Initial Environmental Examination

March 2018

NEP: Urban Water Supply and Sanitation (Sector) Project

Diktel Town Water Supply and Sanitation Sub-Project

Prepared by the Ministry of Water Supply for the Asian Development Bank.

Government of Nepal
Ministry of Water Supply and Sanitation
Department of Water Supply and Sewerage
Third Small Town Water Supply and Sanitation Sector Project
EASTERN REGION PROJECT MANAGEMENT OFFICE
Itahari, Sunsari

DETAILED DESIGN REPORT OF DIKTEL TOWN WATER SUPPLY AND SANITATION SUB-PROJECT

DIKTEL, KHOTANG

Volume I	**Main Report of Water Supply Component**
Volume II	**Appendices to Main Report**
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Volume V	**Initial Environmental Examination (IEE)**

March, 2018

TAEC CONSULT P. Ltd.
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ABBREVIATIONS

ADB	Asian Development Bank
AP	Affected Person
C-EMP	Contractor's environmental management plan
DI	Ductile Iron
DMA	District Metering Area
DSMC	Design, Supervision and Management Consultant
DRTAC	Design Review and Technical Audit Consultant
DWSS	Department of Water Supply and Sewerage
EARF	Environmental assessment and review framework
EIA	Environmental Impact Assessment
EMP	Environmental management plan
EMR	Environmental monitoring report
EPA	Environment Protection Act
EPR	Environment Protection Rules
EO	Environmental Officer
ES	Environmental Specialist
ESA	Environmental safeguard assistant
ESE	Environmental safeguard expert
GI	Galvanized Iron
GoN	Government of Nepal
GRM	Grievance Redress Mechanism
HHs	Households
HDPE	High-Density Polyethylene
ICG	Implementation Core Group
IEE	Initial environmental examination
MoPE	Ministry of Population and Environment
MoWSS	Ministry of Water Supply and Sanitation
NDWQS	National Drinking Water Quality Standard
NPR	Nepalese Rupees
PMO	Project Management Office
RPMO	Regional Project Management Office
ROW	Right of way
REA	Rapid environmental assessment
STWSSSP	Small Towns' Water Supply and Sanitation Sector Project
SPS	Safeguard Policy Statement
SDG	Sustainable Development Goal
2ndSTWSSSP	Second Small Towns' Water Supply and Sanitation Sector Project
TSTWSSSP	Third Small Towns' Water Supply and Sanitation Sector Project
ToR	Terms of Reference
USD	United States Dollars
VDC	Village Development Committee
WTP	Water Treatment Plant
WHO	World Health Organization
WSSDO	Water Supply and Sanitation Divisional Office
WUSC	Water Users' and Sanitation Committee

WEIGHTS AND MEASURES

C	Celsius/centigrade
dBA	decibel audible
Ha	hectare/s
Km	kilometer/s
Kph	kilometer/s per hour
M	meter/s
Kph	kilometer/s per hour
M	meter/s
m^3	cubic meter/s
Amsl	Above mean sea level
mg/l	milligram/s per liter
Mm	millimeter/s

NOTES

In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

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

Diktel town subproject is one of the subprojects proposed under TSTWSSSP. The project town is served by two surface water sources viz., Rambha Khola & Majh Khola. However, the system does not sufficiently meet the growing needs of the people, regarding both quantity and quality. The water samples collected at the collection chamber were tested for physical, chemical and bacteriological parameters. All the parameters are within the permitted values of NDWQS. Water from the source will be tested if required, before the construction phase. Access to sanitation facilities is not satisfactory. The project town has not been declared as Open Defecation Free (ODF) area yet.

The majority of the people depend on agriculture as their main source of income, followed by service, remittance and wage labour. This IEE report is based on the Detailed Design Report and approved ToR for IEE of this project from Ministry of Water Supply and Sanitation, which is attached as Annex 1 of this report.

Categorization: Diktel town subproject is classified as Environment Category B as per the SPS- 2009 as no significant impacts are envisioned. Initial Environmental Examination (IEE) as per EPR-1997 of Schedule-1 has been prepared. The IEE assesses environmental impacts, provides mitigation, and outline monitoring measures.

Subproject Scope: The subproject is formulated under TSTWSSSP to improve water supply and sanitation service delivery in Rupakot Majhuwagadhi Municipality. Investments under this subproject include; i) construction of a piped water supply system (intake, water treatment plant, construction of transmission mains, service reservoir, distribution main and household connections & ii) construction of public toilets

Implementation Arrangements: The Ministry of Water Supply and Sanitation is the executing agency, and the Department of Water Supply and Sewerage (DWSS) is the implementing agency. Project Management Office (PMO), established in DWSS building in Kathmandu and a Regional Project Management Office (RPMO) in Itahari, will implement the project activities. A team of technical, administrative, and financial officials, including safeguard specialists has been provided at the PMO to implement, manage and monitor

project implementation activities. The RPMO has been staffed by qualified and experienced officers for the day-to-day activities of project implementation in the field and is under the direct administrative control of the PMO. Consultant teams are responsible for subproject planning, management, assuring the quality of design and construction; designing the infrastructure and supervising construction and safeguards preparation.

Description of the Environment: The subproject components are located in Diktel town. The subproject components will be in WUSC sites and right-of-way (ROW) of public roads. There are no protected areas, forests, wetlands, mangroves, or estuaries in or near the subproject locations.

Environment Management: An environmental management plan (EMP) is included in this IEE, which includes i) mitigation measures for environmental impacts ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting, iii) public consultation and information disclosure, and iv) a grievance redress mechanism. The EMP will be included in civil work bidding and contract documents.

Some impacts and their significance have been reduced by amending the designs and locations. The concepts in the design of subproject are: i) demand for new piped water supply; ii) maximum population coverage mostly in residential areas and areas of high growth rate; iii) avoidance of water-use conflicts, iv) locating pipelines within ROWs to reduce acquisition of land; v) locating pipelines at least 10 meters away from latrines, septic tanks and any main drains to avoid contaminations; vi) locating intakes at least 30 m upstream from sanitation facilities, vii) locating household and public latrines and septic tanks at least 30 meters downstream from the nearest drinking water source; viii) piloting controlled disposal of septage to reduce the likelihood of uncontrolled disposal; ix) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection.

During construction, impacts will likely arise from the need to dispose of moderate quantities of soil; and the disturbance to residents, businesses, and traffic. These temporary impacts are common for construction activities in urban areas, and there exist well-developed methods for their effective mitigation. Traffic management will be necessary during pipe laying on busy roads.

The total EMP implementation cost is NRs 2, 0,410,000 that includes air quality, noise level monitoring, capacity building, workforce, administrative and other costs, e.g. public consultation and information disclosure, GRM implementation and any unanticipated impact.

(Table 32). The implementation costs of mitigation measures is covered separately under general work contract. The contractor will be responsible for implementing the mitigation measures given in EMP. PMO, RPMO, and DSMC are responsible for monitoring the EMP implementation.

Environmental Impacts, Mitigation, and Monitoring

During construction, there will be few adverse impacts of moderate magnitude. However, these will be temporary, short-term, local, and confined within the active work sites and their immediate vicinities. Existing transmission mains and distribution pipes have remained stable.

For mitigation (i) special care will be taken at sensitive locations, e.g., water body crossings, works near health care and educational institutions and populated area; and (ii) ensuring that, when practicable, works will be properly phased, segmented and organized so that the bulk of works are completed before the beginning of another phase or segment, and before the rainy season. The potential adverse impacts during construction will be minimized and kept highly site-specific.

Trenching and excavation, run-off from stockpiled materials and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall, which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative, but short-term, site-specific, and reversible by mitigation measures such as preparation and implementation of the spoils management plan, re-use of excess spoils and materials during construction. The consultation will be made with the local administration for disposal of spoils in designated locations.

Earthworks will be conducted during the dry season to avoid difficult working conditions that prevail during monsoon. The location of stockyards will be identified at least 300m away from watercourses. Fuel and lubricant storage areas will be located far from water drainage. Precautions will be taken to minimize construction wastes. Measures will be provided to prevent wastewater entering into streams, watercourses, or irrigation channels. Open burning of solid waste generated from the workers camp will be strictly prohibited. Better solid waste management practices will be adopted such as collection, segregation, reuse and recycling activities within the construction site and workers camp.

During operation, the delivery of unsafe water will be mitigated with operation and maintenance, prompt action on leaks, and frequent monitoring as prescribed in the National Drinking Water Quality Standards Directives. The WUSC, as operator, requires capacity

development in water quality monitoring. Monitoring kits and laboratory rooms will be provided to WUSC, and the enhanced capacity development will be met through a "learning-by-doing." An expert in the first year and periodic capacity strengthening after that will undertake the successful operation.

An EMP contains sets of mitigation measures, monitoring activities, roles, and responsibilities of key institutions, training and capacity development for the environmental management. The stakeholders were involved during the IEE through discussions on-site and public consultation. The views expressed by stakeholders were incorporated in the IEE and project design. The IEE will be made available to the public through the ADB and TSTWSSSP websites. The consultation process will continue during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

With rapid urbanization, people in the project town are demanding improved water supply and sanitation services. Diktel Water supply and sanitation subproject has been formulated to meet such aspiration. The objective of this Subproject is to: a) augment the water source and improve water supply service to all parts of the project area regarding quantity and quality and b) to provide medium to high-level water supply service to all people based on a cost recovery basis.

Consultation, Disclosure, and Grievance Redress: Public consultations were done in the preparation of the project design and IEE. On-going consultations will occur during the project implementation. A grievance redress mechanism is described within the IEE to ensure that public grievances are addressed quickly.

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

Conclusions and Recommendations: Diktel small town water supply and sanitation project will bring a series of benefits to the local people. However, there are few environmental impacts associated with the project that needs to be identified beforehand for effective mitigation. This study has identified the impacts, weighed them against the benefits and finds that the benefits outweigh risks. The impacts can be overcome through proper planning, coordination, management, design and mitigation measures. Based on the

findings, there are no significant impacts, and the classification of the subproject as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009).

I. INTRODUCTION

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

1. Name of the Proposal

The Name of the Proposal is Diktel Small Town Water Supply and Sanitation Project

2. Name and Address of the Proponent

The Project proponent, the Third Small Town Water Supply and Sanitation Sector Project (TSTWSSSP) of the Department of Water Supply and Sewerage (DWSS), the Ministry of Water Supply and Sanitation (MoWSS), Government of Nepal, is responsible for the preparation of the IEE report.

Name of Proponent

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

Address of the Proponent:

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3. Consultant, Preparing the Report

TAEC Consult P. Ltd. *Joint Venture with* **Integrated Consultants Nepal (P) Ltd.**is responsible in preparing this IEE report.

B. Background

In January 2000, the Government of Nepal (GoN) endorsed the 15-year Development Plan for Small Towns' Water Supply and Sanitation to improve the health, economic and environmental living conditions of the people in small towns in Nepal. The project embraces

the community managed demand responsive approach, where the community is involved in all aspects of planning and implementation of the town projects. The Asian Development Bank (ADB) has been providing financial assistance to this sector project. The Department of Water Supply and Sanitation (DWSS) is the implementing agency, and the Ministry of Water Supply and Sanitation (MoWSS) is the executive agency.

The first phase of the Project, whose duration was 2001-2008, benefitted people in 29 small towns. Upon the completion of it, and after finding positive impacts of the Project, the Government of Nepal decided to implement the second phase, the Second Small Town's Water Supply and Sanitation Sector Project. Similarly, after the successful completion of the second phase "Third Small Town's Water Supply and Sanitation Sector Project (TSTWSSSP)" is under implementation. For the implementation, formulation, and operation and maintenance of the Project, TSTWSSSP aims to have full participation of the users of the respective towns. The users and GON will also share the cost.

The Project has many stakeholders that include WUSC, Project Management Office (PMO) of DWSS, Water Supply and Sanitation Division/ Subdivision Office, Regional Project Management Office (RPMO), Town Development Fund (TDF), Design and Supervision and Management Consultant (DSMC).

Both the Nepali law and ADB policy require that the planning and decision-making process needs to account for the environmental implications of individual developments, and that action is taken to reduce the adverse impacts to acceptable levels. The goal is achieved through the environmental assessment process, which has become an integral part of lending operations and Project development and implementation.

C. Project Area Description

The Project area of Diktel Water Supply and Sanitation Subproject lies in Rupakot Majuwagadhi Municipality, Khotang District, a hilly/mountainous district in Sagarmatha Zone in the Province 1 of Nepal. The municipality lies between Latitude 27^0 9' N to 27^0 16' N and Longitude 86^0 45' E to 86^0 50' E.

Rupakot Majuwagadhi Municipality was established on 5 March, 2017 after merging neighbouring nine VDCs, Nerpa, Chuiridanda, Nirmalidanda, Patheka, Kharmi, Jalapa, Nunthala, Bueipa and Bijayakharka with former Diktel Municipality. The former Diktel Municipality was established on 18 May 2014 merging the existing Diktel, Bamrang, Laphyang and Kahalle Village Development Committees. It is the district headquarter of Khotang district.

Diktel Bazaar can be reached from two major cities, Kathmandu and Biratnagar, using different routes. The route along Kathmandu-Khurkot-Ghurmi-Diktel is about 255 km. Regular-Local Jeep and bus services are available from Kathmandu. Another route is from Biratnagar-Dhankuta-Hile-Leguwaghat-Bhojpur-Diktel. This route is about approximately 285 km. No regular bus services are directly available on this route. The stretch of the Middle Hill Highway (Ghurmi-Diktel-Bhojpur) passes through the Diktel Municipality.

The project area has an airport for domestic air flights. The nearest airport from Diktel Bazaar is Khanidanda Airport. This new airport was established in 1999 and is about 6 km from the Diktel Bazaar. Another closer airport is Lamidanda airport which is located around 11 Km west of the Bazaar. Nepal Airlines and Tara Airlines Pvt. Ltd operate their services from Kathmandu and Biratnagar to these airports.

The municipality is in a hilly region with altitudes ranging between 500 (Phedi) m to 2600 m (Rupakot) above mean sea level (amsl) with an average altitude of 1623 meters.

The Municipality area has warm and cold temperate types of climate. A warm temperate type of climate is observe between 1,000-2,000 meter elevations, while a cold temperate type of climate exist in between 2,000-3,000 meters, particularly in the mid-hills of the Nepal. The proposed service area elongates between about 1501 to 1815 m elevation.

The rainy season starts from June and ends in September when the monsoon blows across the Bay of Bengal and delivers about 80 % of the annual rainfall. During the dry season, the northwest wind brings dry cold wind bearing little moisture and accounts for the remaining 20% of the annual rainfall. The annual average rainfall recorded at Diktel station (Station NO. 1222) is 1,191 mm.

Diktel Bazaar is one of the major market centers in this area. People sell various farm products like *Alainchi, Amliso, Aakabare,* potato, *Rudraksha*, tea, ginger, honey, and citrus fruits. Metal products like water jars, sickles, fry pans; livestock products, woolen blankets ghee, khuwa; and bamboo products like *Doko, Mandra* are sold on a large scale. There is a weekly Hat bazaar in the project area.

D. Purpose of the IEE

The IEE was conducted to ensure the environmental sustainability of the Subproject, to integrate environmental considerations into the Subproject preparation process, and to manage environment during Subproject implementation. ADB and GoN require projects to undergo environmental assessments. All projects funded by ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects are environmentally sound, designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. The rapid environmental assessment using ADB's REA Checklist has indicated that the Subproject is a Category B undertaking, requiring an IEE. On the GoN side, the statutory requirement that has to be adhered is the Environment Protection Act (1997), and Environment Protection Rules (1997) and as amended in 1999 and 2007). Based on EPR Schedule 1, the Subproject is within the threshold of activities under the water supply and sanitation sector that will require an IEE. This IEE fulfills the policy requirements of both ADB and GoN.

The IEE Report primarily:

i. Provides information on the Subproject and its environmental requirements;
ii. Provides the baseline physical, ecological, cultural and socioeconomic environments and resources in and surrounding the Subproject's area of influence;
iii. Identifies and assesses potential environmental impacts arising from the implementation of the Subproject;
iv. Recommends measures to avoid, mitigate, and compensate the adverse impacts;
v. Presents information on stakeholder consultations and participation during Subproject preparation
vi. Recommends a mechanism to address grievances
vii. Includes an environmental management plan.

E. Need for the Subproject

Currently, the project town relies on the existing piped water system that is being fed by two surface water sources viz., Rambha Khola & Majh Khola. However, the existing water supply system has not been able to meet the growing demand for water. The existing system is intermittent and is limited to only certain parts of the city area. This system serves only about 68.6% of the service area population. There is a demand from other parts of the project town for regular and potable water supply to the consumers.

The water from the existing system is hardly treated. The people are mostly dependent on piped water supply directly from streams/springs, the quality of which is poor with bacteriological contamination. At the same time due to intermittent supply and improper jointing in this large pressure difference area, sometimes, drainage water enter the water distribution pipes.

The project town is not declared as Open Defecation free (ODF) area. About 0.4% of the HHs does not have toilets and the percentage of pit latrines is 9.5, which demand up gradation or renovation. Institutional toilets & public toilets will be dealt in the totality of sanitation components. This will help for the betterment of sanitation facilities in this area. These facilities also inculcate behavior of toilet use among students and the public.

Considering the water demand and the condition of the existing system, there is a need of a project to upgrade the existing water supply situation in the service area to meet the growing demand for private connections and to make drinking water available to the people of the service area throughout the year.

F. Relevancy of the Project

The proposed water supply and sanitation project has been studied from the environmental point of view as per EPA 1996 AD and EPR 1997 AD, 2054 BS (Amendments1999 AD and 2007 AD). The Proposed Water Supply and Sanitation Project is intended to serve drinking water in partial area of 1, 2 & 3 of Rupakot Majuwagadhi municipality. The project is expected to benefit a base year population of about 8,063 populations (2018) & design year populations of 10,934 (2038) by providing a reliable and adequate supply of safe and potable water, promotion of good hygiene and sanitation practices.

The proposed project shall use surface water sources. The Project will not involve the construction of any tunnels; relocation of people or households, settlement plan above the gravity source and construction of river training works. As the proposed project falls within the definitions provided in the EPR 1997(Amendments 1999 and 2007) Annex 1 (G) 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 the categories (A) through (H) of Annex 3.

G. Overview of the Subproject

The Subproject will improve the water supply system of the project area that includes partial areas of ward no. 1, 2 & 3 of the Rupakot Majuwagahdi Municipality which actually belong to the entire ward i.e., 1 to 9 of the former Diktel Muniicpality.

The Project Management Office (PMO) of the Department of Water Supply and Sanitation (DWSS) is the proponent of the proposed Diktel Town Water Supply and Sanitation Project. The implementation period will be two years, including operation and maintenance.

H. Methodology Adopted

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

The study team visited the site to identify the potential impacts, both positive and negative, of the project. During the visit, the team met local people and conducted meetings, brainstorming sessions, field examinations, and data gathering. The team also made walkthrough surveys of the project area to assess the baseline environment and potential environmental impacts of the project during construction and operation phase.

A checklist was prepared and the findings and mitigation measures required, where necessary, have been described. The major parameters of concern were identified, and their significance evaluated.

The consultant has addressed the environmental aspects by furnishing information on the Physical, Biological, Socioeconomic and Cultural Environments.

1. **Physical Environment Assessment:** Existing environmental constraints and potential impacts in the project area were studied through field surveys, complemented by secondary information from reports and interviews with some of the government officials, schools and representatives of the local bodies.

2. **Biological, Environmental Assessment:** The information on the biological environment was gathered through a reconnaissance survey of the project site and surrounding area. Due attention was paid to vegetation, wildlife and aquatic life of the

project area and its surroundings. The methods used for the collection of biological information are as follows:

- A collection of ethnobotanical information on socio-economically important plant species through consultation with local informants
- Ethno-zoological data have been obtained by conducting interviews and discussion with local informants
- Information on local uses of aquatic biota, fish spawning sites, migration patterns, weedy aquatic plants, etc. was obtained through interviews/discussions with local informants.

3. **Socioeconomic and Cultural Environment Assessment:** Social assessment has attempted to determine the social implications regarding assumed positive and negative impacts. Primary data for the Initial Social Assessment, which is an integral part of the Initial Environment Examination (IEE), were obtained mainly through Focus Group Discussions with communities. Additional data were collected from documents on the districts and household survey questionnaires.

II. Policy, Legal and Administrative Framework

A. Nepal's Environmental Policy and Legal Framework

The Constitution of Nepal defines that each person shall have the right to live in a healthy and clean environment (Clause 1 of Article 30). The victim of environmental pollution and degradation shall have the right to be compensated by the pollutant as provided for by law (Clause 2 of Article 30). It prescribes for the State to give priority to the protection of the environment and prevention of its further damage due to physical development activities. Proceeding from, and conformable to, the Constitution, the Government of Nepal has passed a series of environmental laws, policies and implementing regulations and standards. Among these, the basic legislation that provides the framework within which environmental assessment is carried out in Nepal is the:

Environmental Protection Act (EPA), 1997, which requires a proponent to undertake IEE or environmental impact assessment (EIA) of the proposed project and have the IEE or EIA report approved by the concerned sector agency or Ministry of Population and Environment (MoPE), before implementation. The EPA: (i) sets out the review and approval process of IEE and EIA reports, that involve informing and consulting stakeholders; (ii) stipulates that no one is to create pollution that would cause significant adverse impacts on the environment or harm to public life and health, or to generate pollution beyond the prescribed standards; (iii) specifies for the Ministry in charge of Environment (currently the MoPE) to conduct inspection of approved projects to ensure that pollution prevention, control or mitigation is carried out according to the approved IEE or EIA report; (iv) provides for the protection of objects and places of national heritage and places with rare plants, wildlife and biological diversity; and (v) states that any person/party affected by pollution or adverse environmental impact caused by anybody may apply to the prescribed authority for compensation to be recovered from the polluter/pollution generator.

Environmental Protection Rules (EPR), 1997, and its amendments in 1999 and 2007 define the implementing rule and regulations of the IEE/EIA process, elaborating the provisions in the EPA. The preparation, review, and approval of IEE and EIA reports are dealt in Rules 3 to 7 and 10 to 14. Schedules 1 and 2 lists down the activities of the projects that are required for IEE and EIA, as amended in 2007.

Other environmental Act, Rules, Plan, Policies, Guidelines that are relevant to the Subproject are presented in the Table 1.

