creation of employment opportunity to the local community.

ii. Skill Enhancement

20. Although many people in the project area are found unskilled at present, the construction of the water supply system and the distribution network is likely to enhance their skills in plumbing, fittings and other construction works.

b. Operation and Maintenance Phase

i. Improvement in health and saving of time

21. After the water supply and sanitation project is complete, the people living within the project area will benefit from the supply of sufficient quantity and good quality water and improved sanitary conditions.

ii. Development of Market center

22. The availability of good supply of drinking water will accelerate development of market centers.

iii. Appreciation of Land Value

23. One of the major benefits of the project is that the land price will increase due to the availability of reliable safe drinking water and sanitation system.

iv. Women Empowerment

24. Women and girls in particular will largely benefit from this project, as they are the ones who spend a great deal of time in fetching water. With the operation of the water supply scheme, this time will be saved.

v. Quality of Life Values

25. The project may help to enhance the life quality of people by many ways, like by providing opportunities for jobs, providing good quality water, improved sanitation etc.

2. Adverse Impacts

a. Pre-construction Phase

26. The pre-construction works involved field survey and investigation, development of design & detailed drawings, carrying out cost estimate etc. This also includes discussion with WUSC and revision of design if necessary. Then bidding processes commence and finally the construction contract is awarded to the contractor.

b. Construction Phase

i. Physical Environment

Erosion and land surface disturbance

27. Top soil during construction may lead to erosion and caving thereby causing soil erosion, silt runoff, and unsettling of street surfaces. The activity as such will be a nuisance and discomfort to the road users and inhabitants.

Topsoil Lost

28. Formation of topsoil is very long natural process and is the most fertile portion of the soil.

Damage to the Existing Facilities

29. During the construction time, while excavating the earth, existing water supply distribution pipe lines and telecommunication cable may get damaged in few places particularly in bazaar area in spite of great care.

Air and Noise pollution

30. The construction activity will comprise of construction, transmission and distribution pipelines, construction of storage reservoirs, transport and installation of pumps.

Impact on water bodies

31. There will be some impacts on water bodies located within project area during construction phase. Possible activities, which may influence the water quality, are listed below.

Waste Management and Disposal

32. Lack of Proper waste management and disposal system may arise during construction period.

ii. Biological Environment

33. The project area falls under built up area with agricultural land and no forest area is covered. Only scattered plants of local species and fruit plants are available within the sub-project area and thus feeble impact to these is anticipated only during construction period. Loss of vegetation cover

34. The loss of vegetation cover and species diversity due to earthwork primarily at direct impact area of deep well site will be minimum as these are located in open grass land within OHT premises. During the construction, there will be loss of herbs and shrubs cover rather than trees.

Impact on Fauna

35. The project site is within the built up area. Population dynamics of resident and migratory birds and reptiles at the project site may be affected during construction period due to various construction activities.

Impact on aquatic life

36. Some of the construction activities and protection works are proposed at the bank of river. These construction activities will physically disturb the water quality for certain period of time and may cause impact on aquatic life.

iii. Socio-economic Environment

Disturbance to the community activities

37. Construction activities particularly construction works in the roads may cause disturbances to the community activities, festivals and social events.

Social Dispute and Dissatisfaction

38. There is possibility of influx of outside workforce and with them money from the construction work and unwanted communities can cause some strife with the local community.

Occupational health and safety (OHS)

39. Life and health of workers particularly of those involved in concreting, trench cutting, formwork and rebar fixing in overhead tank is of prime concern.

MITIGATION MEASURE

40. Suitable, cost effective and environmentally friendly mitigation measures shall be recommended during the preparation of IEE report for all the perceived impacts to minimize the environmental impacts of project implementation. In general the following area shall be covered while preparing mitigation measures:

- i. Project design and preparation Phase
- ii. Project construction phase
- iii. Project operation and maintenance phase

In general the following impacts are expected, which will be addressed in IEE report in detail.

- a. Environmental problems relating to project sitting/ project location phase:

Physical Environment

- Land use or location conflicts
- Conflicts in water allocation

Biological

- Disturbance of wildlife

Socio Cultural Environment

- Encroachment to private/ public property, cultural resources, historic sites, vegetation, wetland, surface draining, and
- Conflicts due to inadequate compensation if private land is use.

- b. Environmental problems relating to project planning and design phase:

Physical Environment

- Demolition and disposal of existing structures
- Degradation of surface waters by soil erosion from distributed areas
- Discharge of drilling slurries and produced waters
- Waste equipment servicing and sanitary and domestic wastes
- Taking of test borings within proposed rights of way
- On-site transport of materials and storage of materials and supplies
- Controlling over-extraction of groundwater and runoff damages
- Adequacy of primary water treatment plants installation
- Securing safe water and planning of adequate excess drainage discharge system.
- Quality of water pipes laid down in distribution system

Biological

Clear cutting and disposal of vegetation

Socio Cultural Environment

- Degradation of areas through repeated access and increased use
- Securing physical access to site

- c. Environmental problems relating to project construction phase:

Physical Environment

- Runoff and sedimentation from grading for track roads and alteration of hydrological patterns due to maintenance roads
- Loss of land use and population relocation disturbances due to placement of pipes, construction materials and substations

Socio Cultural Environment

- Secondary development of shops, temporary sheds and trails during construction generating waste in surrounding area

- d. Environmental problems relating to project operation phase:

Physical Environment

Use of local surface water or groundwater

- Contamination of groundwater and detection of water borne diseases
- Detection of chemical contamination such as Arsenic, Iron, Nitrate etc. in water causing additional costs incurred in the removal of hazardous chemicals.

Socio Cultural Environment

- Increased demands on services and facilities in local communities
- Social and cultural conflicts concern with water distribution, excess water discharge and maintenance

41. Concerned agencies like TSTWSSSP, DWSS, WSSDO and local agencies, local administration office shall be consulted during the implementation of mitigation measures. National EIA guidelines 1993 will be used for significant analysis of impacts.

8.0 ALTERNATIVES TO THE IMPLEMENTATION OF THE PROPOSAL

42. The study will consider different project alternatives for the selection of the best option to achieve the sustainability of the proposed development works. Following will be the significant alternatives to be considered during the study.

8.1 Design

43. Alternative designs of project will be examined and analyzed to select most appropriate design of the proposed project so that the road caters best of its services to the project area. In doing so, environmental consideration and safety point of view will be given due considered and accordingly analyzed.

8.2 Project site

44. Alternative routes will be considered and studied in the process so as may avoid significant environmental impacts. The options will primarily focus on reducing the felling of rare and endangered tree species, avoid the habitat of significant value, reducing the felling large numbers of trees, avoiding the damage to public infrastructures and private structures, etc.

8.3 Technology, procedure of Operation, Time Schedule, and Raw Materials to Be Used.

45. The study will analyze different technology, procedures of operation, time - schedule and raw materials to be used to select the best alternative among them. The technological alternatives will include fully-mechanized, semi-mechanized, labor-intensive, labor-based etc process of proposal implementation.

46. Similarly methods of operation whether contractor based, community based, labor base or a mix of them will be assessed.

47. Procedures of operation will be assessed in terms of round the year operation and seasonal operation of road; types and specifications of vehicles that are allowed to ply on the road, etc will also be assessed in terms of needs as well as demand in the area. Schedule of implementation of the proposal works including agricultural off-season, monsoon season, day and night time working etc will be assessed.

48. Alternative resources required for the proposed works, including asphalt, cement steel, gabion boulders, gravel, earth, sand, bioengineering sapling will be assessed.

8.4 Other Factors

49. The study will also consider the different options of project implementation. The IEE study will examine different alternatives for the environmental management system. The options will be assessed based on the institutional structures of the project implementation, monitoring options, extent of participation of the stakeholders, role of local bodies, including NGOs/CBOs etc.

9.0 MATTERS CONCERNING THE PREVENTION OF THE IMPACTS OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT

50. The IEE team will study the mitigation measures for all the identified significant impacts and incorporate them in the report. The proponent will identify the most suitable of measures to prevent or to reduce significant adverse impacts. Measures to enhance beneficial project impacts will also be presented. The mitigation measures will deal separately for physical, biological, socio-economic and cultural environments in both the construction and operation phases. The proponent will be responsible for the implementation of environmental mitigation and enhancement program mentioned in IEE report.

51. The mitigation measures shall be specific and developed by applying a pragmatic approach that is technically and economically feasible, socially acceptable, and preferably of proven effectiveness. The cost required for each and every mitigation measure and enhancement measures will be estimated and incorporated in IEE report. Cost of mitigation and enhancement measures will be categorized in terms of construction and operation phases.

52. The enhancement and mitigation measures will be categorized in terms of the physical, biological, socio-economic and cultural environment for the construction and operation phases. A matrix of impact and mitigation measures shall also be included in the IEE report.