Table 1: Other Relevant Environmental Act, Rules, Plan, Policies, and Guidelines of Nepal

Act/ Rule Policy/Law/Guideline	Year	Relevant Provisions	Remarks
Water Resources Act	1992	A comprehensive law on the development, use, and conservation of water resources in Nepal, it aims to minimize damage to water bodies by requiring an EIA before granting a license to use water resources for any purpose.	The District Office has granted use of water resource.
		Th proponents shall make sure that the beneficial use of water resources does not cause damage to other water uses/users (Article 4).	
		Article 17 requires proponents to apply for any necessary land acquisition accordingly;	Sites for main & other structures have been acquired accordingly. Pipelines and other small structures will be within RoW .
		Article 18 requires the compliance with quality standards in making use of water resources. Article 19 prohibits the pollution of water resources. Under the Act are two regulations for drinking water purposes: (i) Water Resources Regulation, 1993, setting out the implementation procedures of the Act; and (ii) the Drinking Water Regulation, 1998, which specifies compliance with the drinking water quality standards and control of water pollution (or sanitation) as it affects drinking water.	EMP prescribes the compliance with NDWQS and its Directives during operation.
Forest Act	1993	The Act prohibits the extraction of boulders, rocks, pebbles, sand or soil from national forests, defined as all forests, excluding private forests, whether marked or unmarked with forest boundary, to include waste or uncultivated lands, or unregistered lands surrounded by the forest or situated near adjacent forests as well as paths, streams, rivers, lakes, riverine lands within the forest.	No trees will be cut. EMP stipulates no illegal quarrying of natural aggregate materials.
Local Self-Governance Act	1999	The Act gives Local Government the functions, duties & powers to: (i) conserve & protect their local environment & natural resources; (ii) plan, implement &/or operate &maintain local WS projects; (iii) implement or arrange for implementation local sanitation/sewerage & drainage projects; (iv) protect cultural heritage & religious sites; &/or (v) monitor project activities within their respective jurisdictions.	Provides basis for Local Government to monitor the environmental performance of the subprojects. EMP provides the responsibilities of LGs in EMP implementation.
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 arrange such as removal of waste accumulated during production process and prevention of dust, fume, vapor and other waste materials, which adversely affect the health of workers.	
Solid Waste Management Act	2011	Article 4 provides that the management of hazardous, medical, chemical or industrial waste rest upon the generators of such wastes. Management should be as prescribed in the Act. Article 5 provides that individuals and entities have the duty to reduce the amount of solid waste generated while carrying out work or business.	EMP prescribes eco-friendly management of solid and hazardous wastes.

Act/ Rule Policy/Law/Guideline	Year	Relevant Provisions	Remarks
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 subclause 2 states "Nobody shall engage a child in a risk full occupation or work set forth in the Schedule". The section 4 states "Child not to be engaged in work against his will by temptation or fear or pressure or by any other means."	
Local Self-Governance Rules	2000	The rule states for Impact Assessment of the Project In assessing the impact of a project, the local government shall have to pay attention to the following factors:- (a) Social impact: Whether there is a rise in the awareness, change in the living style, thinking and culture and growth of the social and moral activities of the local people; (b) Economic Impact: Whether there is growth in the opportunity of employment or self-employment, in the business transaction, in purchasing power and the overall economic activities of the local people; (c) Services and Facilities: Quality of the services provided by the project, the reaction of the people who have or who have not enjoyed the services and the needs to increase the qualitative and quantitative growth of the services. (d) Environmental Impact: Whether, after launching the project, there occurs deluge, drought, floods, landslides, soil erosion and the like natural calamities	Provides a basis for Local Government to monitor the environmental performance of the subprojects. EMP provides the responsibilities of LGs in EMP implementation.
National Environmental Policy and Action Plan (NEPAP)	1993	Of its five objectives, most relevant to the Project are to (i) mitigate adverse environmental impacts; and (ii) safeguard national & cultural heritage & preserve biodiversity, within & outside protected areas.	The subproject will not impact on physical, cultural heritage & biodiversity. EMP provides measures to mitigate impacts.
National Water Supply and Sanitation Policy	1998	The Policy requires the: (i) monitoring of water quality supplied by completed WSS projects; and (ii) evaluation of their benefits in improving health (e.g., reducing waterborne diseases) and in relieving the sufferings of women and other disadvantaged groups in carrying out their responsibilities over water collection and maintenance of sanitation and hygiene.	Monitoring of the quality of supplied water is prescribed in the EMP following the NDWQS Directives.
National Urban Policy	2007	The policy gives importance to environment conservation while carrying out urban development works and natural resource use; thus, supporting the required environmental conservation and protection in donor-assisted development projects.	ADB IEE is conducted to ensure environmental conservation and protection.
National Urban Water Supply and Sanitation Sector Policy	2008	The Policy requires the IEE or EIA of proposed WSS projects by the EPA/EPR to (i) incorporate consultations with key stakeholders, including endpoint users; & (ii) specify measures to mitigate environmental impacts before, during construction & operation, as well as corrective measures.	GoN TOR of IEE has been approved. This ADB IEE will be submitted to ADB for review and approval.
Updated 15-Yr	2009	The Plan defines the population threshold of "small towns" to be in the range of	EMP prescribes environmental effects and

Act/ Rule Policy/Law/Guideline	Year	Relevant Provisions	Remarks
Development Plan for Small Towns Water Supply and Sanitation Sector		5,000 to 40,000. Reference to Schedules 1 and 2 of the EPR, as amended in 2007, places water supply projects in small towns under Schedule 1 or within the threshold of water supply projects requiring only an IEE. The Plan emphasizes monitoring and evaluation as an important component of a project to determine the overall impact of a project.	performance monitoring.
Implementation Directives for the National Drinking Water Quality Standards	2005	It sets out the water sampling, testing, analysis, monitoring and surveillance procedures to certify that the quality of supplied drinking water conforms to the National Drinking Water Quality Standards.	Monitoring of the quality of supplied water is prescribed in the EMP following the NDWQS Directives.
National EIA Guidelines	1993	Chapter 3 of this guideline described an Initial Environmental Examination Report must be prepared for those projects which may cause significant impact on environment, whose impact may be known easily and for which mitigation measures may be revealed easily, as mentioned in Schedule-1	EMP prescribes environmental impact and mitigation measures and their performance monitoring.

Nepal is a party to the following international environmental agreements that have broad relevance to works and environmental assessment of works under the Project:

i. World Heritage Convention, in 1978;

ii. Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), in 1987;

iii. Convention on Biodiversity, in 1992;

iv. Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol and subsequent London Amendment, in 1994;

v. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, in 1996.

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

The Diktel Water Supply and Sanitation Project does not and will not break or go against Nepal's commitment to these international agreements. It supports the country's effort to meet its committed target for SDG 6th.

B. Environmental Assessment Requirements

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

C. Environmental Assessment Requirements of ADB

All projects funded by the ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects funded under ADB loan are environmentally sound, legally compliant, and safe. On the environment, the ADB Operations Manual, Bank Policy (OM Section F1/OP, 2010), underpins the SPS 2009. The policy promotes international good practice as reflected in internationally

recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines.[1]

ADB's Environmental Safeguards policy principles are defined in SPS (2009), Safeguard Requirements as per Table 2 and the IEE is intended to meet these requirements.

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

Table 2: SPS 2009 Safeguard Requirements

SPS 2009 - Safeguard Requirements	Remarks
Use a screening process for each proposed project, as early as possible, to determine the extent and type of environmental assessment (EA) so that the studies are undertaken commensurate with the significance of potential impacts and risks.	REA has been undertaken, indicating that the Subproject is **NOT**: (i) environmentally critical; and (ii) adjacent to or within environmentally sensitive/critical area. The extent of adverse impacts is expected to be local, site-specific, confined within main and secondary influence areas. Significant adverse impacts during construction will be temporary & short-term, can be mitigated without difficulty. There is no adverse impact during operation. Hence, IEE is sufficient.
Conduct EA to identify potential direct, indirect, cumulative, & induced impacts and risks to physical, biological, socio-economic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical, cultural resources in the context of the project's area of influence. Assess potential transboundary global impacts, including climate change.	IEE has been undertaken to meet this requirement. (Section VI). No trans boundary & global impacts, including climate change.
Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also, consider the no project alternative.	Analysis of alternatives is presented in Section III.
Avoid, and where avoidance is not possible, minimize, mitigate, &/or offset adverse impacts and enhance positive impacts using environmental planning & management. Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.	An EMP has been prepared to address this requirement. Section IX
Carry out meaningful consultation with affected people &facilitate their informed participation. Ensure women's participation. Involve stakeholders, including affected people & concerned NGOs, early in the project preparation process & ensure that their views & concerns are made known to & understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to EA. Establish a GRM to receive & facilitate resolution of affected people's concerns & grievances on project's environmental performance.	Key informant and random interviews have been conducted. A grievance redress mechanism for the resolution of valid Project-related social and environmental issues/concerns is presented in Section VIII.
Disclose a draft EA (including the EMP) promptly, before project appraisal, in an accessible place & a form & language(s) understandable to affected people & other stakeholders. Disclose the final EA, & its updates if any, to affected people & other stakeholders.	The draft IEE will be disclosed on ADB's website before Project appraisal. The GoN has approved the ToR of IEE Report. Copies of both SPS-compliant IEE and GoN-approved IEE will be made available at the offices of the PMO, ICG, and WUSC for public consultation.
Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.	EMP implementation, reporting, and disclosure of monitoring reports are in this IEE.
Do not implement project activities in areas of critical habitats, unless (i) there are no	

SPS 2009 - Safeguard Requirements	**Remarks**
measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.	The subproject does not encroach into areas of critical habitats. No tree will be cut. However, ground cover and low shrubs in the subproject footprint and some work easement will have to be removed for the transmission main. Although in due time, groundcover is expected to naturally grow over the backfilled affected area, EMP recommends seeding of the re-surfaced area to accelerated re-growth.
SPS 2009 - Safeguard Requirements 1	**Remarks**
Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phase-outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.	This requirement is marginally applicable to the Subproject regarding waste generation, e.g., effluent from septic tanks and generated sludge and sludge disposal from water supply and sanitation structures. The Subproject will not involve hazardous materials subject to international bans or phase-outs.
Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.	EMP provides measures to mitigate health and safety hazards during construction and operation.
Conserve physical, cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during the environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.	The Subproject will not affect any physical, cultural resource. The EMP recommends the measure/s mitigate the adverse impact on PCRs in the case of the chance find.

D. Environmental Impact Assessment Requirements of Nepal

The Environmental Protection Rules (EPR) defines the process that should be followed in the preparation, review, and approval of environmental assessment reports. The process applicable to the Subproject is summarized in Table 3. The key environmental quality standards applied in the GoN IEE (as well as in the ADB IEE) are listed in Table 4 and their details featured as Annex A.

Table 3: The GoN IEE Report Preparation, Review, Approval, and Implementation Process

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

CSA: Concerned Sector Agency; EPR: Environmental Protection Rules, 2054 (1997), with amendments in 1999 and 2007; MoPE: Ministry of Population and Environment VDC: Village Development Committee

Table 4: Relevant Environmental Quality Standards

Particular	National Standard	International Standard
Ambient air quality	National Ambient Air Quality Standards, for Nepal, 2003	WHO Air Quality Guidelines, Global Update, 2005
Emission standard for diesel generator discharge to ambient Air	Emission standard for diesel generator	EPR-15, 1997
Noise	National Noise Standard Guidelines, 2012	WHO Guideline Values on Noise Level
Drinking water quality	National Drinking Water Quality Standards, 2006	WHO Guidelines for Drinking-water Quality, Fourth Edition, 2011

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

III. Analysis of Alternatives

A. With- and Without-Subproject Alternatives

Middle Hill Highway (Ghurmi-Diktel-Bhojpur) passes through this project town. Similarly, this project town also covers former Diktel municipality, the district headquarter of Khotang district. However, this project town is facing significant development challenges: (i) there is insufficient piped water supply system for the growing demand of consumers, and (ii) Public places are in need of institutional & public toilets.

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

With subproject' alternative: With the Subproject, 11,057 populations (2018) will have convenient access to reliable and adequate safe and potable water supply, and the local people will have easy access to sanitation in public places so that it helps to improve the health and sanitation. As a result, good hygiene and sanitation practices will be promoted & there will be reduced health and safety risks. Overall, the 'with subproject alternative' will bring about improved public health and living environment that will contribute to improved quality of life in the project town. Improved water supply and sanitation will create an enabling environment for local economic development and improved social services that communities within the sphere of influence of the town will benefit from; thus, contributing to the overall local economic development of the District.

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

B. Alternatives Relative to Planning and Design

1. Alternative Sources

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

2. Alternative Design

The system alternatives need to be developed to assess the most cost effective, reliable and efficient system that can serve the design population. Optimization of a proposed water supply system can be done in terms of system layout, alternative technology, alternative materials and alternative sources. However, for this proposed project, the system design has been done under two scenarios.

In this proposed project, two alternatives have been considered using alternate system layouts keeping other parameters constant. First proposed alternative is fully gravity systems whereas, second alternative is mixed (partly pumped and partly gravity).

The distribution system and storage system has been proposed identical for both alternatives. However, intakes, water treatment facilities, transmission system and allied structures for the transmission system has been considered different for these alternatives.

a) System Alternative I

In this system alternative, additional spring source nearby Chhebe Khola has been proposed to supplement water discharge to the existing system supported by Ramba and Majh Khola. The transmission line is about 7.5 km and diverts water of 5 lps. As this source is at a lower elevation than the main water treatment plant (WTP-1), a separate water treatment plant (WTP-2A) has been proposed for this source. The treated water from this WTP has been transported to a storage reservoir located at the main bazaar (RVT-C)

b) System Alternative II

In this system, alternative additional water required for the Town Project has been abstracted from at lower elevation of Chebbe Khola near Triveni. Water from this source has been proposed for pumping to transfer to Diktel Bazaar since this source is located at a lower elevation (1201m).

c) Selected Alternative for Detail Design / Proposed Subproject

The analysis of alternative show that Alternative I has been lest cost options. In terms of capital cost, operation cost and various cost parameters Alternative I is the best among alternatives. Similarly, the proposed tariffs in both alternatives were compared with the affordability data from the socio-economic survey of the town. The analysis, indicates that the proposed water tariffs are affordable and fall below 5% of the monthly income for all income categories in first alternative (Alternative I) However, in second alternative monthly tariffs are not affordable in all income categories. Alternative II is un-feasible option for the project town. So Alternative I, has been selected as the best feasible option. The summary comparisons of cost and other parameters of two alternatives are given below:

Table 5: Cost Comparisons of Two Alternatives Based on Feasibility Report

S.N.	Particular	Alternative I	Alternative II
1	Total Capital Cost in NPR	322,402,783	420,034,926
2	Annual O&M Costs in NPR	4,232,360	7,215,156
3	Total Base Year Population (No)	8,069	8,069
4	No. of Service Connection (No.)	1,049	1,049
5	Length of Transmission Main (m)	26.55	22.87
6	Length of Distribution main (m)	23,572	23,572
7	Capital Cost/Pop served	39,956	52,055
8	Capital Cost per HH	307,343	400,415
8	O&M Cost/Pop Served	524.52	894.18
9	Affordable in all income categories (monthly)	<5%	> 5%
10	Remark	Feasible Option	

C. Water Quality

The entire population of the service relies on the existing piped water supply system which is only the source of water supply for them. Some of the major systems carry out occasional disinfection (use of 3-5 kg bleaching powder once in a month during the rainy season). Water Samples collected at collection chamber were tested for various physical, chemical and bacteriological parameters. The results of the tests are given in Table 6.

All parameters of the water quality of sampled water sources are within the permitted values of NDWQS. Taking a few samples from the source before the construction phase to ensure the water quality to make adequate provisions for water treatment, if required is recommended.

The physical and chemical quality of the existing and proposed sources (potential) is good except for iron, which is slightly higher than the desirable limit in the existing Majh Khola source. The entire source will be monitored before finalizing the treatment unit for implementation after taking a few samples in other seasons.

Water quality assessment of the proposed project has been done at three levels by–

- Visual observation of the water being consumed and analysis of socio-technical surveys;

- Conducting simple bacteriological tests called the Coliform P/A Test Vial, developed by ENPHO to determine the presence of coliform bacteria at the water source and water use points[2].

- Water quality assessment with samples taken at source points for physical and chemical parameters.

The results of the Coliform P/A Test Vial are shown that in each sample collected there is a positive indication.

Table 6: Result of water quality tests

	Parameters	Unit	Samples				NDWQS, Nepal
			Ramba Khola	Chhebe Khola	Ramba Khola	Majh Khola	
			8-5, 2016	6-16,2017	6-16,2017	6-16,2017	
1	pH (26°C)	-	6.6	7.2	7.1	6.7	6.5-8.5
2	Electrical Conductivity	umhos/cm	58	235	129	51	1500
3	Turbidity	NTU	1.4	1.2	1.3	42	5(10)
4	Color	TCU	NO	0.13	0.19	0.17	500
5	Taste		NO	NO	NO	NO	N.O
6	Odor		NO	NO	NO	NO	N.O.
7	Total dissolved solids	mg/l	32	145	78	32	1000
8	Total hardness as CaCo3	mg/l	38	112	60	16	5(15)
9	Chloride	mg/l	0.99	3.72	1.86	3.72	250
10	Residual Chlorine	mg/l	<0.10	N.D.(<0.10)	N.D.(<0.10)	<0.10	0.1-0.2
11	Sulphate	mg/l	6.4	8.62	9.45	8.74	250
12	Ammonia	mg/l	0.42	0.08	0.15	0.28	1.5
13	Nitrate	mg/l	0.4	0.73	0.44	6.6	50
14	Aluminium	mg/l	0.03	0.08	0.06	0.13	0.2
15	Fluoride	mg/l	0.46	0.08	0.08	0.07	0.5-1.5
16	Calcium	mg/l	3.2	30.4	22.4	4	200
17	Arsenic (As)	mg/l	<0.01	<0.01	<0.01	<0.01	0.05
18	Mercury	mg/l	<0.001	<0.001	<0.001	<0.001	0.001
19	Iron	mg/l	<0.05	<0.05	<0.05	**3.42**	0.30(3)
20	Manganese	mg/l	<0.05	<0.05	<0.05	0.16	0.2
21	Cadmium	mg/l	<0.003	<0.003	<0.003	<0.003	0.003
22	Chromium	mg/l	<0.05	<0.05	<0.05	<0.05	0.05
23	Lead	mg/l	<0.01	<0.01	<0.01	<0.01	0.01
24	Copper	mg/l	<0.05	<0.05	<0.05	<0.05	1
25	Zinc	mg/l	<0.2	0.10	0.13	0.11	3

Note: N.O> means Not Objectionable

[2] This on-site bacteriological test is based on the principle developed by Manja et al in 1982. The test is based on the readily observable formation of black precipitate iron sulfide in the test bottle, as result of the reaction of H_2S with iron.

IV. DESCRIPTION OF THE SUBPROJECT

A. Subproject Site

The service area of the proposed project covers partial areas of wards 1, 2 & 3 of Rupakot Majhuwagadhi Municpality that belongs to the entire ward (1-9) of former Diktel Municipality. The delineation of the service area of the proposed project has been done in consultation with WUSC, WSSDO and project site local stakeholders based on the needs and the willingness to implement the project as per policy and the requirements of TSTWSSSP. Also, the delineation of the project area is based on field observation of the technical team of the design consultant, which considers efficient management of the water supply system.

The population of the service area was 7,822 with 1,049 households in 2016 AD. The Project area is in Rupakot Majhuwagadhi Municipality that lies between Latitude 27^0 9' N to 27^0 16' N and Longitude 86^0 45' E to 86^0 50' E is situated in Khotang district in Sagarmatha Zone in the Province 1 of Nepal. The altitude ranges between 500 (Phedi) m to 2600 m (Rupakot) above mean sea level (amsl) with an average altitude of 1623 meters. The climate of the area is warm and cold temperate type.

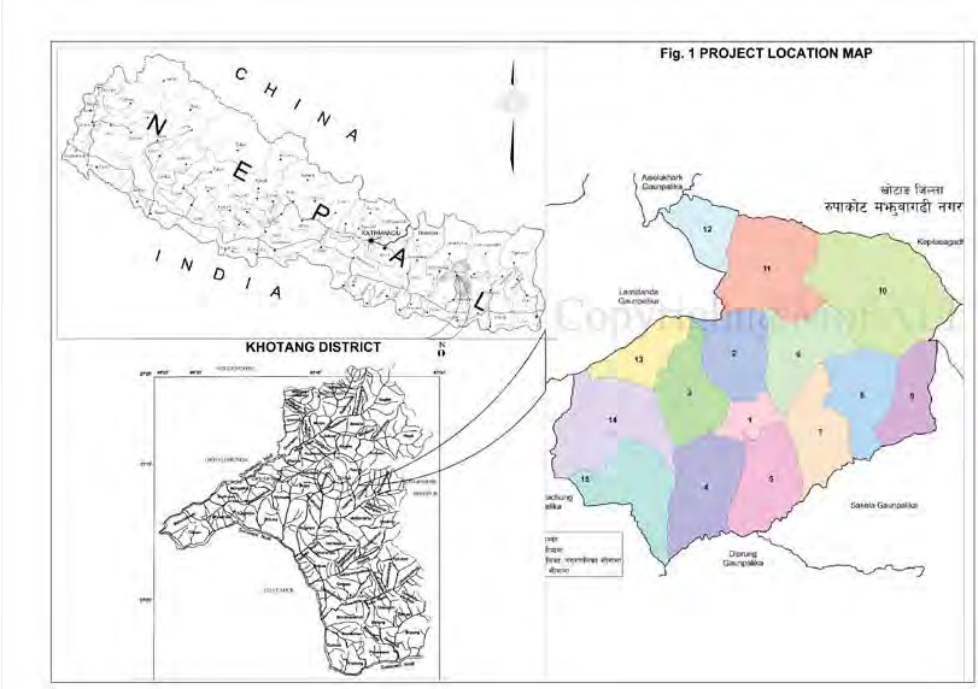


Figure 1: The Project Location Map

B. Sub-project Components

The Diktel Town sub project has been conceptualized as a totally gravity surface water system . The overall concept has been develped with distribution system comprising of bulk water system (BDS) and household distribution system (DS). In this concept, whole service area shall be divided in number of service areas with dedicated storage reservoirs, also referred as sub-system, for that particular service area.Therefore, the main system comprises of number of sub system. Altogether, the Diktel town system comprises of three sub systems.

All the transmission components of the system; intake, transmission line, WTP and allied structures, have been designed with a slightly higher capacity (10 to 20%) than the ever recorded low discharge in the corresponding sources. Therefore, a transmission system for five lps capacity has been designed for the Chebbe Khola system. The following sections describe the proposed sub project components.

1. Intake

Existing intakes for the proposed gravity source shall be rehabilitated to increase discharge in the respective transmission line. An additional spring intake has been proposed at Chebbe Khola bank.