10.0 MATTERS TO BE MONITORED WHILE IMPLEMENTING THE PROPOSAL

10.1 Environmental Management Plan

53. The project proponent has to develop an Environmental Management Plan (EMP) to systematically manage all the perceived environmental impacts of the project. It shall be therefore based on the mitigation measures for the project induced impacts. An Environmental Management Plan (EMP) has a dual purpose. It is designed to monitor the contractor's work during project implementation. It helps to check contractual compliance with specified mitigation measures. It also helps in making periodic checks on the actual environmental impacts of the Project over the years following completion of the works, and compares these with those impacts anticipated at the time of Project appraisal. The EMP therefore provides the necessary feedback required for correcting potentially serious Project deficiencies, and for planning of other projects.

54. The EMP shall include the responsibilities of different stakeholders based on preliminary plans and schedules. This program shall include measures required during the project design, construction and operational phases and shall include recommendations on allocation of components of the EMP to the various parties involved. Feasible and cost-effective measures to prevent/mitigate/reduce significant negative impacts should be recommended in an Environmental Management Plan. The impacts and costs associated with implementing the measures will have to be detailed. The EMP will include proposed work programs, budget estimates, schedules, staffing and training requirements, and other support services to implement the mitigating measures.

10.2 Environmental Monitoring Plan

55. The project will develop Environmental Monitoring Program for the pre-construction, construction and post construction activities of the project. The program will evaluate:

- (i) the extent and severity of the adverse environmental impacts as compared to what was predicted,
- (ii) how effective the mitigating measures were and compliance with the regulations and
- (iii) overall effectiveness of the EMP.

56. The environmental monitoring of the project includes field supervision and reporting of project activities prior to and during the project construction and operation in order to ensure that the works are being carried out in accordance to the approved design and that the environmental mitigation measures are fully implemented in accordance with the EMP.

57. The DSC will prepare progress reports on EMP implementation and submits to relevant agencies on regular basis. The WSSDO Tanahun will supervise the environmental monitoring activities undertaken by DSC.

58. Monitoring of the mitigation measures during the construction and operation phase will be mainly considered the impacts of followings :

59. **Construction Phase:**Soil erosion, sedimentation and slope stabilization; spoil-tip protection and management; stock taking of species of urban vegetation during vegetation clearance along pipeline alignments and re-plantation; change in hydrology and morphology of streams and rivers; water, air and noise (vibration) pollution; solid waste; land intake and compensation; reinstatement of damaged structures and services; crime and community stress; health, safety and sanitation of the work force and camps; archaeological and cultural sites and chance finds; and traffic management.

60. **Operation Phase:**Discharge of water during plant maintenance, leakage, backwash, treatment operations; silt disposal; quality of drinking water supplies; pipe flushing.

61. **Monitoring mechanism:** The monitoring mechanism during construction will be of regular type whereas baseline monitoring, compliance monitoring and process monitoring shall have to be done during the operation and maintenance phase. The monitoring team shall visit the project site and monitor the effectiveness of the implementation of mitigation measures.

Information Disclosure, Public Consultation and Participation

62. Public consultation is the process of exchanging information with those persons and organizations with a legitimate interest in a project and/or who are likely to be affected by the project (stakeholders). It is a two-way process that informs and involves the community in developing a project, and informs the proponent about issues and concerns, which can then be addressed in project design. Information disclosure involves stakeholders in monitoring the development and implementation of a project and fosters openness in decision-making by presenting documents and other project materials for public scrutiny.

63. The consultation and disclosure involves consultation with stakeholders at an early stage of project preparation, and throughout project implementation. As a minimum, stakeholders will be consulted regarding the scope of the environmental study before work has commenced in earnest, and should then be informed about the likely impacts of the project and proposed mitigation once the draft IEE report is under preparation. The report should record the views of stakeholders and indicate how these have been taken into account in project development.

64. Information is disclosed through public consultation and more formally by making documents and other materials available in a form and at a location in which they can be easily accessed by stakeholders. This normally involves making draft reports available (in the local language) at public locations in the community and providing a mechanism for the receipt of comments and making documents available more widely.

65. Public consultation and involvement should be given highest priority in the implementation of mitigation measures. Public consultation should take place and on the basis of decision of the consultation meeting, implementation of mitigation measures should be prioritized and should be carried out with the involvement of the local people.