2. Transmission Mains

The total length of the transmission main from Ramba Khola and Majh Khola intakes to the proposed WTP is about 4 km. and 0.9 km., respectively. As the pipe used in the existing transmission lines from both the Khola to Diktel Bazaar are sub-standard in pressure ratings (4 kgf to 6 kgf pressure), it is not possible to incorporate existing pipeline in this project. Therefore, a cumulative length of about 5 km pipe of transmission has to be replaced by a bigger pipe diameter with the appropriate pipe rating.

In addition to the upgrading of the existing transmission line, an additional 5.76 km. length of the transmission line is necessary to transport the water of the spring source from Chebbe Khola to Diktel Bazaar.

The cumulative length of the pipe used in transmission system and bulk water system is about 18.178 km.

3. Thrust Blocks, Saddle Blocks and Thrust Beam

Thrust blocks have been proposed for DI pipes (transmission and distribution mains for both alternatives) from being moved by forces exerted within the pipes arising from the internal pressure of the pipeline or the flow of water hitting bends, tapers and closed or partially closed valves. Typical thrust blocks have been designed for a pressure of 24 kg/sq cm for both transmission lines and distribution line.

Similarly, Thrust Beam and Saddle Blocks are proposed for DI pipes laid up in sloppy areas and un-buried portions. All saddle blocks are proposed to be anchored with concrete at the center of each pipe to prevent movement. Provision of RCC support for the stretches of buried and un-buried DI pipe line which are laid-up in sloppy area has been made to prevent pipe movement.

4. Water Treatment Plant

The cumulative design capacity of the water treatment plant is about 1.382 MLD or 1382.4 cum per day (57.6cum/hour).

This water treatment plant (WTP-1) has been proposed to treat water of the existing sources. It has been proposed near Thapagaon Nigale (1861m) after combining the two existing sources Ramba and Majh Khola. As the existing system does not have any treatment facilities, a conventional type treatment plant comprising of a horizontal roughening filter (HRF) and a slow sand filter (SSF) has been proposed.

The proposed roughening filter (HRF) of WTP-1 has been designed for a flow capacity of 36 cum/hour with a filtration rate of 2 cum/sq.m/hr. Four numbers of identical units have been proposed. The size of each unit has been calculated as 4 m x1.7 m. The inlet and outlet chambers are 90 cm wide. The overall size of each chamber is 4m x 8.8m. Each unit comprises of three chambers for the fill filter material.

A Slow Sand Filter (SSF) has been proposed. The filtration rate of 0.2 cum/sq.m/hr has been adopted for design. It will have a depth of 2.8 m including a freeboard of 50 cm. Three chambers (each 5 m x 12 m) have been proposed.

The water treatment plant WTP-2 has been proposed near Diktel Gaon to treat water from the new spring source. The combination of roughening filter and slow sand filter has been proposed for this new source.

Similarly, the proposed horizontal roughening filter (HRF) of WTP-2 has been designed for a flow capacity of 21.6 cum/hour with a filtration rate of 2cum/sqm/hr. Two numbers of

identical units have been proposed. The size of each unit has been calculated as 4m x 1.7m. The inlet and outlet chambers are 90cm wide. The overall size of each chamber is 4m x 8.8m. Each unit comprises of three chambers for the fill filter material.

The filtration rate of 0.2cum/sqm/hr has been adopted for design in a slow sand filter (SSF) proposed at WTP-2. It will have a depth of 2.8m including a free board of 50 cm. Two chambers (each 5m x 12m) have been proposed.

Each WTP has its dosing sytem before distributing water to the RVTs. The dosing system comprises of electronic dosing pump with FRP tank and stirring device. As the pump is automatic dosing pump of the electronic type, close housing is recommended.

5. Service Reservoir

The total capacity of the service reservoir provided in the Diktel Bazaar Town water supply sub-project is about 375 cubic meters. As all the existing reservoirs are made of masonry, quite old with leaks, three RCC reservoirs (Table 2-3) have been proposed with different shapes as per the appropriate site conditions.

Table 7: Proposed Service Reservoirs

SN	Location	TYPE	Capacity (CUM)	CODE
1	Existing Tank Area (North of S. Area)	RCC Circular	150	A
2	Near Police Office Area (South of S. Area)	RCC Circular	50	B
3	Near Army Base Camp (Main Bazaar)	RCC Rectangular	175	C

6. Distribution Main

The distribution system comprises of a pipe network, which are looped in certain cases and branched in other. The network has been analyzed using EPAnet, a design analytical software tool. The entire system has been designed using Polyethylene (PE) and Ductile Iron (DI) pipes. For proper saddle arrangements at household connections in the distribution pipe, the minimum diameter of the distribution pipe has been adopted as 50mm.

Two types of pipes have been proposed in the distribution network; Ductile Iron (DI), and PE pipes. However, couple hundred meters of GI pipes have been used in Kholsi Crossing and at reticulation line at household distribution chamber. The total pipe length of proposed distribution system works out to be 24,351 km as shown in table 2-4.

The total pipe length of the proposed distribution system works out to 23,552 m. A total of 3,503 m GI pipes (50 and 65mm dia) of the medium class has been proposed, where PE

pipes are not suitable. The total length of the PE pipes of 50 to 110 outer diameters is 19,871 m.

Table 8: Pipe Used for Distribution Network (in meters)

PE PIPES	Pressure Rating		
	16 Kg /sqcm	10Kg /sqcm	6Kg /sqcm
PE pipe 50 OD	3,487	14,892	
PE pipe 63 OD		3,267	
PE pipe 75 OD		456	945
PE pipe 90 OD		18	700
PE pipe 110 OD		0	390
Sub-Total	**3,487**	**18,633**	**2,035**
DI SPIGOT-SOCKET			
GI pipe of ND of 150	196		
Sub-Total	196		
Total	**24,351**		

The pipelines will be laid along both sides of wider roads and paved roads to avoid the pavement demolition and long house connections. Therefore, double pipelines are essential to avoid long household connections. However, to reduce the initial investment, all other narrow and rural roads will be provided with only one pipe at either side of the road.

The three sub-systems are also interlinked and water from one sub-system can be supplied to another sub-system in case of maintenance and other unforeseen events. Appropriate valve chambers have been proposed to regulate this.

7. House Connection

The system has been designed for private house connections. All the existing connections will be replaced by new HHs connections with identical meters. The total households of the project area were about 1,049 during 2016. It has been estimated that household connections in the project area will be 1,081 during 2018 AD with the adopted population growth rate. Most of the connections will be private.

The house connections shall comprise of about 12 m pipe PE pipes and water meters. The house connection pipe shall be PE-100 (20mm outer diameter of rating PN-16). Tapping of household connections in PE and GI pipes have been proposed from PE saddles with ferrules. The saddles for PE pipes shall be of electrofusion type whereas, in case of GI pipes, the saddles shall be of general type tightened with screws/ nut bolts.

Distribution from DI pipes shall be discouraged, if possible, by providing reticulation lines. However, provisions of the saddle for distribution from DI pipes have also been considered.

Dry dial volumetric rotary piston type water revenue meter for all house connections are proposed. These recommended household water meters have 15mm ND.

8. Appurtenances

These shall primarily comprise of valve chambers to house flow control valves etc. Altogether 24 valve chambers are expected in the system. RCC valve chambers have been proposed since almost all urban roads are narrow and subjected to traffic.

9. DMA Establishment

One increasingly common principle of managing a large water network is to sub-divide it into some areas, typically of between 500 and 2000 connections, each established area having a defined and permanent geographical and/or hydraulic boundary. Such an area is known as a District Management Area or, more commonly, a District Meter Area (DMA). Ideally, each DMA has a single source of supply to maximize the accuracy of the data, with a strategically placed and suitably sized meter installed at the inlet that is capable of accurately measuring the flow into the area. In this way, it is possible to regularly quantify the leakage level in each DMA so that the leakage location activity is always directed to the worst parts of the network.

An important factor in lowering and subsequently maintaining a low level of leakage in a water network is pressure control. The division of the network into DMAs facilitates the creation of a permanent pressure control system, thus enabling pressure reduction in DMAs which reduces the level of background leakage, the rate of flow of individual burst and the rate of the annual burst frequency.

To manage NRW in the proposed system, the total system has been divided primarily into 3 DMAs. All areas of Matthilo Bazaar have been proposed to be served by RVT A (located at the existing RVT site) with a capacity of 150 cum. These areas which are in the upper level of the service area have been termed as DMA-A. The middle portion of service area has been proposed to be served by RVT-B, located at the middle of the bazaar and termed as DMA-B. Similarly, the third service reservoir RVT-C which serves HHs situated at lower elevations has been termed as DMA-C.

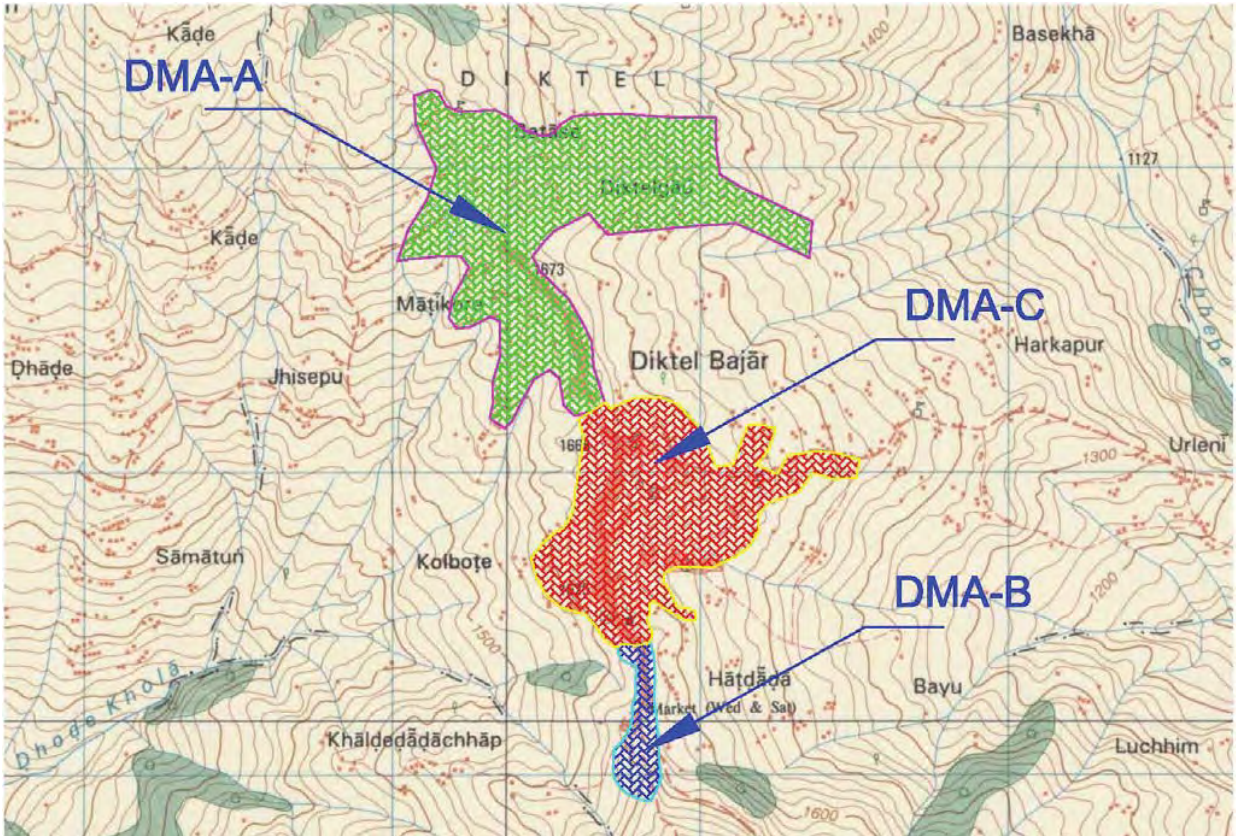


Figure 2: District Metering Area (DMA) of the Proposed System

C. Salient Feature of the Project Area

The detail salient features of the project are shown in Table 9.

Table 9: Salient Feature of the Project

S.N.	Items	Description
1	Name of Project	Diktel Town Water Supply and Sanitation Project
2	Type	Gravity
3	Study Level	Detailed
4	Location Area	
	Province	1
	Zone	Sagarmatha
	District	Khotang
	VDC/Municipality	Rupakot Majuwagadhi Municipality
	Ward	Partial area of Ward No. 1, 2 and 3 of the Municipality (Ward 1,2,3,4,5 & 9 of former Diktel Municipality)

S.N.	Items	Description
5	Available Facilities	
	Road	Middle Hill Highway (Ghurmi-Diktel-Bhojpur)
	Supply Water System	DWSS/Municipality/WUSC and Hand pumps
	Electricity	Available
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
6	Social Status	
	Present HHs Numbers (2016)	1,049
	Present Population (2016)	7,822
	Base Year Population (2018)	8,063
	Design Year Population (2038)	10,934
	Weighted Growth Rate % (WGR)	1.54
	Projected HHs in Design Year (based on WGR)	~1,081
7	Water Demand (MLD)	
	Base Year (2018)	0.765
	Design Year (2038)	1.037
8	Source Characteristics	
	Source Name	Existing source Ramba and Majh Khola Proposed Chebbe Khola
	Source Type	Existing source Ramba and Majh Khola -Gravity+ Proposed Chebbe Khola-Gravity
	Source Location	All sources are within the municipality
	Safe Yield (lps)	Existing Ramba and Majh Khola - 8.0 lps+ Proposed Chebbe Khola-Gravity – 5 lps
9	Type of Structures	
	Intake	2 Nos Existing Stream Intake + 1 No of Proposed Spring Intake
	Storage Reservoir (No-Capacity)	1N-50cum + 1N-150 cum+1-175 cum. (all proposed)
	Valve Chamber (Bricks/RCC/Surface Valve Box)	4/10/10
	Office Cum GH /Guard House	1/2
	Household Connection	1,049
	Fire Hydrant	8
	Transmission Line and BDS (meter)	Cumulative of 18.178
	Distribution Network (meter)	24,351

S.N.	Items	Description
10	Total Cost of WS Component (Inclusive of all) NRs.	296,309,339.45
11	Cost Sharing Arrangement	
	GON Component (75 %)	207,416,537.62
	TDF Loan (25 %)	74,077,334.86
	WUSC's Commitment for O&M as upfront (Cash)	14,815,466.97
12	Tariff	
	Up to 6 cum/monthly (NRs)	210
	7 to 10 cum/monthly (NRs)	53
	11 to 20 cum/monthly (NRs)	79
13	Economic Analysis	
	FIRR (Base case) %	9.14%
14	Environment	
	ADB Category	B, Only IEE necessary
	IEE finding	No significant adverse impact.
15	Per Capita Cost for W/S component	
	Base Year	36749.3
	Design Year	18969.9

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment and Resources

1. Landforms and Topography

The Project is in Rupakot Majhuwagadhi Municipality which is situated in Khotang district in Sagarmatha Zone of the Province 1 of Nepal. It municipality lies between Latitude 27^0 9' N to 27^0 16' N and Longitude 86^0 45' E to 86^0 50' E. The municipality is in a hilly region with altitudes ranging between 500 (Phedi) m to 2600 m (Rupakot) above mean sea level (amsl) with an average altitude of 1623 meters.

2. Climate

The Municipality area has warm and cold temperate types of climate. A warm temperate type of climate is observe between 1,000-2,000 meter elevations, while a cold temperate type of climate exist in between 2,000-3,000 meters, particularly in the mid-hills of the Nepal. The proposed service area elongates between about 1501 to 1815 m elevation.

The rainy season starts from June and ends in September when the monsoon blows across the Bay of Bengal and delivers about 80 % of the annual rainfall. During the dry season, the northwest wind brings dry cold wind bearing little moisture and accounts for the remaining 20% of the annual rainfall. The annual average rainfall recorded at Diktel station (Station NO. 1222) is 1,191 mm.

3. Water Quality

All parameters of the water quality of sampled water sources are within the permitted values of NDWQS. The physical and chemical quality of the existing and proposed sources (potential) is generally good except for iron, which is slightly higher than the desirable limit in the existing Majh Khola source. The entire source will be monitored before finalizing treatment unit for implementation after taking a few samples in other seasons.

4. Air Quality

Though there is a lack of secondary information on air quality for the project area, the ambient air quality is expected to be within the National Ambient Air Quality Standards of Nepal as there is no industries and traffic volume is very low. Due to a similar reason, noise levels in the project area are expected to be within permissible standards prescribed by the Ministry of Environment of the GON.

5. Acoustic Environment

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

D. Ecology, Environment and Resources

About 90,000 ha. of the Khotang district has vegetation cover. According to local informants, the forest vegetation cover in the district is increasing since the handover of forests to Community Forest Users Groups (CFUGs).

The project area offers limited habitat for aquatic life and fisheries due to the absence of abundant perpetual sources of water. A limited number of species of aquatic life and fishes are available within the project area.

The forest surrounding the project area provides refuge to many species of mammals. Discussions with residents and several site visits have confirmed that other than monkeys none of the protected species listed were observed along or near the project site in recent years.

1. Flora

The dominant forest types existing in the project area include thin Salla -forests, mix-forest of Chilaune (*Schimaa wallichii*), and Uttis (*Alnus nepalensis*) dense mix forests, and Gobresalla. *Micheila champaca*, is a protected plant species found within the project area. This species is banned for felling, transportation, and export for commercial purposes. The major tree species available in the project area are given in Table 10.

Table 10: Major Tree Species Found in the Project Area

Local name	Botanical Name	Family	Forest Act	IUCN	CITES
Bans (Malingo, Bhalu)	*Bambusa nutans/ Dendrocalamus hookeri*	Gramineae			
Banjh	*Quercus lanata*	Fagaceae			
Bot dhayaro	*Lagerstroemia parviflora Roxb.*	Lythraceae			
Champ	*Micheila champaca*	Magnoliaceae	Protected	Listed	3
Chilaune	*Schima wallichi*	Theaceae			
Dhale Kutus	*Castanopsis indica*	Fagaceae			
Dudilo	*Ficus neriifolia*	Moraceae			
Gobre Salla	*Pinus wallichiana*	Pinaceae			
Gurans	*Rhododendran arboreum*	Ericaceae			
Kafal	*Myrica esculenta*	Myricaceae			
Kaulo	*Machilus odoratissima*	Lauraceae			

Local name	Botanical Name	Family	Forest Act	IUCN	CITES
Khirra	*Sapium insigne (Royle) Benth. Ex Hook.f.*	Euphorbiaceae			
Khote salla	*Pinus roxburghii*	Pinaceae			
Kyamun	*Syzigium cerasoides*	Myrtaceae			
Lampate	*Daubanga sonneretidoes*	Lythraceae			
Mayal	*Pyrus pashia*	Rosaceae			
Mahuwa	*Engelhardifia spicata*	Juglandaceae			
Musure katush	*Castanopsis tribuloides*	Fagaceae			
Nibaro	*Ficus auriculata*	Moraceae			
Oak	*Quercus lamellose, incana, dilatata*	Fagaceae			
Paiyun	*Prunus ceratoides*	Rosaceae			
Phaledo	*Erythrina species*	Leguminosae			
Sissioo	*Dalbergia sissoo*	Leguminosae			
Tanki	*Bauhinia purpurea L.*	Leguminosae			
Uttis	*Alnus nepalensis*	Betulaceae			

Source: Field survey, 2016

The project area is rich in shrubs and small tree species with medicinal and aromatic values and performs important soil conservation functions. They provide close canopy cover to the ground and thereby prevent losses through surface run-off and soil erosion even during the high intensity of rainfall. The dominant shrub and small tree species existing in the project area are given in Table 11. None of them are endangered or rare.

Table 11: Dominant Shrub and Small Tree Species in the project area

Local Name	Botanical Name	Family
Aasuro	*Adhotoda vasica*	Acanthaceae
Aiselu	*Rubus ellipticus*	Rosaceae
Argeli	*Girardinia versifolia*	Urticaceae
Aasare	*Viburnum erubescens*	Caprifoliaceae
Bhogate	*Maesa macrophylla*	Myrsinaceae
Dhusure	*Colebrookea oppositifolia*	Labiatae
Ghodtapre	*Centella asiatica (L.) Urban.*	Umbelliferae
Lajjavati	*Mimosa pudica L.*	Leguminosae
Sajivan/Kadam	*Origanum vulgare L.*	Labiatae
Simali	*Vitex negundo*	Verbenaceae
Vanmara	*Eupatorium adenophorum Spreng*	Compositae

Source: Field survey, 2016

The grass species of plants belonging to the Gramineae family which provide wild and domestic animals roughage. The grass species are highly effective for protecting different types of soil from erosion. Morphologically, they are characterised by deep root systems and light shoot structures providing the function of armoring. They have a high potential for

bioengineering purposes and can thrive in harsh conditions. Until recently, their potentialities are harnessed only in the natural state. The dominant grass species that were observed during field survey are presented in Table 12.

Table 12: Grass Species Available in the Project Area

Local Name	Botanical Name	Family
Arthunge	*Heteropogon contortus (L) Beauvois*	Gramineae
Babiyo	*Eulaliopsis binata (Retz.) C.E. Hubbard*	Gramineae
Banso	*Digitaria sps, Eragrostos sps*	Gramineae
Dubo	*Cynodon dactylon*	Gramineae
Kans	*Saccharum spontaneum*	Gramineae
Khar	*Saccharum spontaneum*	Gramineae
Salima	*Chrysopogon gryllus (L.) Trin.*	Gramineae
Siru	*Imperata cylindrical*	Gramineae
Ulla	*Themeda caudate (Ness)A. Camus*	Gramineae

Source: Field survey, 2016

2. Fauna

Some of the mammals reportedly present in the nearby forests are listed in Table 13.

Table 13: Mammals in the Project Area

Name			Family	CITES	IUCN	Forest Act
Local	English	Scientific				
Ban Biralo	Jungle cat	*Felis Chaus*	Felidae	2	LR/lc	
Bandar	Monkey	*Macaca Assamensis*	Cercopithecidae	2	VU	Protected
Chari Bagh	Leopard cat	*Felis bengalensis*	Felidae	1	LR/nt	-
Chituwa	Common Leopard	*Panthera Pardus*	Felidae	1	LR/nt	-
Dhedu	Langur Monkey	*Semnopithecus entellus*	Cercopithecidae	1	LR/nt	-
Dumsi	Porcupine	*Hystrix hodgsoni*	Hystricidae			-
Fayuro	Fox	*Vulpes bengalensis*	Canidae	3	DD	-
Ghoral	Ghoral	*Naemorhedus goral*	Bovidae	1	LR/lc	-
Kharayo	Indian hare	*Lepus nigricollis*	Leporidae		-	-
Lokharke	Squirrel	*Funambulus pennati*	Sciuridae		-	-
Mal samproo	Yellow throated marten	*Martes flavigula*	Mustelidae	3	-	-
Sayal	Jackal	*gangetica Canis aureus*	Canidae	3	-	-

LR/LC= Lower Risk/Least Concern; VU= Vulnerable; nt= Near Threatened; DD=Data Deficient; and EN=Endangered *(Source: Field Survey, 2016)*

According to local people, local and migratory birds are found within the project area. However, none of these are protected or endangered.Species The commonly found species of birds are given in Table 14.