66. Monitoring is one of the components of EMP. The results of monitoring should also be disclosed in the form of demonstration, charts, figures, graphs, and samples, etc..to the local people, school students and other interested stakeholders. In the process of compliance monitoring of the project construction, local people and construction workers should be consulted.

10.3 Grievance Redress Mechanism

67. The TPCC, Tamsariya, Tanahun will be responsible to address the issues and problems raised by the local communities regarding the loss of assets, water and sanitation etc. during the implementation of the project. The TPCC, Tamsariya, shall ask the Environment Specialist of the DSMC to assist in the handling of grievances and the community level stakeholders should be encouraged to help in the handling of grievances at the project sites.

68. The affected person / community will submit grievances / complaints to the TPCC, Tamsariya,. The TPCC, Tamsariya, will try to solve the grievance at the project level. If the grievance cannot be solved at the project level, TPCC, Tamsariya, will forward it to Director General (DG)'s Office at Kathmandu through TSTWSSP.

11.0 OTHER NECESSARY MATTERS

69. The report shall include all cited information, reference lists, maps, graphs, photographs, tables and charts, graphs, and questionnaires used during the IEE study as per the ERR 97.The IEE Report will be prepared based on Schedule-5 (pertaining to Rule 7) of the EPR'97.

70. IEE report shall be prepared as per this TOR and shall be submitted to MoWS through TSTWSSSP. The basic format of the report will be in accordance with the EPR, 1997 and National EIA Guidelines, 1993. Land use map of location sites, letters obtained from the stakeholders in response to public notification, and the newspaper cut piece of public notification and no objection letter from district office will be included in the IEE report. Similarly, wherever applicable maps, photographs, tables and matrix shall be presented. The format for the IEE report should include, but not limited the following:

INTRODUCTION

- 1.1 Purpose of the Report
- 1.2 Basis and extent of the IEE study
 - 1.2.1 ADB Policy
 - 1.2.2 National Act and Rules
 - 1.2.3 Policies and Legal Framework of KUKL
 - 1.2.4 Objectives and Scope of the Environmental Study
 - 1.2.5 Approach and Methodology

1. DESCRIPTION OF THE PROJECT

- 2.1 Existing Water Supply, Sanitation and Drainage Infrastructure
 - 2.1.1. Water Supply
 - 2.1.2. Sanitation
 - 2.1.3. Drainage
- 2.2 Type, category and need of the Subprojects
- 2.3 Size or magnitude of operation**
- 2.4 Proposed schedule for implementation**
- 2.5 Description of the Subprojects

Table: Components of Subprojects

Infrastructure	Function	Description	Location

2. DESCRIPTION OF THE ENVIRONMENT

3.1 Physical Resources

- Topography
- Geology and soils, seismology
- Climate and air quality
- Water Resources

3.2 Surface water and quality

- Groundwater and quality

3.3 Ecological Resources

- National Parks and protected areas
- Forests (including rare or endangered species)
- Flora
- Fauna
- Fisheries/aquatic biology

4 Social and cultural resources

- Population and communities
- Health facilities
- Educational facilities
- Socio-economic conditions
- Physical or cultural heritage
- Employment
- Slums and Squatter Settlements

5 Economic Development and Prospects for Growth

Infrastructure

Transportation

Drinking Water Supply

Surface Drainage, Sanitation & Sewerage

Electricity

Communications

Economic Characteristics

Industries

Agricultural development

Mineral development

Tourism development

Development organisations

Major Environmental Problems

Health and Sanitation

3. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1. Pre-construction Phase

- a. Environmental impacts due to project design

4.2. Construction Phase

- a. Environmental impacts due to project construction
 - i. Physical Environment
 - ii. Biological Environment
 - iii. Socio-Economic and Cultural Environment

Compensation and rehabilitation as per the Resettlement Plan (RP)

Reinstatement of damaged community services and infrastructure

Influx of outside workforce, money and unwanted activities

Health and safety

- a. Occupational Health and Safety (OHS)
- b. Community Health and Safety

Dislocation of archaeological artifacts

Traffic management

4.3. Operational Phase

Residual Impacts

Potential Environmental Enhancement Measures

Trans-boundary and Cumulative Impacts

4. ANALYSIS OF ALTERNATIVES WITH AND WITHOUT PROJECT SITUATIONS

5. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

6. GRIEVANCE AND REDRESS MECHANISM

7. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

ENVIRONMENTAL MANAGEMENT PLAN AND OBJECTIVES

MONITORING & MITIGATION PLAN

IMPLEMENTATION ARRANGEMENTS

- a. Environmental Procedures and Institutions
- b. Reporting procedures
- c. Procurement plan & environmental monitoring & mitigation cost estimates
- d. Project Implementation Schedule