Table 14: Bird Species in the project area

Name			Family	CITES
Local	**English**	**Scientific Name**		
Bhangera	Sparrow	*Passer domesticus*	Passeridae	
Dhukur	Red Turtle Dove	*Streptopelia tranquebarica*	Columbidae	
Huchil	Owl Bam	*Tyto alba*	Tytonidae	2
Kag	Crow	*Corous macrorhynches*	Corvidae	
Kalij	Pheasant	*Lophura leucomelana*	Phasianidae	
Koili	Cuckoo	*Eudynamus scolopacea*	Cuculidae	
Luiche	Jungle Fowl	*Gallus gallus*	Phasianidae	
Mayur	Peacock	*Pavo cristatus*	Phasianidae	
Piura	Hill Patridge	*Arborophila hyperythra*	Phasianidae	
Sarung	Myna	*Gracula religiosa*	Sturnidae	3

Source: Field Survey, 2016

Of the 17,600 butterfly species known to exist, Nepal hosts about 645 species representing 4% of the total. The project area provides habitats for a variety of butterflies, and during the walkover surveys, various types of butterflies were observed.

The project area contains a variety of reptiles, among them, are snakes. In Nepal, three species of reptiles are categorized under the threatened species (*Gavialis gangeticus*, *Python molurus*, and *Varamus flavescens*). However, none of these reptiles were recorded during the study.

3. Protected, Rare or Endangered Species

One protected wildlife, mammal species is reported in the project area, and rest of the existing species of mammals are commonly found species. Among the reported species, monkey, Macaca assamensis, is the protected and vulnerable species according to the Forest Act, and IUCN respectively.

4. Protected Area

The project road is not located in or near any national park, wildlife reserve, conservation area, hunting area, including a buffer zone area, world heritage site, and other protected areas.

E. Socio-economic and Cultural Environment

1. Settlement pattern

The town is located in a hilly area with a heterogeneous ethnic composition. Most of the government and non-governmental offices are located in ward nos 1, 2 and 3 of former municipality, which have the densest population of the service area. The settlement pattern of the bazaar is dense with a row of houses on the ridge. However, the settlement pattern of other areas is scattered.

2. Population and Household

As the area of the municipality consists of ward areas of the thirteen former VDCs, the total population of historical time has been estimated by summing the population of these thirteen VDCs. The ward-wise population of the project town according to the census of 2001 and 2011 has been presented below:

Table 15: Population of the Project Town

Ward	W. Area (Ha)	Census 2001			Census 2011			Growth Rate
		HHs	Pop	P. Densities (PPHA)	HHs	Pop	P. Densities (PPHA)	
1	575	987	4,976	8.7	1,218	5,342	9.3	0.71
2	1442	656	3,430	2.4	749	3,525	2.4	0.27
3	1488	597	3,120	2.1	648	2,876	1.9	-0.81
4	1888	578	3,208	1.7	648	3,192	1.7	-0.05
5	1622	579	3,133	1.9	420	2,858	1.8	-0.91
6	5589	652	3,456	0.6	249	3,009	0.5	-1.38
7	1470	340	1,956	1.3	204	3,099	2.1	4.71
8	1526	272	1,565	1.0	204	2,449	1.6	4.58
9	1093	402	2,124	1.9	240	1,967	1.8	-0.76
10	3495	790	4,374	1.3	171	3,872	1.1	-1.21
11	2401	767	4,064	1.7	153	3,499	1.5	-1.49
12	946	544	2,839	3.0	96	2,539	2.7	-1.11
13	1028	339	1,792	1.7	181	1,596	1.6	-1.15
14	2373	1,010	5,381	2.3	258	4,538	1.9	-1.69
15	1714	530	2,769	1.6	209	2,542	1.5	-0.85
Total	28,650	9,043	48,187	1.7	5,648	46,903	1.6	-0.27

Source: CBS 2001 and 2011

The total population of Rupakot Majuwagadhi Municipality as per the census of 2011 is 46,903. The population of the municipality in 2001 was 48,187. The analysis of the census population shows that the overall annual growth rate of the municipality is declining by 0.27%. Most of the wards have had declining population growth rates in the last decade. The declining population growth rate attributed to the Maoist insurgency during early 2000 AD. The former Diktel VDC along with other neighboring VDCs was badly affected by the insurgency.

Ward no. 1 of the municipality (Ward no 2 of former Diktel Municipality or old Diktel main bazaar area), is the only comparatively densely populated ward. The population density of this ward is comparatively high. The overall population density of the project area decreased from 1.7 (2001 AD) to 1.6 (2011 AD) person per hectare.

As the social surveys have been done before the formation of Rupakot Majuwagadhi Municipality, all the social information has been presented in terms of former ward (i.e. Diktel Municipality). The service area of the proposed project comprises partial ward area of 1to 5 and 9 of former Diktel municipality. The consultants conducted a socio economic survey in 2016 of the proposed service area. The survey shows that the total population of the service area is 7,822.

Table 16: Beneficiaries households

Former Ward	Present Ward Number of Rupakot Majuwagadhi Municipality	HHS	Total Population
1	Partial Area of WN 1	258	1976
2		466	3293
3		180	1337
4	Partial Area of WN 2	77	547
5		63	617
9	Partial Area of WN 3	5	52
Total		1,049	7,822

Source: Socioeconomic survey 2016

3. Ethnicity and caste

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

The survey revealed that Brahmans/Chhetris are the main groups of the project area comprising of 56% (520 of the total household whereas Janajatis are the second largest group comprising of 36 percent. Similarly, Dalits comprise about 8 percent within the service area. The details are presented in Table 17.

Table 17: Distribution of households and population by Ethnic composition

S.N.	Caste/Ethnic Group	Ward No. of Former Municipality						Total	%
		1	2	3	4	5	9		
1	Brahmin/Chhetri	148	199	126	22	23	2	520	56
2	Janajati	74	165	33	31	29	2	334	36
3	Dalit	14	32	11	14	4	1	76	8
4	Other	0	0	0	0	0	0	0	0
	Grand Total	236	396	170	67	56	5	930	100

Source: Socio-economic Survey 2016

4. Education and Health

Education

Various public and private institutions such as school and college, community based organization/NGO, bank and financial institution, hospitals, hotels and lodge exist in this

area. According to the institutional data obtained from the social survey, nine educational institutions, including one diploma level college as well as 8 schools with primary to higher secondary level school were recorded in the service area with 6,112 people including students, staffs and teachers. Similarly, most of the educational institutions depend on both taps and spring for the water supply.

Health

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

5. Economic Activities

The economy of the municipality is extensively agrarian although most of the households in the project area depend on more than one occupation. During the household survey of the project area, detailed data has been collected about the major occupation and economic activities of all the households. The survey shows that the highest number of the population (about 51%) are engaged in the agriculture sector, whereas the lowest (0.11%) of the households are engaged in industrial work, 26.88% in business, 16% in service. Similarly, about 4% and 1.51% of the household heads are dependent upon remittance and labor, respectively.

The survey revealed that the main sources of household income of the service area are agriculture, service, remittance and wage labor, respectively. Among the total households, 6.3% have monthly incomes of more than Rs. 7,501- 10,876, about 40 % have monthly incomes in the range of Rs. 10,876-20,000 whereas 45 % falls in the range Rs. 20,001-50,000. Likewise, 3.7% households are earning more than Rs. 50,000 per month. About 4.8% households' fall under the poor category as they are only earning less than Rs 7,500 per month. The monthly incomes of HHs in the service area is given in Table 18.

Table 18: Income Level of Households by Ward

S.N.	Income Range	Ward No. of Former Municipality						Total	%
		1	2	3	4	5	9		
1	< Rs.7,500	9	11	2	12	11	0	45	4.8
2	Rs.7,501-10,875	14	31	7	4	2	1	59	6.3
3	Rs.10,876-20,000	104	126	86	37	20	2	375	40.3

S.N.	Income Range	Ward No. of Former Municipality						Total	%
		1	2	3	4	5	9		
4	Rs.20,001-50,000	101	212	69	13	20	2	417	44.8
5	>Rs.50,001	8	16	6	1	3	0	34	3.7
	Grand Total	236	396	170	67	56	5	930	100

Source: Socio-economic Survey 2016

F. Existing Water Supply & Sanitation Situation

1. Existing Water Supply

Diktel Bazaar Water Supply and Sanitation is the only existing piped water system in the project area. Two former committees merged into a new committee. The system serves parts of ward no. 1 to 3 of the Rupakot Majuwagadhi municipality (Ward nos. of 1 to 5 of the former Diktel Municipality).

2. Water Quality

During the survey, respondents were asked about existing water quality in the project area. The survey revealed that about 0.4% of respondent mentioned good quality whereas almost 99% felt satisfactory or moderate. Some of the major systems carry out occasional disinfection (use of 3-5 kg bleaching powder once in a month during the rainy season). Water Samples collected at collection chamber were tested for various physical, chemical and bacteriological parameters.

All parameters of the water quality of sampled water sources are within the permitted values of NDWQS. Taking a few samples from the source before the construction phase to ensure the water quality to make adequate provisions for water treatment, if required is recommended.

The physical and chemical quality of the existing and proposed sources (potential) is good except for iron, which is slightly higher than the desirable limit in the existing Majh Khola source. The entire source will be monitored before finalizing the treatment unit for implementation after taking a few samples in other seasons.

3. Household Latrine Status

The survey shows that about 44.6% household have pour flush latrines whereas 45.6% households have ventilated pit latrines. Similarly, 9.5% have pit latrine which seems to be temporary and need to be replaced.The existing latrines in the houses as well as in the schools are not maintained properly. The community has very limited knowledge on the use of sanitary latrines and personal hygiene, especially in the city periphery.

Table 19: Coverage of sanitary facilities

S.N.	Type of Toilet	Ward No. of Former Municipality						Total	%
		1	2	3	4	5	9		
1	No Toilet	1			3			4	0.4
2	Pit Latrine	35	36	4	9	3	1	88	9.5
3	Ventilated Pit Latrine	145	256	7	2	13		423	45.6
4	Water Seal/Pour Flush	55	103	159	54	40	4	415	44.6
5	Cistern Flush								0
	Grand Total	236	396	170	67	56	5	930	100

4. ODF Situation in Service Area

The Diktel municipality is not declared ODF area.

5. Drainage Facilities

There is no proper drainage system for stormwater as well as for the domestic sewage in the Project area. As the terrain is mostly steep, people are less concerned about stormwater drain.

6. Wastewater Management Practices

There is no sewerage system in the project area. Wastewater from individual houses is managed inside the houses/premises. The socio-economic survey conducted in 2016 shows that 97.1% HHs have their toilets. There is no wastewater treatment plant in the Municipality to treat domestic sewage/septage. However, the survey shows that 99% of the sampled HHs showed an interest in improving the septage management system and are interested in paying for it.

7. Solid Waste

The survey revealed that 95% of households are disposing of domestic solid waste in pits near to the houses whereas 2.3% of households use private collectors. It was observed that the respondents have sufficient knowledge about improperly managed solid waste that may affect the public health and the surrounding environment. The disposal of solid waste is done according to Table 20.

Table 20: Existing solid waste management practices

SN	Waste Management Practice	Ward						Total	%
		1	2	3	4	5	9		
1	Pit Near to House	7	8	8	7	7	4	41	95.3
2	Private Collector	0	0	1	0	0	0	1	2.3

SN	Waste Management Practice	Ward						Total	%
		1	2	3	4	5	9		
3	Pit/Container managed by VDC/Municipality	0	0	0	1	0	0	1	2.3
	Total	7	8	9	8	7	4	43	100

Source: Socio-economic Survey 2016

8. Institutions involved in Water Supply and Sanitation Field

The main institutions involved in water supply and sanitation sector in the project area are Diktel Bazaar Water Supply and Sanitation committee ; Water Supply and Sanitation Division Office (WSSDO), Diktel, Khotang; has been actively supporting the WUSC to complete the water supply system and carry out WASH activities in the project area. It has been providing both financial and technical support for large scale maintenance and providing pipes, bleaching powder and human resource as and when needed basis.

9. Water Supply and Sanitation User's Association

The Diktel Bazaar Water Supply and Sanitation Committee consist of 13 members representing from various clusters within the service area. The executive committee consists of 12 male and 1 female members. The WUSC was registered in Water Resource Committee, Khotang in 2054 B.S. as per the Water Resource Act-2049 and Water Resource Rule 2050 and involved in the management and improvement of the water supply system in Diktel Bazaar. The name of present WUSC members and their designation are presented in the tabular form:

Table 21: Members of Diktel Bazaar Water Users and Sanitation Committee

S.N.	Name	Position
1	Mr. Gajurman Rai	Chairperson
2	Mr. Dhan Kumar Joshi	Vice Chairperson
3	Mr. Chatra Kumar Bajimay	Secretary
4.	Ms. Bhabimaya Rai	Assistant Secretary
5	Mr. Navaraj Joshi	Treasurer
6	Mr. Bhim Bahadur Sainju	Member
7	Mr. Gyanendra Joshi	Member
8	Mr. Utsav Joshi	Member
9	Mr. Chandra Kumar Shrestha	Member
10	Mr. Ratna Bahadur Khatri	Member
11	Mr. Krishna Prasad Acharya	Member
12	Mr. Dhruba Karki	Member
13	Mr. Rajendra Kumar Shrestha	Member

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Beneficial Impacts

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

1. Construction Phase

a) Employment Generation

The project will generate direct employment opportunities e.g. skilled and non-skilled work for the local people. Construction activities such as laying and joining of pipelines will create an opportunity for about fifty local people. The earning will positively affect the local economy, thereby reducing the chances of seasonal migration of the local people. To obtain such benefits, priority will be given to employing local laborers.

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

b) Skill Enhancement

The construction of the project will not only provide direct employment opportunities but also ensure the transfer of skills and technical proficiency to the local workforce. The project activities i.e. constructing mechanical treatment plant, surface drains, a valve chamber and buildings will generate transferable skills. In future, these skills will be useful for locals to generate income as well as implement when the need arises. To obtain or augment such benefits, proper work plan and code of conduct should be implemented during the construction.

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

c) Local trade and business opportunity

The proposed project creates business opportunity in the project area. Because construction work involves many workforces, few shops about food items and, agriculture and livestock

product will gain a momentum around the vicinity of the construction site. This demand and supply chain will boost local trade and business sector.

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

2. Operation Phase

a) Improved health and hygiene

Deteriorating water quality and unsanitary conditions are often the causes of waterborne communicable diseases. The survey report showed that the people in the project area are dependent on the existing piped water supply system that is hardly treated. So, the locals are compelled to consume water that is supplied directly from streams/springs, the quality of which is poor with bacteriological contamination. After the implementation of the project, the hygiene of the local people will improve which will reduce the risk of occurrence of waterborne diseases thereby improving the public health in the area. Regular maintenance of the project components needs to be carried out so that the project operates smoothly and the benefits are kept intact.

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

b) Increased economic opportunity

After the completion of the project, there might be increased rural-town migration due to better facilities and opportunities. The increased economic level may increase the value of the land, thereby uplifting the economic status of the local people. These benefits can be maximized by ensuring regular maintenance of water supply and sanitation components and by promoting land development activities in the area.

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

c) Women empowerment

Women and girls are mainly responsible for household activities. Improved water supply and sanitation will contribute towards better health and hygiene of women, girls and the entire household members. The proposed project will also save their time to fetch water. The beneficial impacts to women and girls can be augmented by conducting health and awareness programs to the local community.

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

Overall, the Subproject will lead to improved public health and environment, significantly improving the quality of life of the residents of Rupakot Majhuwagadhi Municipality.

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

Table 22: Summary of Impact Matrix of Beneficial Issues of BWSSP

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

Note: Scoring is done based on following;

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

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

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

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

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

Significance of Impact

Total Score: More than 75 : Very Significant

50-75 : Significant

Less than 50 : Insignificant

B. Adverse Impacts

1. Impacts and Mitigation Measures during Design Phase

The Impacts, Issues, Concerns & Mitigation Measures during the design phase is illustrated in Table 23.

Table 23: Impacts & Mitigation Measures during Design Phase

Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility
Detailed design			
Manual preparation	Health and safety of community and workers	• Prepare training manuals in Nepali with sketches on community health and safety and potential occupational health and safety	PMO,RPMO & DSMC
Location of pipes and photographs of sites and utilities before construction,	False claims from people; water quality changes due to construction. Interference with other utilities	• Place water pipes away from 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 including preparation of Archaeological Impact Assessment, or other agreed document by DOA if required.	PMO,RPMO & DSMC /Contractor
Sludge disposal	Inadequate disposal of sludge from reservoirs and treatment plant will cause nuisances to affected properties.	• The design of sludge disposal sites will be made at designated sites approved by the municipalities.	PMO,RPMO & DSMC

2. Impacts during Construction Phase

a) Non-Compliance with Environmental Legislation

This issue will arise when there is a lack of awareness among Project and Subproject staff and management of environmental safeguard requirements, compliance with the requirements, conditions specified in the IEE Report, approval status, and consent.

The impact is thus indirect in nature, local in extent, low in magnitude and short term in duration.

Measures to mitigate these concerns include (i) capacity strengthening of the PMO Environmental Officers and their counterpart at the subproject level; and (ii) ensuring that necessary permit and registration are obtained.

b) Erosion & land surface disturbance

Excavation and digging of trenches during construction has the potential to cause erosion and cave in thereby causing soil erosion, silt runoff and unsettling of street surfaces. Unorganized disposal of the excavated earth can disturb the street surface and decrease the aesthetic and economic value of the area. The activity will be a discomfort to the road users and inhabitants.

Quarrying activities operated to supply the aggregate demand of the Subproject may disturb land that could cause further erosion and landslide.

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

Mitigation Measures

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

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

c) Impacts on Air Quality

Dust will be generated from inadequately managed or haphazard: (i) earthworks such as clearing, grubbing, excavations, and drilling; (ii) demolition works; (iii) stockpiling of natural aggregates, excavated materials and spoils; (iii) transport, loading and unloading of natural aggregates; (iv) movement of construction-associated vehicles; and (v) on-site rock crushing and concrete mixing; (vi) burning of firewood for cooking & heating in work and labor camps

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

Some mitigation measures include:

i. Confining earthworks according to Excavation Segmentation Plan that should be part of the C-EMP;

ii. Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, or as necessary;

iii. If re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces;

iv. During demolition, watering of exterior surfaces, unpaved ground in the immediate vicinity and demolition debris;

v. Place signage at active work sites in populated areas;

vi. Requiring trucks delivering aggregates and cement to have tarpaulin cover

vii. Limiting speed of construction vehicles on access roads and work sites to a maximum of 30 km/h;

viii. Prohibit burning firewood in work & labor camps (promote LP gas for cooking purposes and electric heater for heating purposes;

ix. Use of vehicles complying with NVMES, 2069 enforcement, and green sticker standards

x. Prohibit open burning of solid waste.

Odor and gas emissions: There will be a salient impact during the demolition of community toilets and septic tanks in public places.

To mitigate odor and gas emissions, before demolition: (i) clean and disinfect the community toilet.

d) Noise

Noise-emitting construction activities include earthworks, concrete mixing, demolition works, movement and operation of construction vehicles and equipment, and loading and unloading of coarse aggregates. The significance of noise impact will be higher in areas where noise-sensitive institutions such as health care and educational facilities are situated.

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

Some mitigation measures include: (i) using equipment that emits the least noise, well-maintained and with efficient mufflers; (ii) restricting noisy activities to daytime and overtime work to avoid using noisy equipment; (iii) limit engine idling to a maximum of one minute; (iv) spread out the schedule of material, spoil and waste transport; and (v) minimizing drop heights when loading and unloading coarse aggregates.

e) Impacts on Water Resources

Impacts on Surface Water Quality: Some sections of the distribution pipeline will cross water bodies, exposing them to risks of pollution caused by: (i) poorly managed construction sediments, and waste materials; and (ii) poor sanitation practices of construction workers. Polluted water bodies will be harmful to aquatic life and people that depend upon such contaminated sources.

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

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

For management & final disposal of solid waste following mitigation measures will be applied:

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

f) Impacts on River Morphology and Hydrology:

Quarrying from riverbeds could cause the alteration of the river morphology and hydrology. The contractor will obtain quarry materials from the government approved area.

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

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

Impacts on the Quality of Groundwater Resource: There are no private and community groundwater wells that will be affected by the Subproject.

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

g) Impacts on Flora and Fauna

Haphazard site clearing, parking, and movement of construction vehicles and equipment stockpiling, will result in disturbance to the land in the project area. However, the impacts to flora and fauna will be minimal.

The impact is thus direct in nature, local in extent, low in magnitude and short term in duration.

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

h) Impacts on Physical, Cultural Resources

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

i) Impacts on the Socioeconomic, Environment and Resources

The impacts will result from excavation works, stockpiling, the operation of construction vehicles and equipment, and accidental damage to utilities (e.g., power supply poles, open drains, and water taps or hoses). Nuisance and safety hazards are the indirect impacts.

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

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

j) Community health and safety hazards

Communities will be moderately exposed to threats due to impacts on air and water quality, ambient noise level; mobility of people, goods, and services; accesses to properties, economic activities, and social services; service disruptions, etc. Construction workers may potentially bring communicable diseases in the community.

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

Mitigation measures include: (i) Contractor's implementation of C-EMP; (ii) adequate space & lighting, temporary fence, shining barriers and signage at active work sites; (iii) Contractor's preparedness in emergency response; and (iv) adequate dissemination of GRM and Contractor's observance and implementation of GRM v) At least 30% of the local people should be given an opportunity for work in the project activities.

k) Workers' Health and Safety Hazards

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

potentially exposed to communicable and transmittable diseases in the community and the workforce.

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

Mitigation measures include (i) Enforce the use of personal protective equipment (PPE) among construction workers(ii) provide safe access to and from work sites; (iii) provide safe & adequate water supply and sanitation facilities at camp and work sites ; (iv) provide health care and emergency care of workers (v) Construct gender friendly toilets

l) Impacts on the Sustainability of Works

During construction, seismic events may occur, causing damage to unsettled, unfinished, or uncured and completed structures and affecting their structural integrity.

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

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

3. Impacts, Issues, Concerns and Mitigation Measures during Operation

a) Non-compliance with relevant environmental legislation

This issue will arise when there is a lack of awareness of Project staff and management of environmental safeguards requirements, compliance with the requirements and conditions specified in the IEE Report and approvals and permits for the use of water resources.

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

Measures to mitigate this concern include (i) capacity strengthening of the WUSC and continuing capacity strengthening of Project staff; and (ii) ensuring compliance with EPA/EPR, NDWQS, applicable conditions in IEE approvals and registration for the use of water resources.

b) Occupational Health and Safety Hazards

Mishandling of chemicals and other hazardous substances may pose health and safety hazards to the workers.

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

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

c) Generation of waste water and sullage

The reliable and sufficient water supply will increase the generation of wastewater and sullage. If inadequately managed, this situation will lead to contamination of the water supplied through leaks or broken pipes in the distribution system.

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

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

C. Indirect, Induced and Cumulative Impacts

1. During Construction

a) Indirect and Induced Impacts

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

2. Cumulative Impacts

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

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

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

i. Civil works must be well planned, strategized and completed promptly;
ii. The contractor should implement the C-EMP fully, and key institutions should act their roles in EMP implementation effectively;
iii. There must be adequate consultations with stakeholders, including vehicle operators, and local authorities and coordination, particularly regarding expected cumulative impacts. Vehicle operations should temporarily adjust to the circumstances to relieve some road space limitations and for public safety and convenience;

The grievance redress mechanism should be disclosed (through public meetings, display at strategic places and media) to the communities affected by the cumulative impacts.

The summary of above-mentioned adverse impacts (construction & operation phase) of the project is shown in Table 24.

Table 24: Summary of Impact Matrix of Adverse Issues

Adverse Issues	Impact Rating				
	Nature	Magnitude	Extent	Duration	Rating
Construction Phase					
Non-Compliance with Relevant Environmental legislation	ID	L (10)	L (20)	ST (5)	In Significant (35)
Land Surface disturbance	D	M (20)	L (20)	ST (5)	In Significant (45)
Impacts on Air Quality	ID	H (60)	S (10)	ST (5)	Very Significant (75)
Noise	D	M (20)	L (20)	ST (5)	Insignificant (45)
Impacts on Water Resources	D	M (20)	S (10)	ST (5)	Insignificant (35)
Impacts on River Morphology and Hydrology	D	M (20)	L (20)	ST (5)	Insignificant (45)
Impacts on Flora and Fauna	D	L (10)	L (20)	ST (5)	Insignificant (35)
Impacts on Physical Cultural Resources	No any Impacts				
Impacts on the Socio-economic Environment and Resources	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Community Health and Safety Hazards	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Workers' Health and Safety Hazards	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Impacts on the sustainability of works	D	M (20)	L (20)	ST (5)	Insignificant (45)
Operation Phase					
Non-Compliance with relevant environmental legislation	D	M (20)	L (20)	LT (20)	Significant (60)
Occupation Health and Safety Hazards	ID	M (20)	L (20)	LT (20)	Significant (60)
Generation of Waste-water and Sullage	ID	M (20)	L (20)	LT (20)	Significant (60)

Note: Scoring is done based on following;

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

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

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

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

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

Significance of Impact

Total Score: More than 75 : Very Significant

50-75 : Significant

Less than 50 : Insignificant

VII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

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

Summary of the Consultations Outcomes

The public meeting was organized in the Diktel Municipality Office for the discussion of the environmental impacts due to the construction of Diktel Town Subproject.

The local peoples' concerns regarding the construction of Subproject are summarized below:

Common Issues Raised by Stakeholders

The common issues raised by the local stakeholders during IEE Study are as follows:

i. The contractor should bring construction related materials (sand, gravel & Boulder) from DDC approved crusher plant for the project.
ii. The extraction of sand, gravel & boulder from unauthorized quarry/ riverbed must be prohibited.
iii. The project should give priority to local people while hiring for construction related jobs.
iv. The project must develop a solid waste management plan and a waste disposal plan.

Issues addressed by the Study Team

i. The law and the site specific EMP of the project will compel the contractor to bring construction related materials (sand, gravel & Boulder) from DDC approved sources.

ii. Whether the project conforms to the laws will be monitored by DDC, RPMO, etc. during the construction phase.
iii. The safe disposal of solid waste management plan will be developed for the construction phase of the project
iv. Local workers of Diktel Bazaar will be given priority for employment.

The project envisages that stakeholder consultations will continue during the project period and concerned stakeholders will be invited and encouraged to participate. The PMO and ICG will maintain rapport with WUSC and the VDC. PMO, ICG, Contractors, and WUSC will be open to the public to discuss concerning the progress of the subprojects, adverse

impacts, mitigation measures and environmental monitoring and grievances. The stakeholder consultations in future will be as follows.

i. During construction, if changes in design, alignment, and location occur, the PMO and ICG will hold at least one public consultation to solicit perceived impacts, issues, concerns and recommendations from affected communities;

ii. Before construction, the PMO and ICG will conduct an information, education and communication (IEC) campaign among the affected communities about the upcoming construction, its anticipated impacts, the grievance redress mechanism, contact details and location of the PMO and ICG, and status of compliance with the Government's environmental safeguard requirements. Billboards about the subproject, implementation schedule and contact details of the executing agency, PMO-ES, ICG-ESA and Contractors will be set up at strategic locations. The grievance redresses procedure and details will be posted at the offices of the ICG, WUSC, and VDC;

iii. During construction, regular random interviews will be conducted by the ICG-ESA every month to monitor environmental concerns of subproject communities;

iv. During operation, periodic random interviews will be conducted by the ICG and WUSC to monitor the environmental concerns of subproject communities;

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

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

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the Grievance Redress Mechanism

The Project-specific grievance redress mechanism (GRM) is meant for persons seeking a satisfactory resolution to their complaints on the social and environmental performance of the subprojects under the TSTWSSP. The mechanism, developed in consultation with key stakeholders, will ensure that: (i) the basic rights and interests of every person adversely affected by the social and environmental performance of a Subproject are protected; and (ii) their concerns are effectively and timely addressed.

B. Proposed Set-Up

The MoWSS, as the Project executing agency, will establish the GRM and its support system, including setting up the Grievance Redress Committee (GRC) at the subproject level. The GRC will comprise the: (i) Chief of the WSSDO; (ii) members of the WUSC; (iii) two representatives of affected persons, a male and a female; (iv) a member of IP community, preferably female; (v) a representative of a non-government organization or community-based organization actively involved in IP development/other backward communities in the area, if any; (vi) local government representatives, i.e., VDCs and DDC; (vii) DSMC social safeguard expert; and (viii) DSMC environmental safeguard expert (ESE). The environmental safeguard Assistant (ESA) of the ICG will oversee the implementation/observance of the mechanism for environmental complaints at the subproject level. He/she will be technically advised, supported and trained by DRTAC environmental specialist and the DSMC ESE. PMO's Environmental Officer will oversee the implementation/observance of the GRM in all subprojects. Representatives of affected persons (APs), civil society and eminent citizens will be invited as observers during GRC meetings. Contractors and WUSCs (as Operators) will be required to designate their respective counterpart GRM staff.

The GRM will accommodate both informally- and formally lodged, but Project-related, valid grievances. Informally lodged grievances are those received by the Contractors during construction or WUSCs during operation. Formally, lodged grievances are those received at the ICG office. The ICG, GRC, and PMO maintain records of all grievances, informally- and formally lodged, valid and invalid, and appealed. The ICG will immediately inform the PMO, as necessary, particularly when an AP makes an appeal in court. PMO will in turn immediately inform the ADB of the same. The observance/implementation of the GRM will be reported by the: (i)ICG ESA in the subproject's monthly progress reports, semi-annual

subproject environmental monitoring report (EMR) during construction and annual subproject EMR during operation; and (ii) PMO EO in the Project's monthly progress report, semi-annual Project EMR during construction and annual Project EMR during operation.

Sufficient support system, including well GRM-oriented staff of Contractors and WUSCs, communication/documentation/recording and reporting system, funds, and posters declaring contact details and displayed at strategic locations, among others, will be in place to sustain the effective implementation of the mechanism.

C. Access to the Mechanism

Any person who has environmental concerns/issues about the subprojects during detailed design, construction and operation phases will have access to the mechanism free of charge. The PMO EO and ICG ESA will ensure that:

The public, especially the residents and regular passers-by, in the main areas of influence of the subprojects, are aware of their rights to access, and will have access to, the GRM free of administrative and legal charges; and

The GRM is fully disclosed prior to Notice to Proceed for construction is given: (a) in public consultations and social/community preparations, (b) through posters displayed in the offices of the ICG, VDCs, DDC and at strategic places within the main areas of influence of subprojects (posters to include names and contact details of the EO of the PMO and ESA of the ICG).

D. GRM Steps and Timeframe

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

Formal Approach: If a complaint is eligible but is not acted on within three days from the receipt of the complaint, or if AP is not satisfied with the resolution undertaken by the Contractor/Operator, he/she can access the formal mechanism, as follows: (Figure 7)

First Level: The access point will be the ICG. The steps are detailed below. (Figure 8)

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

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

Step 3 - Investigations, Discussion, and Agreement (Day 1): ICG, and the Contractor or Operator and AP, will investigate and discuss the complaint at the site. Agreement on actions and measures and time involved will be made with the AP. The agreement will be properly documented and filed; ICG, AP, Contractor/Operator will have copies.

Step 4 - Implementing the Agreed Action

- If the required action is minor, i.e. not requiring further investigation and would be quick and easy to implement, the Contractor/Operator will immediately implement the agreed action. (Day 2/Day 3)

- If required action is major, i.e. requiring further investigation and/or procurement of supplies/parts, the Contractor/Operator will: (i) immediately provide the most suitable interim measure to reduce the magnitude of the impact (Day 2/Day 3); and (ii) start work on the major action within 5 days from discussion (or not later than Day 8 since receipt of complaint).

- The ICG will advise AP that his/her complaint may be raised to the second level of the GRM, if he/she so prefers when: (i) minor action is not implemented within 2 days from discussion; (ii) interim measure prior to major action is not implemented within 2 days of discussion; or (iii) major action is not started within 5 days of discussion.

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

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

Second Level: The AP will be notified by the ICG when a complaint is forwarded to the GRC. The GRC will call for a hearing, if necessary, where AP can present his or her concerns or issues. The GRC will suggest corrective action or measure at the field level and assign clear responsibilities for implementing its decision within 7 days of receipt of the complaint by GRC. If GRC decision is not acceptable to the AP, if the suggested corrective action/measure is not started within 7 days, the matter/AP will be referred to the third level.

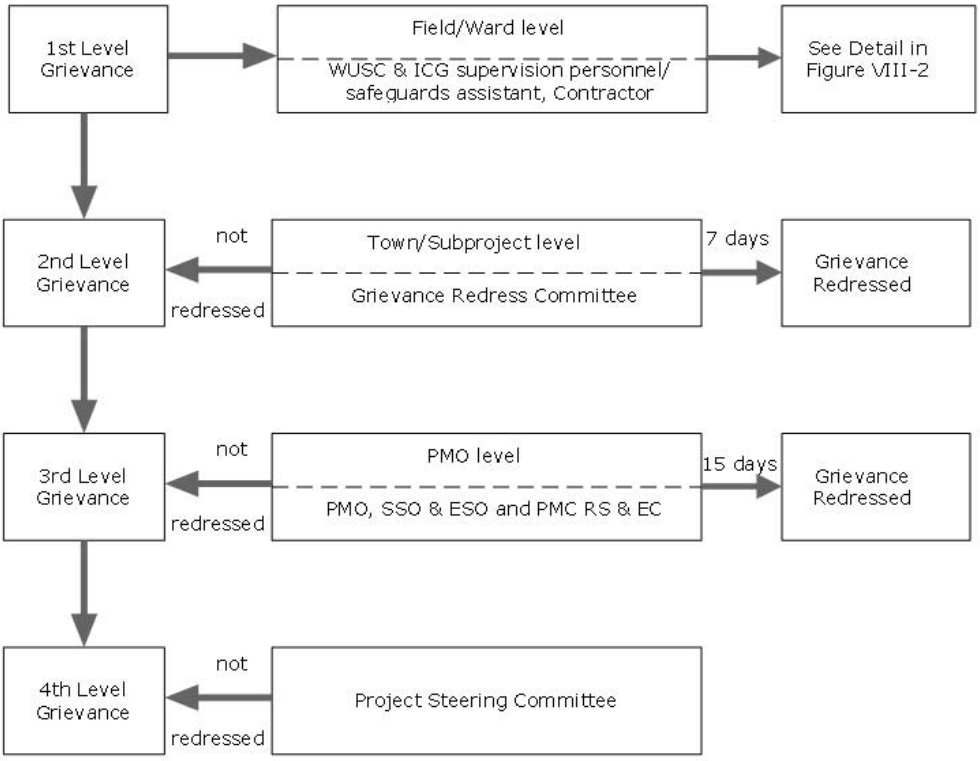
Third Level: The ICG will refer AP and its unresolved complaint or major issues to the PMO EO who will act within 15 days.

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

Despite the GRM, an AP will have access to the country's legal system. Accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. If the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism (AM) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Nepal Resident Mission. The complaint can be submitted in the country's language. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the GRM.

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

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



ES- Environmental Specialist

ESO- Environmental Safeguards Officer

ICG- Implementation Core Group

PMC- Project Management Consultant

PMO- Project Management Office

RS- Resettelment Specialist

SSO- Social Safeguard Officer

WUSC- Water Users and Sanitation Committee

Figure 3: Grievance Redress Mechanism (Formal Approach)

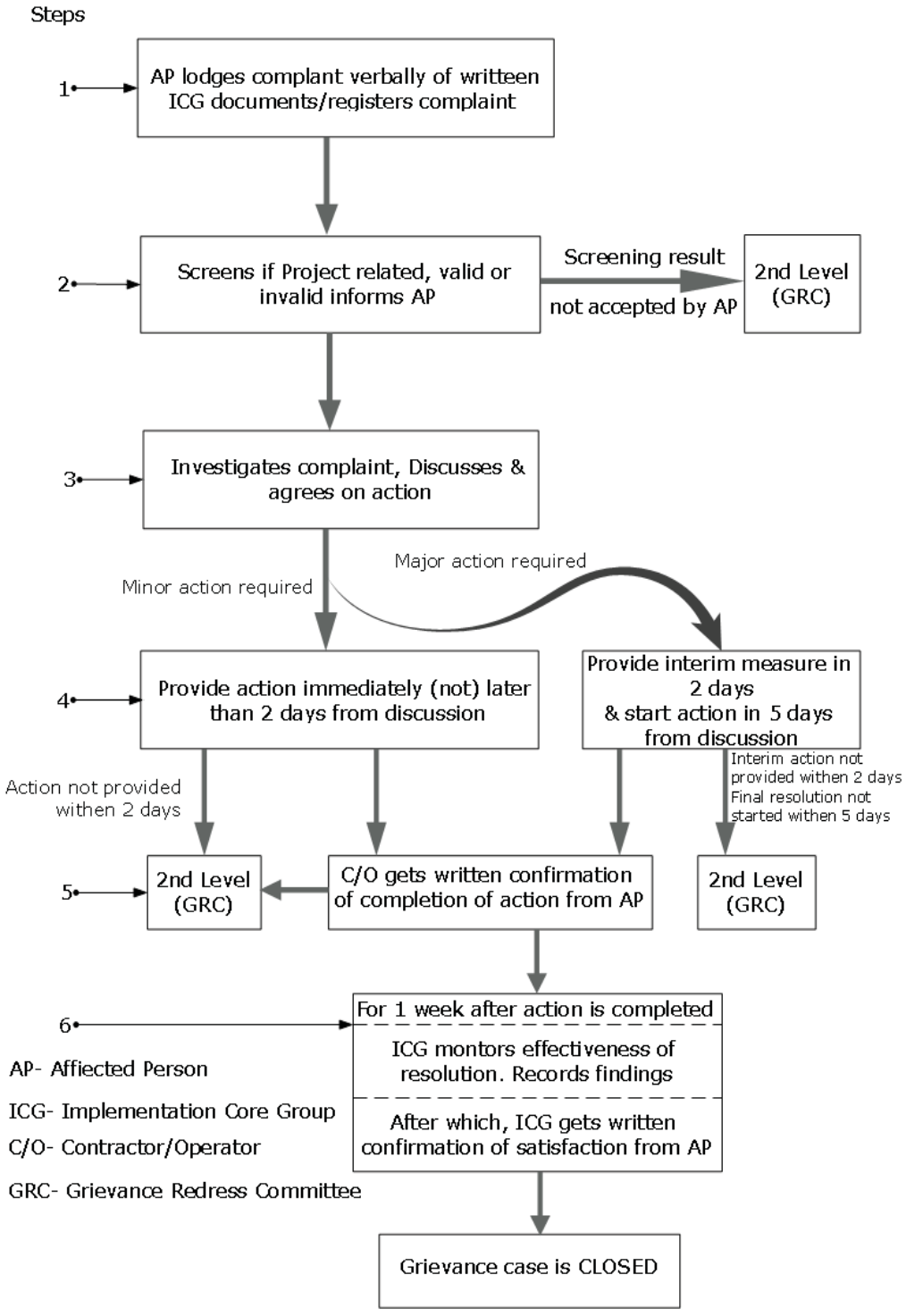


Figure 4: GRM First Level

IX. ENVIRONMENTAL MANAGEMENT PLAN

The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-harmful way with the objectives of (i) providing a proactive, feasible, and practical tool to measure and monitor environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the Environmental assignment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impacts of the project; and (iv) ensuring that safety recommendations are complied.

A copy of the EMP must be kept on work sites at all times. This EMP will be included in the bid documents and will be reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

A. Institutional Arrangement

Executing and implementing agencies: The Ministry of Water Supply and Sanitation (MoWSS) is the executing agency with the responsibility of subproject execution with the responsibility of subproject execution delegated to the Department of Water Supply and Sewerage (DWSS). Water User's and Sanitation Committees of participating towns are the implementing agencies.

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

Before construction:

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

B. During construction and operation

Safeguard Implementation Arrangement

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

- Confirm IEEs/EMPs are updated based on detailed designs and that new IEEs/EMPs are prepared following the EARF and government rules;
- Confirm whether EMPs are included in bidding documents and civil works contracts;
- Provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by regional project management offices (Eastern RPMO and Western RPMO) and contractors;
- Establish a system to monitor environmental safeguards of the project, including monitoring the indicators set out in the monitoring plan of the EMP;
- Facilitate and confirm overall compliance with all Government rules and regulations regarding the site and environmental clearances as well as any other environmental requirements;
- Supervise and guide the RPMOs to properly carry out the environmental monitoring and assessments as per the EARF;
- Review, monitor and evaluate the effectiveness with which the EMPs are implemented, and recommended necessary corrective actions to be taken as necessary;
- Consolidate monthly environmental monitoring reports from RPMOs and submit semi-annual monitoring reports to ADB;
- Ensure timely disclosure of final IEEs/EMPs in project locations and a form accessible to the public; and
- Address any grievances brought about through the Grievance Redress Mechanism promptly as per the IEEs.

Regional Project Management Offices (Eastern and Western RPMOs)

The DWSS/regional engineers and social development officers of the RPMOs will receive support from; (i) the PMO safeguards officers (environmental and social); and (ii) the safeguards specialists (environmental and social), the social mobilizers and environmental management plan (EMP) monitors of the design, supervision and management consultant (DSMC) teams as specified below:

- Prepare new IEEs/EMPs following the EARF and government rules;
- Include EMPs in bidding documents and civil works contracts;
- Comply with all government rules and regulations;
- Take necessary action for obtaining rights of way;
- Oversee implementation of EMPs including environmental monitoring by contractors;
- Take corrective actions when necessary to ensure no environmental impacts;
- Submit monthly environmental monitoring reports to PMO, and;
- Address any grievances brought about through the Grievance Redress Mechanism promptly as per the IEEs.

Civil Works Contracts and Contractors: EMPs are to be included in the bidding and contract documents and verified by the PMO and RPMOs. The contractor will be required to designate an environment supervisor to ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contracts. The government will ensure that bidding and contract documents include specific provisions requiring contractors to comply with all: (i) applicable labor laws and core labor standards on (a) prohibition of child labor as defined in the national legislation for construction and maintenance activities, (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project site.

Capacity Building: The DRTAC safeguards experts (environmental and social) will be responsible for training the; (i) PMO's safeguards officers (environmental and social); (ii) RPMOs' engineers and social development officers. Training modules will need to cover

safeguards awareness and management following both ADB and government requirements as specified below:

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

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

Before construction

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

During construction

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

During operation

- Implement Environmental Management Plan and Water Safety Plan.