8. Conclusions and Recommendations

71. While preparing the report any issue / impacts found relevant will be included in the report, besides the issues /impacts mentioned in this TOR

72. The proponent shall submit fifteen copies of the final IEE Report of this project to the concerned Ministry (Mowss) in accordance with Rule 10 of the EPR, 2054 (1997)

Annex A: RAPID ENVIRONMENTAL ASSESSMENT (REA) and GENERAL SOCIO ECONOMIC CHECKLIST FOR IEE STUDY OF TAMSARIYA TOWN WATER SUPPLY SUBPROJECT

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area.			
<input type="checkbox"/> Densely populated			
<input type="checkbox"/> Heavy with development activities?			
<input type="checkbox"/> Adjacent to or within any environmentally sensitive areas?			
<input type="checkbox"/> Cultural heritage site			
<input type="checkbox"/> Protected Area			
<input type="checkbox"/> Wetland			
<input type="checkbox"/> Mangrove			
<input type="checkbox"/> Estuarine			
<input type="checkbox"/> Buffer zone of protected area			
<input type="checkbox"/> Special area for protecting biodiversity			
<input type="checkbox"/> Bay			
B. Potential Environmental Impacts Will the Project cause...			
<input type="checkbox"/> pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?			
<input type="checkbox"/> impairment of historical/cultural monuments/areas and loss/damage to these sites?			
<input type="checkbox"/> hazard of land subsidence caused by excessive ground water pumping?			

<input type="checkbox"/> social conflicts arising from displacement of communities ?			
<input type="checkbox"/> conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?			
<input type="checkbox"/> unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?			
<input type="checkbox"/> delivery of unsafe water to distribution system?			
<input type="checkbox"/> inadequate protection of intake works or wells, leading to pollution of water supply?			
<input type="checkbox"/> over pumping of ground water, leading to salinization and ground subsidence?			
<input type="checkbox"/> excessive algal growth in storage reservoir?			
<input type="checkbox"/> increase in production of sewage beyond capabilities of community facilities?			
<input type="checkbox"/> inadequate disposal of sludge from water treatment plants?			
<input type="checkbox"/> inadequate buffer zone around pumping and treatment plants to alleviate noise and other			
<input type="checkbox"/> impairments associated with transmission lines and access roads?			
<input type="checkbox"/> health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.			
<input type="checkbox"/> health and safety hazards to workers from handling and management of chlorine used for			
<input type="checkbox"/> dislocation or involuntary resettlement of people?			
<input type="checkbox"/> disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?			
<input type="checkbox"/> noise and dust from construction activities?			
<input type="checkbox"/> increased road traffic due to interference of construction activities?			
<input type="checkbox"/> continuing soil erosion/silt runoff from construction operations?			

<input type="checkbox"/> delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and			
<input type="checkbox"/> delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?			
<input type="checkbox"/> accidental leakage of chlorine gas?			
<input type="checkbox"/> excessive abstraction of water affecting downstream water users?			
<input type="checkbox"/> competing uses of water?			
<input type="checkbox"/> increased sewage flow due to increased water supply			
<input type="checkbox"/> increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater			
<input type="checkbox"/> large population influx during project construction and operation that causes increased			
<input type="checkbox"/> social conflicts if workers from other regions or countries are hired?			
<input type="checkbox"/> risks to community health and safety due to the transport, storage, and use and/or disposal of			
<input type="checkbox"/> 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			
C. Potential Environmental Impacts			
Will the Project cause...			
<input type="checkbox"/> impairment of historical/cultural monuments/areas and loss/damage to these sites?			
<input type="checkbox"/> interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?			
<input type="checkbox"/> dislocation or involuntary resettlement of people?			
<input type="checkbox"/> disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?			
<input type="checkbox"/> impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?			
<input type="checkbox"/> overflows and flooding of neighboring properties with raw sewage?			
<input type="checkbox"/> environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?			

<input type="checkbox"/> noise and vibration due to blasting and other civil works?			
<input type="checkbox"/> risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?			
<input type="checkbox"/> discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?			
<input type="checkbox"/> inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?			
<input type="checkbox"/> road blocking and temporary flooding due to land excavation during the rainy season?			
<input type="checkbox"/> noise and dust from construction activities?			
<input type="checkbox"/> traffic disturbances due to construction material transport and wastes?			
<input type="checkbox"/> temporary silt runoff due to construction?			
<input type="checkbox"/> hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?			
<input type="checkbox"/> deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?			
<input type="checkbox"/> contamination of surface and ground waters due to sludge disposal on land?			
<input type="checkbox"/> health and safety hazards to workers from toxic gases and hazardous materials which may be contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unstabilized sludge?			
<input type="checkbox"/> large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?			
<input type="checkbox"/> social conflicts between construction workers from other areas and community workers?			
<input type="checkbox"/> 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 construction and operation?			

<input type="checkbox"/> 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?			
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A. GENERAL SOCIO-ECONOMIC SITUATION OF THE INFLUENCE AREA

1. Overview of settlements in the zone of influence (ZoI) area

Settlement Code*	Name of Settlement and address	Household and Population	Caste/ethnic distribution	General Comment
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

* Use the same codes as in strip map and topographical map.

a. Economic activities/main occupation

Settlement Code	Number of HH and Percentage of Population engaged in					
	Agriculture & Livestock	Labour & Porter	Business/Commerce	Cottage Industry	GO/NGO Employees	Others (specify)
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						
K						

3. Existing services and infrastructures

S. N.	Service/Infrastructure	Settlement Code									
		Category									
		A	B	C	D	E	F	G	H	I	J
1	EDUCATION										
1.1	Campus (no.) Students (no.)										
1.2	High School (no.) Students (no.)										
1.3	Primary School (no.) Students (no.)										
2	HEALTH										
2.1	Hospital /health centre (no.) Capacity (beds)										

S. N.	Service/Infrastructure Category	Settlement Code									
		A	B	C	D	E	F	G	H	I	J
11.2	Hatia/Bazaar (no.)										
11.3	Playground (no.)										
11.4	Community Centre (no.)										
11.5	Community Organisation										
11.6	Others (specify										

4. Land holding pattern

Land holding Pattern (ropani)	Settlement (HH No.)										Remarks
	A	B	C	D	E	F	G	H	I	J	
Landless											
less than 1											
1 to 5											
5 to 10											
10 to 20											
20-50											
> 50											

5. Food grain availability (HH no.)

Availability Status	Settlements (HH No.)										Total
	A	B	C	D	E	F	G	H	I	J	
Surplus											
Sufficient for whole year											
Sufficient for three to nine months											
Sufficient for three months											
Less than three months											

6. Major existing agriculture production (denote the most dominant by 1, second dominant by 2 and so on).

S. No.	Type of Agriculture Production	Settlements									
		A	B	C	D	E	F	G	H	I	J
1.0	CEREALS										
1.1	Rice										
1.2	Wheat										
1.3	Maize										
1.4	Millet										
1.5	Junelo										
1.6	Phaper										
1.7	Others (list)										
2.0	CASH CROPS										
2.1	Oil Seeds										
2.2	Beans/Dal										
2.3	Tobacco										
2.4	Potato										
2.5	Vegetables										
2.6	Fruits										

2.7	Tea/Coffee											
2.8	Amliso											
2.9	Sericulture											
2.10	Others (list)											
3.0	LIVESTOCK & FISHERIES											
3.1	Cattle (cows & buffaloes)											
3.2	Horses, Mules											
3.3	Yak											
3.4	Goat											
3.5	Sheep											
3.6	Rabbit											
3.7	Pig											
3.8	Fisheries											
3.9	Poultry											
3.10	Bee-keeping											
3.11	Others											

7. Migration for employment

No. of HHs from where at least one person (may be HH head) is away from home for more than 6 months.

Settlement (No. of HH)									
A	B	C	D	E	F	G	H	I	J

8. Name of settlement:

Address:

A. Seasonal migration in search of work

Month	No. of Total HH	Destination	Purpose
Baisakh			
Jestha			
Ashad			
Shrawan			
Bhadra			
Ashwin			
Kartik			
Marga			
Poush			
Magh			
Falgun			
Chaitra			

B. Dominant off-farm occupation in the settlement in descending order

1.....

2.....

3.....