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

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

C. Environmental Management Plan (EMP)

Table 25: Environmental Management Plan Matrix

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
1. Before Construction Activities					
Consents, permits, clearances, no objection certificate (NOC), etc.	Failure to obtain necessary consents, permits, NoCs, etc. can result to design revisions and work stoppage	· Obtain all of the necessary consents, permits, clearance, NOCs, etc. before the start of civil works. · Include in detailed design drawings and documents all conditions and provisions if necessary	PMO, RPMOS,& DSMC	Incorporated in final design and communicated to contractors	Before award of contract
Existing utilities	Disruption of services	· Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction · Require construction contractors to prepare a contingency and spoil management plan	DSMC, RPMOS	List of affected utilities and operators; Bid document to include a requirement for a contingency plan for service interruptions, e.g. provision of water if disruption is more than 24 hours, spoil management plan	During detailed design phase Review of spoils management plan: Twice (once after first draft and once before final approval)
Drinking water supply	Extraction of unsatisfactory raw water quality Delivery of unsafe water to the distribution system Inadequate protection of intake well Health Hazards arising from inadequate design of facilities for receiving, storing and handling of Chlorine & other chemicals	· Provision of water treatment plant to meet satisfactory water quality · Perimeter fencing around deep tube well location. · Tube well should be at least 30m upstream from sanitation facilities. · "Housed" dosing unit with ventilation for chlorine · Train operators for handling chlorine	PMO, RPMOS & DSMC	Incorporated in final design and communicated to contractors	Prior to award of contract
Construction work camps, stockpile	Disruption to traffic flow and sensitive receptors	· Determine locations before award of construction contracts	DSMC, RPMO	List of selected sites for construction work camps,	During detailed design phase

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
areas, storage areas, and disposal areas				hot mix plants, stockpile areas, storage areas, and disposal areas. Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	
Waste generation	Generation of solid waste, wastewater from labor camp and other construction waste may cause pollution	· Follow the principle of "Reduce, Reuse, Recycle, and Recover" · Prohibition of unwanted littering and discharge of waste. · Solid waste is either managed in a pit or disposed in municipal collection system.	Contractor	Contractor's records. Visual inspection	Visual inspection by RPMO & DSMC-ESS on monthly basis
Sources of materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, resulting water logging, and water pollution	· Prepare list of approved quarry sites and sources of materials	DSMC, RPMOS	List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of quarry sites	During detailed design phase, as necessary with a discussion with detailed design engineers and PIUs suitability of sources and permit for additional quarry sites if necessary.
EMP Implementation Training	Impact to the environment, workers, and community	· Project manager and contractors should be trained on EMP implementation, spoils management, standard operating procedures (SOP), health & safety (H&S), Labor Act (1992)	PMO, RPMOs, and DSMC. Contractor's Environmental Supervisor	Record of completion (Safeguards Compliance Orientation) Contractor records for EMP implementation at worksites	During the detailed design phase before the mobilization of workers to site
2. During Construction Activities					
A. Physical Characteristics					
Topography landforms, geology, and soils and river morphology and hydrology	Sand, gravel or crushed stone will be required for this subproject. Extraction of natural aggregate materials may cause localized changes in topography and landforms (if on land) or river morphology and	· Utilize readily available sources with environmental clearance and license · Borrow areas and quarries comply with environmental requirements · Coordinate with local authorities for quarrying from rivers. Alternative sources should be identified.	Contractor	Records of sources of materials	Monthly by RPMOS

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	hydrology (if on the river).				
Water quality	Trenching and excavation, run-off from stockpiled materials and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall, which may cause siltation and reduction in the quality of adjacent bodies of water.	· Spoils management plan. · Reuse excess spoils and materials · Disposal site in designated areas. · Earthworks during dry season · Stockyards at least 300m away from watercourses. · Fuel storage area away from water drainage · Take precautions to minimize the overuse of water · Prevent wastewater into water sources. · Ensure safe water diversion · No obstruction in flowing water.	Contractor	Areas for stockpile storage of fuels and lubricants and waste materials; Number of silt traps installed along trenches leading to water bodies; No visible degradation to nearby drainage, water bodies due to construction activities	Visual inspection by RPMOS and DSMC-ESS on weekly basis Frequency and sampling sites to be finalized during detailed design and final location of subprojects components
Air quality	Work at the dry season and transporting construction materials may increase dust, carbon, monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons in air environment	· Use of physical controls, sprays, covers, compaction, screening, enclosure, windbreaks, binders and road surfacing · Cover delivery trucks during transportation · Construction vehicle's speed limited to 30kph. · Use of vehicles complying with NVMES, 2069 · Prohibition of open burning of solid waste. · Minimize stockpile height	Construction Contractor	Location of stockpiles; Number of complaints from sensitive receptors; Heavy equipment and machinery with air pollution control devices; A certification that vehicles are compliant with air quality standards.	Visual inspection by RPMOS & DSMC-ESS on monthly basis Frequency and sampling sites to be finalized during the detailed design stage and final location of Subproject components
Acoustic environment	Temporary increase in noise level and vibrations by excavation equipment, and the transportation of materials, equipment and people. However, the proposed subproject pipeline will follow ROW alignment	· Prepare work schedule with community consultation and local administration · Overtime work restricted low noise generating equipment. · Minimize drop heights · No horns until necessary · Use modern vehicles and machinery with low noise emissions · Maintain low noise levels · Warning signs in noise hazard areas. Workers must wear hearing protection there. · Identify vibration risk to nearby structures. Take caution working in such areas.	Contractor	Number of complaints from sensitive receptors; Use of silencers in noise-producing equipment and sound barriers; Equivalent day and night time noise levels	Visual inspection by RPMOS & DSMC-ESS on monthly basis
Aesthetics		· Prepare a debris disposal plan.	Contractor	Number of complaints from	Visual inspection by

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	Interference with the enjoyment of the area and creation of unsightly or offensive conditions	· Minimize stockpile size · Clear wastes regularly · Avoid stockpiling of excess spoils. · Cover delivery trucks during transportation. · Clean roads. · Use screening enclosure shade cloth, temporary walls · Clean site regularly. · Follow the principle of "Reduce, Reuse, Recycle, and Recover"		sensitive receptors; Worksite clear of hazardous wastes Worksite clear of any wastes unutilized materials, and debris Transport route and worksite cleared of dirt	RPMOS & DSMC-ESS on monthly basis
B. Biological Characteristics					
Biodiversity	Activities in WUSC acquired area. There are no protected areas in or around subproject sites.	· Tree cutting will not be required for this project.	Contractor	PIU and PMO to report in writing the number of trees cut and planted if any (during detailed design stage) Some complaints from sensitive receptors on disturbance of vegetation, poaching fishing, etc.	Visual inspection by RPMOS & DSMC-ESS on monthly basis
C. Socioeconomic Characteristics					
Existing provisions for pedestrians and other forms of transport	The road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject's pipeline will follow ROW alignment.	· Prepare suitable transportation routes · Safe passage for vehicles and pedestrians · Schedule material deliveries on low traffic. · Erect and maintain barricades if required · Inform through display board about nature, duration of construction and contact for complaints · Complete the work quickly nearby institution, place of worship, business, hospitals, and schools. · Consult with business and institutions for work schedules. · Restore damaged properties and utilities	Construction Contractor	Traffic route during construction works, including number of permanent signs, barricades, and flagmen on worksite; Number of complaints from sensitive receptors; Some signage placed at the project location. Number of walkways, signage, and metal sheets placed at project location	Visual inspection by RPMOS & DSMC-ESS on monthly basis
Socioeconomic status	Staffing will be required during construction. This can result in an increase	· Engage the local workforce. · Secure construction materials from local market.	Construction Contractor	Employment records; Records of sources of materials	Visual inspection by RPMOS &DSMC-ESS on monthly basis

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	in local revenue.			Records of compliance to Nepal Labor Act(1992), district wages	
Other amenities for community welfare	Civil works may result in an impact to the sensitive receptors such as residents, businesses, and the communities. Excavation may also damage infrastructure located alongside the roads.	· Identify location and nature of existing infrastructure before excavation · Minimize repeated disturbance to locals by integrating other forms of infrastructures. · Inform local about nature, duration and possible impacts of the construction and integrate their concerns · Promptly relocate infrastructure materials · Take prior permission from local authority for water use · Restore damaged properties and utilities to pre-work conditions. ·	Construction contractor	Utilities Contingency Plan Number of complaints from sensitive receptors	Visual inspection by RPMOS & DSMC-ESS on monthly basis
Community health and safety	Construction works will impede the access of residents and business in limited cases	· Restrict work force in designated areas. · Identify stockyard areas in consultation with local administration · Work on private land requires written permission of landowners and DSMC. · Prefer small mechanical excavator for trenching · Construct gender friendly toilets for workers · Prohibit alcohol and drugs on site · Prevent excessive noise; · Code of conduct for workers includes restricting workers in designated areas, no open defecation, no littering, no firewood collection, no fire except designated places, no trespassing, no residence at construction sites, and no obligation to potentially dangerous work · Maintain a complaint logbook in workers camp and take action promptly of complaints	Contractor	The number of permanent signs, barricades, and flagmen on worksites as per Traffic Management Plan (see Annex for sample); Number of complaints from sensitive receptors; Number of walkways, signs, and metal sheets placed at the project location Agreement between landowner and contractors in case of using private land as work camps storage areas etc.	Visual inspection by RPMOS & DSMC-ESS on weekly basis Frequency and sampling sites to be finalized during detailed design and final location of sub-project components
Workers Health & Safety	There is invariably a safety risk when construction works such	· Comply Labor Act (1992) of GoN · Train all site personnel on environmental health and safety	Contractor	Site –Specific H&S plan Equipped first-aid stations Medical insurance coverage	Visual inspection by RPMOS (monthly) and DSMC-ESS on a weekly basis.

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working at height and excavation works.	· Exclude public from worksites · Provide personal protective equipment to workers and ensure their effective usage · Document procedures to be followed for site activities; and · Maintain accident reports and records. · Make first aid kits readily available · Maintain hygienic accommodation in work camps. · Ensure uncontaminated water for drinking, cooking and washing, · Assure clean eating areas · Make sure sanitation facilities are readily available · Provide medical insurance coverage for workers; · Provide orientation for guest visitors · Ensure that visitors do not enter hazard areas unescorted; · Require workers to wear high visibility clothes · Ensure moving equipment is outfitted with audible backup alarms; · Chemical and material storage areas need to be marked clearly · Hearing protection equipment enforced in noisy environment		for workers Number of accidents Records of supply of uncontaminated water Condition of eating areas of workers Record of H&S orientation training Availability of personal protective equipment at construction site % of moving equipment outfitted with audible back-up alarms Signage for storage and disposal areas Condition of sanitation facilities for workers	Frequency and sampling sites to be finalized during detailed design and final location of sub-project components
D. Historical, Cultural, and Archaeological Characteristics					
Physical and cultural heritage	There are no archaeological, paleontological, or architectural sites of significance listed by local, national authority a nd UNESCO.	· Stop work immediately to allow further investigation if any findings are suspected.	Contractor	Records of chance finds	Visual inspection by RPMOS and DSMC-ESS on Monthly basis.
E. Others					
Submission of EMP implementation Report	Unsatisfactory compliance to EMP	· Appointment of EMP supervisor · Timely monitoring reports with field photographs	Contractor	Availability and competency of appointed supervisor Monthly report	Monthly monitoring report to be submitted by RPMOS to PMO

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
					PMO to submit semi-annual monitoring report to ADB
Post Construction Activities	Damage due to debris, spoils, excess construction materials	· Remove spoils wreckage, rubbish, or temporary structures no longer required; · All excavated roads shall be reinstated to original condition. · All disrupted utilities should be restored · All affected structures rehabilitated /compensated · The construction camp needs to clear of spills e.g. oil, paint, etc. and other pollutants after dismantling · All hardened surfaces shall be ripped; all imported materials shall be removed and all temporary services shall be cancelled · Request PMO/PIU in writing that worksites and camps are vacated and restored to pre-project conditions	Contractor	RPMOS/PMO report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed, and (iv) worksite cleanup is satisfactory.	Before turnover of completed works to WUSC
Environmental legislation compliance	Lack of awareness in project managers and WUSC about legislations and IEE requirements	· Strengthen capacity of WUSC and project staffs · Ensure compliance with NDWQS	PMO, RPMOs, DSMC, and WUSC	Monitoring reports and checking operations against O&M manuals and permits/clearances	After commissioning of systems and semi-annually
Drinking water supply system	Delivery of unsafe Water	· Prepare operations and maintenance plan · Proper handling and storage of calcium Hypochlorite · Ensure qualified persons to handle disinfection, safe storage of chemicals · Ensure capacity of WUSC to implement quick response to hazardous chemical spills · Implement SPS-complaint EMP and a water safety plan · Monitor water quality	PMO, RPMOs, DSMC, and WUSC	Water Quality reports WTP records in the log book	During O&M of the system Quarterly monitoring
	Excessive algal growth in reservoirs.	· Close water tanks all the time · Clean reservoirs as per the O&M schedule.	WUSC	Water quality results	During O&M of the system. Daily maintenance of chlorine residual, cleaning.
Mishandling of chlorine	Excessive exposure to chlorine, hypochlorous acid, and hypochlorite ion	· Ensure proper storage and handling practices for chemicals · Ensure the knowledgeable and skilled person is	WUSC	Water quality test	

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	results in irritation of the esophagus, a burning sensation in the mouth and throat, and spontaneous vomiting.	in charge of chlorine handling · Ensure use of PPE while using chemicals; · Use of chlorine as per WHO guideline			
Sanitation facilities (toilets and septage disposal site)	Contamination of land or waterways due to overflow of septic tanks and the uncontrolled dumping of septage	· The subproject incorporates a pilot for the controlling disposal of septage. This is to reduce the likelihood of uncontrolled septage disposal to land and local waterways (nallas). Further septic tanks will be designed to ensure maximum retention is achieved and will be emptied at the required frequency (min every 3 years). Households will be educated on the above to further reduce the likelihood of septic tank overflows and uncontrolled dumping of septage.	WUSC, DSMC, RPMOs, and PMO for education campaign	Sanitary inspection reports. Water quality reports from test pits near tubewell sites	During O&M of the system.

D. Environmental Monitoring Program

Environmental monitoring will be done during construction on three levels:

(i) Monitoring the development of project performance indicators by the PMO-ESS;

(ii) Monitoring implementation of mitigation measures by the Contractor; and

(iii) Overall regulatory monitoring of environmental issues by the PMO.

In addition to regular monitoring on-site (at the subproject level) by the ICG and DSMC-ESS on the EMP implementation of the mitigation measures, monitoring of key environmental parameters is proposed. Table 30 presents the indicative environmental monitoring plan for the subproject, which includes environmental parameters, with a description of the sampling stations, the frequency of monitoring, applicable standards, and responsible agencies. This will be updated during detailed design to ensure EMP and monitoring program is commensurate to the impacts of the subproject.

Table 26: Environmental Monitoring Program

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

E. Institutional Capacity Development Program

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

WUSC does not have the capacity to monitor the quality of supplied water as prescribed in the NDWQS and its Directives. Although monitoring kits and laboratory rooms will be provided, it does not guarantee that WUSC would be able to handle them for effective monitoring. DWSS has five regional laboratories; however, some are not functioning well due to lack of human resources. For effective monitoring, it is recommended that a licensed and accredited laboratory be engaged in water quality monitoring during the first 2-3 years of operation during when WUSC will enhance its capacity by actively participating. After the engagement period and initial phase of "learning by doing", there should be continuing periodic training to sustain WUSC's capacity. The cost of monitoring during operation takes account of a licensed laboratory for water quality monitoring and training WUSC. A Water Safety Plan is included in subproject design and will oblige the operator to carry out water quality monitoring accordingly. The amount of NPR 500,000 will be provided annually to implement the Plan. There will be sufficient fund to include training by the licensed and accredited lab while monitoring water quality.

The DRTAC-ESS will be responsible for environmental awareness training and management by both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. Typical modules would be as follows: (i) sensitization; (ii) introduction to the environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers before deployment to work sites. The proposed training project along with the frequency of sessions is presented in Table 31.

Table 27: Training Program for Environmental Management

Items	Pre-construction	Construction	
Training Title	Orientation workshop	Orientation program/ workshop for contractors and supervisory staff	Experiences and best practices sharing
Purpose	To make the participants aware of the environmental safeguard requirements of ADB and GON and how the project will meet these requirements	To build the capacity of the staff for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and GON	To share the experiences and best practices aimed at learning lessons and improving implementation of EMP
Contents	Module 1: Orientation ADB Safeguards Policy Statement Government of Nepal Environmental Laws and Regulations Module 2: Environmental Assessment Process ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements Review of environmental assessment report to comply with ADB requirements Incorporation of EMP into the project design and contracts	Roles and responsibilities of officials/contractors/consultants towards protection of the environment Environmental issues during construction Implementation of EMP Monitoring of EMP implementation Reporting requirements	Experiences on EMP implementation – issues and challenges Best practices followed
Duration	1 day	1 day	1 day on a regular period to be determined by PMO, ICGs, and (provide if PMC/DRTAC or DSMC)
Participants	Executing and implementing agencies, PMO, and PMO staff (technical and environmental) involved in the project implementation	PMO ICGs Contractors	PMO ICGs Contractors

F. Staffing Requirement and Budget

Costs required for implementing the EMP will cover the following activities:

(i) Updating IEE, preparing and submitting reports and public consultation and disclosure;

(ii) Application for environmental clearances; and

(iii) Implementation of EMP, environmental monitoring program, and long-term surveys.

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

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

The operation phase for mitigation measures are good operating practices to mitigate the environmental impacts of this phase & the responsibility remains to WUSC. WUSC will conduct all monitoring during operation and maintenance. The Water Safety Plan, included in each subproject design, will allocate NPR 500,000 annually for operation and maintenance particularly water quality monitoring. If a licensed laboratory is engaged for the first 2-3 years of operation for training purposes, the cost can be accommodated under the Water Safety Plan.

The cost of awareness program & WSP during contract is NPR 600,000.00 under provisional sum.

The indicative cost of EMP implementation is shown in Tables 28.

Table 28: Indicative Cost of EMP Implementation

SN	Particulars	Stages	Unit	Total Number	Rate (NPR)	Cost (NPR)	Cost covered by
A.	Monitoring Measures						
1.	Air quality monitoring	- Pre-construction - Construction	Per location	3	450000.00	300,000.00	Civil works contract
2.	Noise levels monitoring	- Pre-construction - Construction	Per location	2	30000.00	60,000.00	Civil works contract
B	Capacity Building						
1.	(i) Orientation workshop for officials involved in the project implementation on ADB Safeguards Policy Statement, GoN environmental laws and regulations, and environmental assessment process; (ii) induction course contractors, preparing them for EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during implementation; and (iii) lessons learned information sharing	Module 1 – immediately upon engagement of the (provide if DRTAC or DSMC) environmental specialists Module 2 – before award of civil works contracts (twice a year for 4 years) Module 3 – before start of Phase 2 and upon completion of the project	lump sum	1 8	Module 1 – 300000.00 Module 2 – 100000.00 Module 3 – 200000.00	300,000.00 800,000.00 200,000.00	DRTAC
C.	Human Resources Costs						
1	PMO Environment Safeguards Officer	Construction phase	1	20	65000.00	1300000.00	Budget covered through DRTAC
2	ICG Environment Safeguard Assistants	Construction phase	2	20	25000.00	1,000,000.00	Budget covered through DSMC
3	PMO Environmental Safeguard Specialist	Responsible for environmental safeguards of the project at PMO level	person months (spread over entire project implementation period)	24	350000.00	8,400,000.0	Remuneration and budget for travel covered in the DRTAC contract
4	DSMC Environmental Safeguard Specialist	Responsible for environmental safeguards of the project at ICG level	person months (spread over entire project implementation period)	20	300000.00	6,000,000.0	Remuneration and budget for travel covered by the DSMC contract
D.	Administrative Costs						
1.	Legislation, permits, and agreements	Permit for excavation, tree-	Lump sum		XXX	XXX	These consents

SN	Particulars	Stages	Unit	Total Number	Rate (NPR)	Cost (NPR)	Cost covered by
		cutting permits, etc.					are to be obtained by the contractor at his expense.
		Environmental assessment and environmental clearances as per EPA 1996 and EPR, IEE presentation at review committee related expenses	Lump sum	1	50,000	50,000	50,000
E.	Other Costs						
1.	Public consultations and information disclosure	Information disclosure and consultations during preconstruction and construction phase, including public awareness campaign through media	As per requirement	Lump sum		300,000	Covered under DSM Contract
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information dissemination)		Lump sum		200,000	PMO cost
3.	Any unanticipated impact due to project implementation	Mitigation of any unanticipated impact arising during construction		Lump sum	Contractor's liability	As per insurance requirement	Civil works contract – contractor's insurance defect liability period
TOTAL						2,0,410,000	

However, the provisional amount of NPR 1,000,000.00 has been provided to execute all necessary environmental mitigation measures.

G. Implementation Schedule

Environmental management will be implemented from the detailed design phase through to procurement, construction, and operation. Table 29 presents the indicative timeframe of key EMP activities about the subproject implementation schedule. Similarly, Table 30 presents training for capacity building programs for the project.

Table 29: Environmental Management Implementation Schedule

Activity			**Indicative Time Frame**
SUBPROJECT IMPLEMENTATION			
	Detailed Design & Bidding Documents		
	Procurement		
	Construction		
	Defects Liability Period		
	Operation and Maintenance		
ENVIRONMENTAL MANAGEMENT			
	Overall		
	1.	Design Review and Technical Audit Consultant of Environmental Specialist	Starting (4 yrs of intermittent inputs)
	2.	PMO's submission of Environmental Monitoring Report (EMR)	
		Monthly EMR for Subproject's Monthly Progress Report	8th day after effective month
		Semi-Annual EMR during construction for submission to ADB	8th day after effective 6-months
		Annual EMR for submission to ADB	8th day after effective year
	Before Construction Mobilization		
	1.	Finalization of EMP, (if applicable) revision of IEE	
	2.	ADB review & approval of revised IEE & EMP.	
	3.	Obtaining Government's approval of IEE Report	
	4.	Community preparation (including disclosure of Final IEE & its EMP)	
	5.	Establishment of baseline data (as set out in the EMP)	(shall have been done before award of contract)
	6.	Preparation of C-EMP by selected Contractor, review of C-EMP	before start of works on site
		against SPS-compliant EMP.	or establishment of construction-related facilities.
	Construction		
		Mobilization to Demobilization	
	1.	Implementation of mitigation measures and conduct of environmental effects monitoring following the C-EMP.	
	2.	Submission of Environmental Monitoring Report (EMR)	
		Monthly, by Contractor	5th day of the month following the effective month
		Quarterly, by Contractor or by Licensed Laboratory	3rd day of the month following the effective quarter
	Operation (potentially could start even before DLP is over)		
	1.	Implementation of mitigation measures & monitoring activities as	Starting Q/Q Y
		specified in the EMP	

Activity			Indicative Time Frame
	2.	Submission of EMR	Starting Q/Q Y
		Monthly, by Operator	5th day of the month following the effective month
		Quarterly, by Operator or (if applicable) by Licensed Laboratory	3rd day of the month following the effective quarter

Table 30: Proposed Topics for Capacity Building/Training

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

X. MONITORING AND REPORTING

RPMO will monitor and measure the progress of EMP implementation. The monitoring activities will relate to the project's impacts that are identified in the IEE. PMO, ICGs will compare the work completed and deviation from the original scope. They will also undertake site inspections and document review to verify the project comply with the EMP.

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

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

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

I. Conduct periodic visits to projects with adverse environmental or social impacts;
II. Conduct supervision and review by ADB's safeguard specialists/officers or consultants for projects with significant adverse social or environmental impacts;
III. Review the periodic monitoring reports submitted by EAs to ensure that adverse impacts and risks are mitigated, as planned and as agreed with ADB;
IV. Work with EAs to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies to re-establish compliance; and

V. Prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

XI. CONCLUSION AND RECOMMENDATION

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

The proposed subproject, and its components, is not located within or adjacent to environmentally sensitive areas.

The extent of adverse impacts is expected to be local, confined within the subprojects' main areas of influence, quarry or burrowing sites, waste disposal sites, and the routes to and from these sites. With mitigation measures in place and ensuring that the bulk of earthworks are completed before the onset of the rainy season, the potential adverse impacts during construction would be site-specific.

The few adverse impacts of moderate magnitude during construction will be temporary and short-term (i.e., most likely to occur only during peak construction). These will not be sufficient to threaten or weaken the surrounding resources. Mitigation measures, integral to socially and environmentally responsible construction practices, are commonly used at construction sites and are well known to Contractors. Hence, mitigation measures would not be difficult to implement.

During operation, the potential delivery of unsafe water can be mitigated with good operation and maintenance, prompt action on leaks, and complying with the required quality monitoring of supplied water as prescribed in the National Drinking Water Quality Standards Directives.

The proposed subproject will bring about: (i) the benefits of access to a reliable supply of safe and potable water; (ii) promotion of good hygiene and sanitation practices and reduced health and safety risks as positive impacts; and (iii) enhanced community health, improved quality of life and safe communities as outcomes.

Based on the above findings, the classification of the Diktel Water Supply and Sanitation Project Category B is confirmed, and no further special study or detailed EIA needs to be undertaken.

XII. LITERATURE REVIEWED

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Annex 1: Approved Terms of Reference

Government of Nepal
Ministry of Water Supply and Sanitation
Department of Water Supply and Sewerage
Third Small Towns' Water Supply and Sanitation Sector Project
PROJECT MANAGEMENT OFFICE
Panipokhari, Kathmandu

TERMS OF REFERENCE (ToR)

for

INITIAL ENVIRONMENTAL EXAMINATION

of

DIKTEL TOWN WATER SUPPLY AND SANITATION PROJECT

KHOTANG DISTRICT

Submitted by:	Submitted to:
Project Management Office, Third Small Towns' Water Supply and Sanitation Project, Department of Water Supply and Sewerage, Panipokhari, Kathmandu	*Ministry of Water Supply and Sanitation, Singhadurbar, Kathmandu*
Prepared by: TAEC Consult P. Ltd. – Integrated Consultants Nepal (P) Ltd. JV	

FEBRUARY, 2018

List of Abbreviations

ADB	Asian Development Bank
CBS	Central Bureau of Statistics
DC	Direct Current
DDC	District Development Committee
DI	Ductile Iron
DL	Distribution Line
DMA	District Meter Area
DSMC	Design Supervision and Management Consultant
DTW	Deep Tube Well
DWSS	Department of Water Supply & Sewerage
EA	Executing Agency
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EPR	Environmental Protection Rules
ES	Environmental Safeguards
FGD	Focus Group Discussion
GI	Galvanized Iron
GoN	Government of Nepal
GRC	Grievance Redress Committee
HDPE	High-Density Polyethylene Pipe
HP	Horse Power
IA	Implementing Agency
IEE	Initial Environmental Examination
IO	International Organization
kV	Kilo Volt
kVA	Kilo Volt Ampere
MoWSS	Ministry of Water Supply and Sanitation
NDWQS	National Drinking Water Quality Standard
NGO	Non-Governmental Organization
NPR	Nepalese Rupee
O&M	Operation & Maintenance
OBA	Output-Based Aid
OHT	Over Head Tank
PAM	Project Administration Manual
PMO	Project Management Office
RCC	Reinforced Cement Concrete
RPMO	Regional Project Management Office
RVT	Reservoir Tank

SS	Stainless Steel
SSTWSSSP	Second Small Towns Water Supply and Sanitation Sector Project
STW	Shallow Tube Well
STWSSSP	Small Towns' Water Supply & Sanitation Sector Project
TDF	Town Development Fund
TL	Transmission Line
ToR	Terms of Reference
TSTWSSSP	Third Small Towns' Water Supply & Sanitation Sector Project
VDC	Village Development Committee
WASH	Water, Sanitation, and Hygiene
WSSDO	Water Supply and Sanitation Division
WTP	Water Treatment Plant
WUA	Water Users' Association
WUSC	Water Users' & Sanitation Committee

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1. NAME AND ADDRESS OF THE PROPONENT

This Terms of Reference (TOR) has been prepared concerning the Feasibility Study Report to carry out the Initial Environmental Examination (IEE) of Diktel Town Water Supply and Sanitation Project in Khotang District. TOR for this IEE study of this project is needed as a reference to EPR 1997 (amendment 2007). The project proponent, Third Small Towns' Water Supply and Sanitation Sector Project (TSTWSSSP) of the Government of Nepal. The Department of Water Supply and Sewerage (DWSS), the Ministry of Water Supply and Sanitation (MoWSS), is responsible for the preparation of the IEE report.

Name of the Proponent:

Project Management Office

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:

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E-mail: info@stwsssp.gov.np

Website: www.sstwsssp.gov.np

2. BACKGROUND AND DESCRIPTION OF THE PROJECT

2.1. Project Background

In January 2000 the Government of Nepal endorsed the 15-year Development Plan for Small Towns' Water Supply and Sanitation to improve the health, economic and environmental living conditions of the people in small towns in Nepal. The project embraces the community managed demand responsive approach, where the community is involved in all aspects of planning and implementation of the town projects. The Asian Development Bank (ADB) has been providing financial assistance to this sector project. The Department of Water Supply and Sewerage (DWSS) is the Implementing Agency whereas the Ministry of Water Supply and Sanitation (MoWSS) is the Executing Agency.

The first phase of the Project, whose duration was 2001-2008, has already been completed and the people of 29 small towns have been benefitted by the Project. Upon the completion of the first phase and after finding positive impacts of the Project, the Government of Nepal decided to implement the second phase, with the name, Second Small Towns Water Supply and Sanitation Sector Project. Simultaneously after the successful completion of the second phase, DWSS has brought some changes on the Third Small Towns' Water Supply and Sanitation Sector Project (TSTWSSSP). For the implementation, formulation, and operation and maintenance of the Project, TSTWSSSP aims to have full participation of the users of the respective towns. The cost will also be shared by the users and GON.

The Project has many stakeholders such as WUSC, Project Management Office (PMO) of DWSS, Water Supply and Sanitation Division/ Sub-division Office, Regional Project Management Office (RPMO), Town Development Fund (TDF) and Design and Supervision and Management Consultant (DSMC) who are responsible for social mobilization, health and hygiene programs and preparation of social profiles.

Both the Nepali law and ADB policy require that the environmental implications of individual developments are taken into account in the planning and decision-making process, and that action is taken to reduce the adverse impacts to acceptable levels. This is done through the environmental assessment process, which has become an integral part of lending operations and Project development and implementation.

2.2. Objective of TOR and the IEE study

The main objectives of the TOR is to guide the subsequent IEE study, to produce a comprehensive and coherent IEE Report as per the Environmental Protection Act, 1997

and Environmental Protection Rules, 1997 (with amendments). The specific objectives of the proposed IEE study include:

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

2.3. Description of the Project

2.4. Location and Accessibility of the Project Area

The Project area of Diktel Water Supply and Sanitation Subproject lies in Rupakot Majuwagadhi Municipality, Khotang District, a hilly/mountainous district in Sagarmatha Zone in the Province 1 of Nepal. The municipality lies between Latitude 27^0 9' N to 27^0 16' N and Longitude 86^0 45' E to 86^0 50' E.

Rupakot Majuwagadhi Municipality was established on 5 March, 2017 after merging neighbouring nine VDCs, Nerpa, Chuiridanda, Nirmalidanda, Patheka, Kharmi, Jalapa, Nunthala, Bueipa and Bijayakharka with former Diktel Municipality. The former Diktel Municipality was established on 18 May 2014 merging the existing Diktel, Bamrang, Laphyang and Kahalle Village Development Committees. It is the district headquarter of Khotang district.

The municipality has 15 wards. Present day Rupakot Majuwagadhi has been formed by incorporating various VDCs with former Diktel Municipality. The formation of the ward of the Municipality has been presented in detail in table below. This has been done to avoid confusion among stakeholders and all social and HHs information of the service area have been collected before declaring the present day political jurisdiction.

Table 2-1 : Formation of the Municipality

Ward No of the Municipality	Formerly Ward No.
1	WN 1 to 3 of former Diktel Municipality
2	WN 4 to 6 of former Diktel Municipality
3	WN 7 to 9 of former Diktel Municipality
4	WN 13 to 15 of former Diktel Municipality
5	WN 10 to 12 of former Diktel Municipality
6	WN 1 to 9 of former Nepra VDC
7	WN 1, 2, 5, 7 and 9 of former Chiuridanda VDC
8	WN 3, 4 , 6 and 8 of former Chiuridanda VDC
9	WN 1 to 9 of former Nirmalidanda VDC
10	WN 1 to 9 of former Patheka VDC
11	WN 1 to 9 of former Kharmi VDC
12	WN 1 to 9 of former Jalapa VDC
13	WN 1 to 9 of former Nunthala VDC
14	WN 1 to 9 of former Buelpa VDC
15	WN 1 to 9 of former Bijaykharka VDC

Diktel Bazaar can be reached from two major cities, Kathmandu and Biratnagar, using different routes. The route along Kathmandu-Khurkot-Ghurmi-Diktel is about 255 km. Regular-Local Jeep and bus services are available from Kathmandu. Another route is from Biratnagar-Dhankuta-Hile-Leguwaghat-Bhojpur-Diktel. This route is about approximately 285 km. No regular bus services are directly available on this route. The stretch of the Middle Hill Highway (Ghurmi-Diktel-Bhojpur) passes through the Diktel Municipality.

The project area has an airport for domestic air flights. The nearest airport from Diktel Bazaar is Khanidanda Airport. This new airport was established in 1999 and is about 6 km from the Diktel Bazaar. Another closer airport is Lamidanda airport which is located around 11 Km west of the Bazaar. Nepal Airlines and Tara Airlines Pvt. Ltd operate their services from Kathmandu and Biratnagar to these airports.

The municipality is in a hilly region with altitudes ranging between 500 (Phedi) m to 2600 m (Rupakot) above mean sea level (amsl) with an average altitude of 1623 meters.

The Municipality area has warm and cold temperate types of climate. A warm temperate type of climate is observe between 1,000-2,000 meter elevations, while a cold temperate type of climate exist in between 2,000-3,000 meters, particularly in the mid-hills of the Nepal. The proposed service area elongates between about 1501 to 1815 m elevation.

The rainy season starts from June and ends in September when the monsoon blows across the Bay of Bengal and delivers about 80 % of the annual rainfall. During the dry season, the northwest wind brings dry cold wind bearing little moisture and accounts for the remaining 20% of the annual rainfall. The annual average rainfall recorded at Diktel station (Station NO. 1222) is 1,191 mm.

Diktel Bazaar is one of the major market centers in this area. People sell various farm products like *Alainchi, Amliso, Aakabare*, potato, *Rudraksha*, tea, ginger, honey, and citrus fruits. Metal products like water jars, sickles, fry pans; livestock products, woolen blankets ghee, khuwa; and bamboo products like *Doko, Mandra* are sold on a large scale. There is a weekly Hat bazaar in the project area.

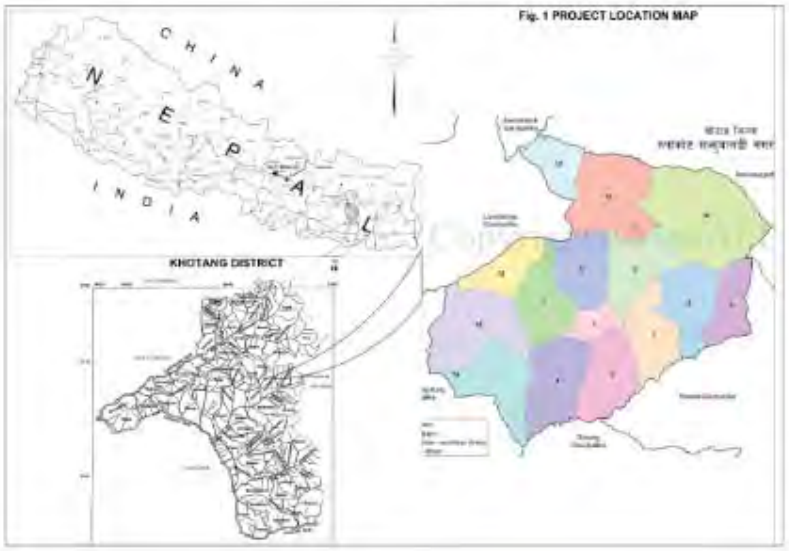

Figure 2-1: Project Location

Table 2-2: Salient Features of the Project

S.N.	Items	Description
1	Name of Project	Diktel Town Water Supply and Sanitation Project
2	Type	Gravity
3	Study Level	Detailed
4	Location Area	
	Province	1
	Zone	Sagarmatha
	District	Kholang
	VDC/Municipality	Rupakot Majuwagadhi Municipality
	Ward	Partial area of Ward No. 1, 2 and 3 of the Municipality (Ward 1,2,3,4,5 & 9 of former Diktel Municipality)
5	Available Facilities	
	Road	Middle Hill Highway (Ghiurni-Diktel-Bhojpur)
	Supply Water System	DWSS/Municipality/WUSC and Hand pumps
	Electricity	Available
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
6	Social Status	
	Present HHs Numbers (2016)	1,049
	Present Population (2016)	7,622
	Base Year Population (2015)	6,069
	Design Year Population (2036)	10,934
	Weighted Growth Rate % (WGR)	1.54
	Projected HHs in Design Year (based on WGR)	~1,061
7	Water Demand (MLD)	
	Base Year (2016)	0.765
	Design Year (2036)	1.037
8	Source Characteristics	
	Source Name	Existing source Rambai and Majh Khola Proposed Chebbe Khola
	Source Type	Existing source Rambai and Majh Khola -Gravity+ Proposed Chebbe Khola-Gravity
	Source Location	All sources are within the municipality
	Safe Yield (lps)	Existing Rambai and Majh Khola – 8.0 lps+ Proposed Chebbe Khola-Gravity – 5 lps

S.N.	Items	Description
9	Type of Structures	
	Intake	2 Nos Existing Stream Intake + 1 No of Proposed Spring Intake
	Storage Reservoir (No-Capacity)	1N-50cum + 1N-150 cum+1-175 cum. (all proposed)
	Valve Chamber (Bricks/RCC/Surface Valve Box)	4/10/10
	Office Cum GH /Guard House	1/2
	Household Connection	1,049
	Fire Hydrant	6
	Transmission Line and BDS (meter)	Cumulative of 16.176
	Distribution Network (meter)	24,351
10	Total Cost of WS Component (Inclusive of all) NRs	296,309,339.45
11	Cost Sharing Arrangement	
	GON Component (75 %)	207,416,537.62
	TDF Loan (25 %)	74,077,334.66
	WUSC's Commitment for O&M as upfront (Cash)	14,815,466.97
12	Tariff	
	Up to 6 cum/monthly (NRs)	210
	7 to 10 cum/monthly (NRs)	53
	11 to 20 cum/monthly (NRs)	79
13	Economic Analysis	
	FIRR (Base case) %	9.14%
14	Environment	
	ADB Category	B, Only IEE necessary
	IEE finding	No significant adverse impact.
15	Per Capita Cost for W/S component	
	Base Year	36749.3
	Design Year	16969.9

2.5. Sub-project Components

The Diktel Town sub project has been conceptualized as a totally gravity surface water system . The overall concept has been develped with distribution system comprising of bulk water system (BDS) and household distribution system (DS). In this concept, whole service area shall be divided in number of service areas with dedicated storage reservoirs, also

referred as sub-system, for that particular service area.Therefore, the main system comprises of number of sub system. Altogether, the Diktel town system comprises of three sub systems.

All the transmission components of the system; intake, transmission line, WTP and allied structures, have been designed with a slightly higher capacity (10 to 20%) than the ever recorded low discharge in the corresponding sources. Therefore, a transmission system for five lps capacity has been designed for the Chebbe Khola system. The following sections describe the proposed sub project components.

2.6. Intake

Existing intakes for the proposed gravity source shall be rehabilitated to increase discharge in the respective transmission line. An additional spring intake has been proposed at Chebbe Khola bank.

2.7. Transmission Main

The total length of the transmission main from Ramba Khola and Majh Khola intakes to the proposed WTP is about 4 km. and 0.9 km., respectively. As the pipe used in the existing transmission lines from both the Khola to Diktel Bazaar are sub-standard in pressure ratings (4 kgf to 6 kgf pressure), it is not possible to incorporate existing pipeline in this project. Therefore, a cumulative length of about 5 km pipe of transmission has to be replaced by a bigger pipe diameter with the appropriate pipe rating.

In addition to the upgrading of the existing transmission line, an additional 5.76 km. length of the transmission line is necessary to transport the water of the spring source from Chebbe Khola to Diktel Bazaar.

The cumulative length of the pipe used in transmission system and bulk water system is about 18.178 km.

2.8. Thrust Blocks, Saddle Blocks and Thrust Beam

Thrust blocks have been proposed for DI pipes (transmission and distribution mains for both alternatives) from being moved by forces exerted within the pipes arising from the internal pressure of the pipeline or the flow of water hitting bends, tapers and closed or partially closed valves. Typical thrust blocks have been designed for a pressure of 24 kg/sq cm for both transmission lines and distribution line.

Similarly, Thrust Beam and Saddle Blocks are proposed for DI pipes laid up in sloppy areas and un-buried portions. All saddle blocks are proposed to be anchored with concrete at the center of each pipe to prevent movement. Provision of RCC support for the stretches of

buried and un-buried DI pipe line which are laid-up in sloppy area has been made to prevent pipe movement.

2.9. Water Treatment Plant

The cumulative design capacity of the water treatment plant is about 1.382 MLD or 1382.4 cum per day (57.6cum/hour).

This water treatment plant (WTP-1) has been proposed to treat water of the existing sources. It has been proposed near Thapagaon Nigale (1861m) after combining the two existing sources Ramba and Majh Khola. As the existing system does not have any treatment facilities, a conventional type treatment plant comprising of a horizontal roughening filter (HRF) and a slow sand filter (SSF) has been proposed.

The proposed roughening filter (HRF) of WTP-1 has been designed for a flow capacity of 36 cum/hour with a filtration rate of 2 cum/sq.m/hr. Four numbers of identical units have been proposed. The size of each unit has been calculated as 4 m x1.7 m. The inlet and outlet chambers are 90 cm wide. The overall size of each chamber is 4m x 8.8m. Each unit comprises of three chambers for the fill filter material.

A Slow Sand Filter (SSF) has been proposed. The filtration rate of 0.2 cum/sq.m/hr has been adopted for design. It will have a depth of 2.8 m including a freeboard of 50 cm. Three chambers (each 5 m x 12 m) have been proposed.

The water treatment plant WTP-2 has been proposed near Diktel Gaon to treat water from the new spring source. The combination of roughening filter and slow sand filter has been proposed for this new source.

Similarly, the proposed horizontal roughening filter (HRF) of WTP-2 has been designed for a flow capacity of 21.6 cum/hour with a filtration rate of 2cum/sqm/hr. Two numbers of identical units have been proposed. The size of each unit has been calculated as 4m x 1.7m. The inlet and outlet chambers are 90cm wide. The overall size of each chamber is 4m x 8.8m. Each unit comprises of three chambers for the fill filter material.

The filtration rate of 0.2cum/sqm/hr has been adopted for design in a slow sand filter (SSF) proposed at WTP-2. It will have a depth of 2.8m including a free board of 50 cm. Two chambers (each 5m x 12m) have been proposed.

Each WTP has its dosing sytem before distributing water to the RVTs. The dosing system comprises of electronic dosing pump with FRP tank and stirring device. As the pump is automatic dosing pump of the electronic type, close housing is recommended.

2.10. Service Reservoir

The total capacity of the service reservoir provided in the Diktel Bazaar Town water supply sub-project is about 375 cubic meters. As all the existing reservoirs are made of masonry, quite old with leaks, three RCC reservoirs (Table 2-3) have been proposed with different shapes as per the appropriate site conditions.

Table 2-3: Proposed Service Reservoirs

SN	Location	TYPE	Capacity (CUM)	CODE
1	Existing Tank Area (North of S. Area)	RCC Circular	150	A
2	Near Police Office Area (South of S. Area)	RCC Circular	50	B
3	Near Army Base Camp (Main Bazaar)	RCC Rectangular	175	C

2.11. Distribution Main

The distribution system comprises of a pipe network, which are looped in certain cases and branched in other. The network has been analyzed using EPAnet, a design analytical software tool. The entire system has been designed using Polyethylene (PE) and Ductile Iron (DI) pipes. For proper saddle arrangements at household connections in the distribution pipe, the minimum diameter of the distribution pipe has been adopted as 50mm.

Two types of pipes have been proposed in the distribution network; Ductile Iron (DI), and PE pipes. However, couple hundred meters of GI pipes have been used in Kholsi Crossing and at reticulation line at household distribution chamber. The total pipe length of proposed distribution system works out to be 24,351 km as shown in table 2-4.

The total pipe length of the proposed distribution system works out to 23,552 m. A total of 3,503 m GI pipes (50 and 65mm dia) of the medium class has been proposed, where PE pipes are not suitable. The total length of the PE pipes of 50 to 110 outer diameters is 19,871 m.

Table 2-4: Pipe Used for Distribution Network (in meters)

PE PIPES	Pressure Rating		
	16 Kg /sqcm	10Kg /sqcm	6Kg /sqcm
PE pipe 50 OD	3,487	14,692	
PE pipe 63 OD		3,267	
PE pipe 75 OD		456	945
PE pipe 90 OD		18	700
PE pipe 110 OD		0	390
Sub-Total	**3,487**	**18,633**	**2,035**
DI SPIGOT-SOCKET			
GI pipe of ND of 150	196		
Sub-Total	196		
Total	**24,351**		

The pipelines will be laid along both sides of wider roads and paved roads to avoid the pavement demolition and long house connections. Therefore, double pipelines are essential to avoid long household connections. However, to reduce the initial investment, all other narrow and rural roads will be provided with only one pipe at either side of the road.

The three sub-systems are also interlinked and water from one sub-system can be supplied to another sub-system in case of maintenance and other unforeseen events. Appropriate valve chambers have been proposed to regulate this.

2.12. House Connection

The system has been designed for private house connections. All the existing connections will be replaced by new HHs connections with identical meters. The total households of the project area were about 1,049 during 2016. It has been estimated that household connections in the project area will be 1,081 during 2018 AD with the adopted population growth rate. Most of the connections will be private.

The house connections shall comprise of about 12 m pipe PE pipes and water meters. The house connection pipe shall be PE-100 (20mm outer diameter of rating PN-16). Tapping of household connections in PE and GI pipes have been proposed from PE saddles with ferrules. The saddles for PE pipes shall be of electrofusion type whereas, in case of GI pipes, the saddles shall be of general type tightened with screws/ nut bolts.

Distribution from DI pipes shall be discouraged, if possible, by providing reticulation lines. However, provisions of the saddle for distribution from DI pipes have also been considered.

Dry dial volumetric rotary piston type water revenue meter for all house connections are proposed. These recommended household water meters have 15mm ND.

2.13. Appurtenances

These shall primarily comprise of valve chambers to house flow control valves etc. Altogether 24 valve chambers are expected in the system. RCC valve chambers have been proposed since almost all urban roads are narrow and subjected to traffic.