C. **DEVELOPMENT POTENTIAL OF THE INFLUENCE AREA**

ACRONYMS

ADB	Asian Development Bank
BS	BikramSambat (56+AD)
CI	Cast Iron
Cum	Cubic meter
DDC	District Development Committee
DI	Ductile Iron
DMA	District Metering Area
DSMC	Design, Supervision & Management Consultant
DWSS	Department of Water Supply and Sewerage
EIA	Environmental Impact Assessment
GI	Galvanized Iron
GoN	Government of Nepal
HDPE	High Density Polyethylene Pipe
ICG	Implementation Core Group
IEE	Initial Environmental Examination
LB	Local Bodies
LPCD	Liter Per Capita Per Day
m ³	meter cube (cubic meter)
MoWSS	Ministry of Water Supply and Sanitation
MP	Member of Parliament
MoPIT	Ministry of Physical Infrastructure and Transport
NDWQS	Nepal Drinking Water Quality Standards
NGO	Non-Governmental Organization
OHT	Over Head Tank
PAC	Public Awareness Campaign
PMO	Project Management Office
PPM	Parts Per Million
PPTA	Project Preparation Technical Assistance
RT	Reservoir Tank
STTWSSSP	Tamsariya Town Third Water Supply and Sanitation Sector Project
TDF	Town Development Fund
TM	Transmission Main
TOR	Term of Reference
TPO	Town Project Office
TSTWSSSP	Third Small Towns Water Supply and Sanitation Sector Project
VDC	Village Development Committee
WHO	World Health Organization
WRDSMC	Western Region Design Supervision and Management Consultancy
WRPMO	Western Region Project management Office
WSSDO	Water Supply and Sanitation Division Office
WSSUC	Water Supply and Sanitation Users' Committee
WSUC	Water Supply and Sanitation Users Committee
WUA	Water Users Association
WUSC	Water Users and Sanitation Committee

Terms of Reference

For

Initial Environmental Examination (IEE) study

Of

Tamsariya Water Supply and Sanitation Project

Submitted to

Ministry of Water Supply and Sanitation

Government of Nepal

Singhadurbar, Kathmandu

Submitted by

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

Prepared By

Building Design Authority Pvt. Ltd. and
Plush Engineers and Architects
(P) Ltd.
(BDA-PEA JV)
Ghantaghar, Kathmandu

April, 2016

Comments on ToR for the IEE study of Tamsariya WSSSP, Tanahu

S.N	Comments	Action Taken	Page No
1	Add "submitted by" and "submitted to", Change date and name of ministry in cover page.	Added	Cover Page
2	follow schedule 3 for format of theToR, as per EPR, 2054, especially in chapter 6.	Followed EPR 1997	Whole report
3	Rearrange issues in to construction phase and operational phase.	Arranged	Page 17-18
4	Add checklist for the data collection.	Added	Annex
5	Give final prioritized issues for IEE study	Given	Page19

Rapid Environmental Assessments (REA)

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLISTS

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

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: Small Town Water Supply & Sanitation Sector Project

Sector Division: Water Supply

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area...			
▪ Densely populated?		No	Average Population density is about 18.35 person per hectare.
▪ Heavy with development activities?		No	No such development activity except road surface improvement programme.
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		No	No remarkable sites
• Protected Area		No	No protected area
• Wetland		No	No Wetlands.
• Mangrove		No	Found in the forest but not within project area
• Estuarine			Not Applicable
• Buffer zone of protected area		No	No buffers zone of protected area
• Special area for protecting biodiversity		No	No such area.
• Bay		No	No such area.

Screening Questions	Yes	No	Remarks
B. Potential Environmental Impacts Will the Project cause...			
<ul style="list-style-type: none"> ▪ pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff? 		No	The tubewells will be located in isolated land. The distributed water is to comply with the National Drinking Water Quality Standards.
<ul style="list-style-type: none"> ▪ impairment of historical/cultural monuments/areas and loss/damage to these sites? 		No	Not expected
<ul style="list-style-type: none"> ▪ hazard of land subsidence caused by excessive ground water pumping? 		No	To avoid ground subsidence and over exploitation, pump tests will be carried out and the results will control the abstraction rate
<ul style="list-style-type: none"> ▪ social conflicts arising from displacement of communities ? 		No	No displacement required
<ul style="list-style-type: none"> ▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters? 		No	Not expected. Only ground water will be used. Tube well will be installed in isolated area and excessive abstraction will be avoided.
<ul style="list-style-type: none"> ▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)? 		No	Iron removal and disinfection will be required before distribution.
<ul style="list-style-type: none"> ▪ delivery of unsafe water to distribution system? 		No	Water will be disinfected to meet the National Drinking Water Quality Standards.
<ul style="list-style-type: none"> ▪ inadequate protection of intake works or wells, leading to pollution of water supply? 		No	Fencing and other protection works of water intakes to prevent pollution of water supply, and will be accessible only to authorized persons. The water will also be regularly monitored to ensure only treated water is distributed.
<ul style="list-style-type: none"> ▪ over pumping of ground water, leading to salinization and ground subsidence? 		No	Pump tests will be carried out and the results will control the abstraction rate.
<ul style="list-style-type: none"> ▪ excessive algal growth in storage reservoir? 		No	Storage reservoirs are only for treated water. The water will be chlorinated and the reservoirs covered to prevent algal growth
<ul style="list-style-type: none"> ▪ increase in production of sewage beyond capabilities of community facilities? 		No	Regular septage pumping is planned and will be dried in the sludge drying bed to be constructed by this project.
<ul style="list-style-type: none"> ▪ inadequate disposal of sludge from water treatment plants? 		No	Disposal of sludge to be done at designated sites as per the EMP.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? 		No	Noise impacts to be monitored. Furthermore, the tubewells and treatment units will be located in an isolated area away from the settlement.
<ul style="list-style-type: none"> impairments associated with transmission lines and access roads? 	Yes		Expected during pipe-relaying but impacts will be temporary and short in duration. Traffic density is very low. A section-wise approach will also limit impairments to traffic and businesses during construction.
<ul style="list-style-type: none"> health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals. 		No	Main dealing chemical is chlorine. Rubber Gloves, boots, mask are provided and training will be provided for proper handling and storage of chlorine.
<ul style="list-style-type: none"> 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? 		No	Personal protective equipment will be provided to workers. Regular training will also be conducted to ensure that workers are aware of the health hazards of chemicals.
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people? 		No	Tubewell and reservoir complex belongs to WUSC, no involuntary resettlement is required.
<ul style="list-style-type: none"> disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		No	The subproject will not affect indigenous peoples or other vulnerable groups. It will be beneficial to women and children as water will be available in their home and fetching water will no more be a problem. The contractor will be encouraged to engage from the local labor force.
<ul style="list-style-type: none"> noise and dust from construction activities? 	Yes		Expected but impacts will be temporary and short in duration. Water sprinkler will be used for mitigation of dust.
<ul style="list-style-type: none"> increased road traffic due to interference of construction activities? 	yes		Expected but impacts will be temporary and short in duration, as present traffic density is very low
<ul style="list-style-type: none"> continuing soil erosion/silt runoff from construction operations? 		No	Quick backfilling will prevent the soil erosion
<ul style="list-style-type: none"> 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? 		No	Any distributed water to comply with the National Drinking Water Quality Standards and addressed in the EMP.
<ul style="list-style-type: none"> delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals? 		No	The O&M manuals to be developed and will be addressed in O & M manual.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> accidental leakage of chlorine gas? 		No	Chlorine gas will not be used instead calcium hypochlorite will be used in the chlorination process.
<ul style="list-style-type: none"> excessive abstraction of water affecting downstream water users? 		No	No surface water is abstracted. Thus not applicable.
<ul style="list-style-type: none"> competing uses of water? 		No	No surface water is abstracted. Thus not applicable.
<ul style="list-style-type: none"> increased sewage flow due to increased water supply 		No	Population density is low. Increased sewage will be easily managed within the individual house by making pit.
<ul style="list-style-type: none"> increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant 		No	Main bazaar has good drainage system with adequate slope. Regular maintenance of the drains will mitigate the increased volume. In other parts settlement is still rural setting and can be easily managed within backyard of house.
<ul style="list-style-type: none"> large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		No	Priority in employment will be given to local residents. Construction contractors will be required to provide a worker's camp, with basic facilities.
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		No	Local people will be given priority for employment
<ul style="list-style-type: none"> 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	Construction will not involve use of explosives and chemicals. Excavation ,trenching will be done manually.
<ul style="list-style-type: none"> 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? 		No	Construction areas will be clearly demarcated and access controlled. Only workers and project staff will be allowed to visit operational sites.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
<ul style="list-style-type: none"> • Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			Not applicable
<ul style="list-style-type: none"> ▪ Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)? 			Not applicable
<ul style="list-style-type: none"> ▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			Not applicable
<ul style="list-style-type: none"> ▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)? 			Not applicable

* Hazards are potentially damaging physical events.