2.14. DMA Establishment

One increasingly common principle of managing a large water network is to sub-divide it into some areas, typically of between 500 and 2000 connections, each established area having a defined and permanent geographical and/or hydraulic boundary. Such an area is known as a District Management Area or, more commonly, a District Meter Area (DMA). Ideally, each DMA has a single source of supply to maximize the accuracy of the data, with

a strategically placed and suitably sized meter installed at the inlet that is capable of accurately measuring the flow into the area. In this way, it is possible to regularly quantify the leakage level in each DMA so that the leakage location activity is always directed to the worst parts of the network.

An important factor in lowering and subsequently maintaining a low level of leakage in a water network is pressure control. The division of the network into DMAs facilitates the creation of a permanent pressure control system, thus enabling pressure reduction in DMAs which reduces the level of background leakage, the rate of flow of individual burst and the rate of the annual burst frequency.

To manage NRW in the proposed system, the total system has been divided primarily into 3 DMAs. All areas of Matthilo Bazaar have been proposed to be served by RVT A (located at the existing RVT site) with a capacity of 150 cum. These areas which are in the upper level of the service area have been termed as DMA-A. The middle portion of service area has been proposed to be served by RVT-B, located at the middle of the bazaar and termed as DMA-B. Similarly, the third service reservoir RVT-C which serves HHs situated at lower elevations has been termed as DMA-C.

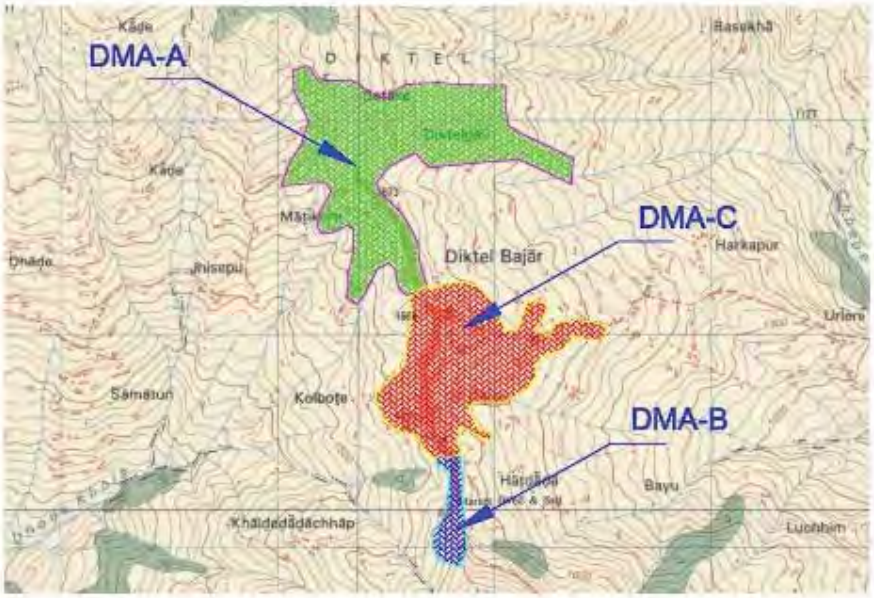

Figure 2-2: District Metering Area (DMA) of the Proposed System

2.15. Sanitation Components

The sanitation component is considered as an integral part of the water supply project so as to minimize the coverage gap between water supply and sanitation components. Recent innovations in sanitation planning include a more integrated planning approach; a greater emphasis on the actual needs and financial capacity of the users, encompassing close consultation with all stakeholders and a systems approach to sanitation, integrating all domains of the town. Local authorities, utilities, and donors have to be convinced that commitment and effective participation from all stakeholders are needed to achieve adequate and inclusive sanitation services. Ensuring effective individual participation in individual capacity, collective capacity, and institutional capacity is fundamental for success.

Integration between the various components of environmental sanitation – excreta, domestic/industrial wastewater; solid waste and stormwater has to be done. Better use of generated synergies through integrated approaches could lead to more sustainable and

cost-effective solutions following a) The Master Plan or Comprehensive Development Plan approach and b) A holistic approach in establishing a service delivery chain from collection to reuse and disposal

There are three important approaches to sanitation planning for urban and peri-urban areas of developing countries which recognize that stakeholder involvement is a prerequisite to effective planning and seek to overcome the shortcomings of top-down and supply-driven approaches.

- The Strategic Sanitation Approach: Strategic planning is an integrated, comprehensive approach that emphasizes not only the technical and economic aspects but also the challenges of institutional capacity and public participation. The strategic planning is more flexible and responsive, less static and not overly complex in the context of the conventional master planning.
- Community-Led Urban Environmental Sanitation Planning: Community-Led Urban Environmental Sanitation Planning is a demand-led approach for the planning and implementation of environmental sanitation infrastructure and services in deprived urban and peri-urban communities. It is a multi-sector and multi-actor approach which emphasizes the participation of all stakeholders from an early stage. It places the community at the core of planning and implementation.
- Sanitation 21: Sanitation 21 is a comprehensive approach for the assessment of planned or unplanned sanitation situations adopting a planning framework, and it does not provide an in-depth guidance for planners and operators. The Sanitation 21 approach suggests that technical planners and designers have to develop more sophisticated planning systems that respond to the needs of rapidly growing cities/towns expediting making technical decisions.

The main issues that need to be addressed in the sanitation components as they would have consequential impacts on all the activities are:

- Toilets/septage/sludge management
- Drainage system
- Solid waste management
- Institution building/strengthening
- Raising awareness

The basic public sanitation requirement of the project area is the construction of toilets for private, a public institution for the betterment of facilities in this area. These facilities also inculcate behavior of toilet use among the general public. The thrust point will be to avail

basic sanitation facilities and declare the whole VDC as ODF. The aim of sanitation is universal coverage. ODF, based on multiple approaches like basic sanitation package, School sanitation and hygiene education program, Community-led total sanitation, School-led total sanitation, Local body-led total sanitation, is considered as the bottom line for program intervention. As per the socio-economic survey, water seal/ pour flush latrines are the most popular type of latrines used by the project area households. Some of the more affluent households had cistern-flush latrines in their households. Many types of hygienic latrines can be promoted in the service area.

- Latrines with Septic Tanks
- Pour-Flush latrines

Features of such latrines and their potential disadvantages shall help the concerned stakeholders in being able to make the right choice depending on the physical characteristics, investment and people's preferences and habits. The World Bank supported Informed Choice Manual technical options for water and sanitation sub-projects can prove to be very useful in carrying out exercises to help the consumers determine the household sanitation options of their preference.

Technical details, costs and other details of the sanitation components shall be given separately after preparation of Sanitation Master Plan in the Second Phase.

2.16. Proposed Service Area

The service area of the proposed project comprises partial ward areas of wards 1, 2 and 3 of Rupakot Majuwagadhi Municipality (which is ward nos 1,2,3,4,5 and 9 of former Diktel Municipality). These areas of the wards are the main Diktel Bazaar area and periphery. The project area was delineated in consultation with WUSC and the local community.

Figure 2-3: Proposed service area of the project

2.17. Population and Demographic Characteristics

As the area of the municipality consists of ward areas of the thirteen former VDCs, the total population of historical time has been estimated by summing the population of these thirteen VDCs. The ward-wise population of the project town according to the census of 2001 and 2011 has been presented below:

Table 2-5: Population of the Project Town

Ward	W. Area (Ha)	Census 2001			Census 2011			Growth Rate
		HHs	Pop	P. Densities (PPHA)	HHs	Pop	P. Densities (PPHA)	
1	575	867	4,976	8.7	1,216	5,342	9.3	0.71
2	1442	656	3,430	2.4	749	3,525	2.4	0.27
3	1466	597	3,120	2.1	646	2,876	1.9	-0.81
4	1866	576	3,206	1.7	646	3,192	1.7	-0.05
5	1622	579	3,133	1.9	420	2,856	1.6	-0.91
6	5569	652	3,456	0.6	249	3,009	0.5	-1.36
7	1470	340	1,956	1.3	204	3,099	2.1	4.71
8	1526	272	1,565	1.0	204	2,449	1.6	4.56
9	1093	402	2,124	1.9	240	1,967	1.8	-0.78
10	3495	790	4,374	1.3	171	3,872	1.1	-1.21
11	2401	767	4,064	1.7	153	3,499	1.5	-1.49
12	946	544	2,839	3.0	96	2,539	2.7	-1.11
13	1026	339	1,792	1.7	181	1,596	1.6	-1.15
14	2373	1,010	5,361	2.3	256	4,536	1.9	-1.69
15	1714	530	2,769	1.6	209	2,542	1.5	-0.65
Total	26,650	9,043	46,167	1.7	5,646	46,903	1.6	-0.27

Source: CBS 2001 and 2011

The total population of Rupakot Majuwagadhi Municipality as per the census of 2011 is 46,903. The population of the municipality in 2001 was 48,187. The analysis of the census population shows that the overall annual growth rate of the municipality is declining by 0.27%. Most of the wards have had declining population growth rates in the last decade. The declining population growth rate attributed to the Maoist insurgency during early 2000 AD. The former Diktel VDC along with other neighboring VDCs was badly affected by the insurgency.

Ward no. 1 of the municipality (Ward no 2 of former Diktel Municipality or old Diktel main bazaar area), is the only comparatively densely populated ward. The population density of this ward is comparatively high. The overall population density of the project area decreased from 1.7 (2001 AD) to 1.6 (2011 AD) person per hectare.

As the social surveys have been done before the formation of Rupakot Majuwagadhi Municipality, all the social information has been presented in terms of former ward (i.e. Diktel Municipality). The service area of the proposed project comprises partial ward area of 1to 5 and 9 of former Diktel municipality. The consultants conducted a socio economic survey in 2016 of the proposed service area. The survey shows that the total population of the service area is 7,822.

Table 2-6: Beneficiaries households

Former Ward	Present Ward Number of Rupakot Majuwagadhi	HHS	Total Population
1	Partial Area of WN 1	356	1976
2		466	3293
3		160	1337
4	Partial Area of WN 2	77	547
5		63	617
9	Partial Area of WN 3	5	52
Total		1,049	7,822

Source: Socioeconomic survey 2016

2.18. Settlement pattern

The town is located in a hilly area with a heterogeneous ethnic composition. Most of the government and non-governmental offices are located in ward nos 1, 2 and 3 of former municipality, which have the densest population of the service area. The settlement pattern of the bazaar is dense with a row of houses on the ridge. However, the settlement pattern of other areas is scattered.

2.19. Ethnicity and caste

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

The survey revealed that Brahmans/Chhetris are the main groups of the project area comprising of 56% (520 of the total household whereas Janajatis are the second largest group comprising of 36 percent. Similarly, Dalits comprise about 8 percent within the service area. The details are presented in Table 2-7.

Table 2-7: Distribution of households and population by Ethnic composition

S.N.	Caste/Ethnic Group	Ward No. of Former Municipality						Total	%
		1	2	3	4	5	9		
1	Brahmin/Chhetri	146	199	126	22	23	2	520	56
2	Janajati	74	165	33	31	29	2	334	36
3	Dalit	14	32	11	14	4	1	76	8
4	Other	0	0	0	0	0	0	0	0
	Grand Total	236	396	170	67	56	5	930	100

Source: Socio-economic Survey 2016

2.20. Education and Health

Education

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

Health

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

2.21. Waterborne and Communicable Diseases

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

2.22. Economic Activities

The economy of the municipality is extensively agrarian although most of the households in the project area depend on more than one occupation. During the household survey of the

project area, detailed data has been collected about the major occupation and economic activities of all the households. The survey shows that the highest number of the population (about 51%) are engaged in the agriculture sector, whereas the lowest (0.11%) of the households are engaged in industrial work, 26.88% in business, 16% in service. Similarly, about 4% and 1.51% of the household heads are dependent upon remittance and labor, respectively.

2.23. Income Level and Poverty Conditions

The survey revealed that the main sources of household income of the service area are agriculture, service, remittance and wage labor, respectively. Among the total households, 6.3% have monthly incomes of more than Rs. 7,501- 10,876, about 40 % have monthly incomes in the range of Rs. 10,876-20,000 whereas 45 % falls in the range Rs. 20,001-50,000. Likewise, 3.7% households are earning more than Rs. 50,000 per month. About 4.8% households' fall under the poor category as they are only earning less than Rs 7,500 per month. The monthly incomes of HHs in the service area is given in Table 2-8.

Table 2-8: Income Level of Households by Ward

S.N.	Income Range	Ward No. of Former Municipality						Total	%
		1	2	3	4	5	9		
1	< Rs.7,500	9	11	2	12	11	0	45	4.8
2	Rs.7,501-10,875	14	31	7	4	2	1	59	6.3
3	Rs.10,876-20,000	104	126	56	37	20	2	375	40.3
4	Rs.20,001-50,000	101	212	69	13	20	2	417	44.8
5	>Rs.50,001	8	16	6	1	3	0	34	3.7
	Grand Total	236	396	170	67	56	5	930	100

Source: Socio-economic Survey 2016

2.24. Existing Water Supply Situation

2.25. Existing Water Supply

Diktel Bazaar Water Supply and Sanitation is the only existing piped water system in the project area. Two former committees merged into a new committee. The system serves parts of ward no. 1 to 3 of the Rupakot Majuwagadhi municipality (Ward nos. of 1 to 5 of the former Diktel Municipality).

2.26. Source description and Intake

Ramba Khola and Majh Khola are two water sources supplying the existing system. All these sources are registered with the District Water Resources Committee. The details of existing sources are illustrated in Table 2-9.

Table 2-9: Existing Source Details

Particulars	Source 1	Source 2
Name of the Source	Ramba Khola	Majh Khola
Location	Former Diktel Municipality -6	Former Diktel Municipality-5
Type (Spring/Stream)	Stream	Stream
Source yield (lps)	4.5 lps	3.5 lps

There is no dispute in the existing water sources. The two sources Ramba Khola and Majh Khola are on public land. Barbed wire fencing protects these sources and most of the catchment areas of these sources are covered with vegetated forests. Private parties also extract water for fish farming from the same intake of Ramba Khola. Therefore, additional water diversion is not possible from the existing sources.

2.27. Transmission Lines, Distribution lines, and Storage Capacity

These transmission lines are about 40 years old. The cumulative length of the transmission line is about 10.0 Km. The entire length of both the transmission line comprises of HDPE pipes. The transmission lines of Ramba and Majh Khola are about 5.4 and 4.6 km, respectively.

The distribution pipeline about 16 Km HDPE pipe networks are serving water to the town. The pipes were not properly laid and the distribution system is not properly maintained, with the distribution pipelines exposed in many places. Most of these pipelines are very old.

The cumulative storage capacity of the existing system is 346 cum. The storage capacity is very high as compared to the discharge. The storage capacity is more than 45% of the daily supply.

Table 2-10: Existing Storage Reservoir Details

Location	Type of structure	Capacity	Remarks
Diktel	Stone Masonry (3Nos.)	300 cu.m.	Very Old
Diktel	Ferro cement (4 Nos.)	20cu.m	Fairly Good Condition
Diktel	Ferro cement (1 No.)	16 cu.m.	Fairly Good Condition
Diktel	Ferro cement (1 No.)	10 cu.m.	Fairly Good Condition

Source: Inception Visit 2015

The different types of reservoirs (Table 2-10) are situated in safe locations on public land. The ownership of the lands has acquired by WUC. The stone masonry reservoir, situated in Diktel bazaar, is very old and needs rehabilitation or replacement. Other ferrocement tanks are in good condition.

As it has been mentioned already, small storage reservoirs having less than 40 cum capacity and the entire distributions mains will not be incorporated in the proposed system.

2.28. Coverage

About 700 private and 50 community taps have been connected to the existing distribution system to serve a population of more than 5,000 in the Diktel Bazaar town area. More than 500 households have already applied for tap connections, but due to insufficient discharges available for tapping in the available local sources, the tapped discharges are not sufficient to meet the water demand of the Diktel Bazaar area.

2.29. Service Level and Consumption

The existing system has a comparatively good operating system. Supply hours for the public are about 4-6 hours and 24 hours for major offices.

2.30. Tariff

The following tariff system (Table 2-11) has been adopted by Diktel Bazaar WUSC, Khotang.

Table 2-11: Existing Tariff Structure

S. N.	Description	Monthly Tariff
1	Public HHs	NRs. 100/HHs
2	Institutions HHs	NRs. 300/HHs

2.31. Water Quality

During the survey, respondents were asked about existing water quality in the project area. The survey revealed that about 0.4% of respondent mentioned good quality whereas almost 99% felt satisfactory or moderate. Some of the major systems carry out occasional disinfection (use of 3-5 kg bleaching powder once in a month during the rainy season). Water Samples collected at collection chamber were tested for various physical, chemical and bacteriological parameters. The results of the tests are given in Table 2-12.

All parameters of the water quality of sampled water sources are within the permitted values of NDWQS. Taking a few samples from the source before the construction phase to ensure the water quality to make adequate provisions for water treatment, if required is recommended.

The physical and chemical quality of the existing and proposed sources (potential) is good except for iron, which is slightly higher than the desirable limit in the existing Majh Khola source. The entire source will be monitored before finalizing the treatment unit for implementation after taking a few samples in other seasons.

Table 2-12: Result of water quality tests

	Parameters	Unit	Samples				NDWQS, Nepal
			Ramba Khola	Chhebe Khola	Ramba Khola	Majh Khola	
			8-5, 2016	6-16,2017	6-16,2017	6-16,2017	
1	pH (26°C)	-	6.6	7.2	7.1	6.7	6.5-8.5
2	Electrical Conductivity	umhos/cm	58	235	129	51	1500
3	Turbidity	NTU	1.4	1.2	1.3	42	5(10)
4	Color	TCU	NO	0.13	0.19	0.17	500
5	Taste		NO	NO	NO	NO	N.O
6	Odor		NO	NO	NO	NO	N.O.
7	Total dissolved solids	mg/l	32	145	78	32	1000
8	Total hardness as CaCo3	mg/l	36	112	60	16	5(15)
9	Chloride	mg/l	0.99	3.72	1.86	3.72	250
10	Residual Chlorine	mg/l	<0.10	N.D.(<0.10)	N.D.(<0.10)	<0.10	0.1-0.2
11	Sulphate	mg/l	6.4	8.62	9.45	8.74	250
12	Ammonia	mg/l	0.42	0.08	0.15	0.26	1.5
13	Nitrate	mg/l	0.4	0.73	0.44	6.6	50
14	Aluminium	mg/l	0.03	0.06	0.06	0.13	0.2
15	Fluoride	mg/l	0.46	0.06	0.06	0.07	0.5-1.5
16	Calcium	mg/l	3.2	30.4	22.4	4	200
17	Arsenic (As)	mg/l	<0.01	<0.01	<0.01	<0.01	0.05
18	Mercury	mg/l	<0.001	<0.001	<0.001	<0.001	0.001
19	Iron	mg/l	<0.05	<0.05	<0.05	**3.42**	0.30(3)
20	Manganese	mg/l	<0.05	<0.05	<0.05	0.16	0.2
21	Cadmium	mg/l	<0.003	<0.003	<0.003	<0.003	0.003
22	Chromium	mg/l	<0.05	<0.05	<0.05	<0.05	0.05
23	Lead	mg/l	<0.01	<0.01	<0.01	<0.01	0.01
24	Copper	mg/l	<0.05	<0.05	<0.05	<0.05	1
25	Zinc	mg/l	<0.2	0.10	0.13	0.11	3

Note: N.O> means Not Objectionable

2.32. Operation costs and current Tariff

WUSCs have been operating the former individual systems, for which water supply technicians, supporting administrative/accountant and office staff are deployed for managing water distribution, maintenance, and meter reading, etc.

2.33. Problems of the Existing System

The problems of the existing water supply system in Diktel Municipality are as follows:

- The existing system is an old system, and the available water infrastructures are not sufficient to meet the current water demand.
- The water supplied is not sufficient to meet the water demand of the service area. The consumers are largely dependent on other sources;
- The water source is not sufficient to meet the present water demand of the service area. The water shortage is acuter during the dry season;

- There is only an intermittent supply of water. The present system capacity is not sufficient to meet the water demand of the population;
- The existing system supplies water without treatment. Therefore, the existing system has not been able to deliver water quality conforming to NDWQS standards especially turbidity during rainy season;
- WUSC has not been able to extend the distribution system to new areas where the demands of water exist, and most of the existing systems need improvements regarding design and construction.

2.34. Existing Sanitation Situation

2.35. Sanitary Facilities

The survey shows that about 44.6% household have pour flush latrines whereas 45.6% households have ventilated pit latrines. Similarly, 9.5% have pit latrine which seems to be temporary and need to be replaced.The existing latrines in the houses as well as in the schools are not maintained properly. The community has very limited knowledge on the use of sanitary latrines and personal hygiene, especially in the city periphery.

Table 2-13: Coverage of sanitary facilities

S.N.	Type of Toilet	Ward No. of Former Municipality						Total	%
		1	2	3	4	5	9		
1	No Toilet	1			3			4	0.4
2	Pit Latrine	35	36	4	9	3	1	88	9.5
3	Ventilated Pit Latrine	145	256	7	2	13		423	45.6
4	Water Seal/Pour Flush	55	103	159	54	40	4	415	44.6
5	Cistern Flush								0
	Grand Total	236	396	170	67	56	5	930	100

2.36. Drainage Facilities

There is no proper drainage system for stormwater as well as for the domestic sewage in the Project area. As the terrain is mostly steep, people are less concerned about stormwater drain.

2.37. Wastewater Management Practices

There is no sewerage system in the project area. Wastewater from individual houses is managed inside the houses/premises. The socio-economic survey conducted in 2016 shows that 97.1% HHs have their toilets. There is no wastewater treatment plant in the

Municipality to treat domestic sewage/septage. However, the survey shows that 99% of the sampled HHs showed an interest in improving the septage management system and are interested in paying for it.

2.38. Solid Waste

The survey revealed that 95% of households are disposing of domestic solid waste in pits near to the houses whereas 2.3% of households use private collectors. It was observed that the respondents have sufficient knowledge about improperly managed solid waste that may affect the public health and the surrounding environment. The disposal of solid waste is done according to Table 2-14.

Table 2-14: Existing solid waste management practices

SN	Waste Management Practice	Ward						Total	%
		1	2	3	4	5	9		
1	Pit Near to House	7	8	8	7	7	4	41	95.3
2	Private Collector	0	0	1	0	0	0	1	2.3
3	Pit/Container managed by VDC/Municipality	0	0	0	1	0	0	1	2.3
	Total	7	8	9	8	7	4	43	100

Source: Socio-economic Survey 2016

2.39. Project Rationale

Because of its political location as a District Headquarter, the city will tend to grow in the future. However, the existing water supply system has not been able to meet the growing demand for water.

The present water supply is intermittent and is limited to only certain parts of the city area. The current systems serve only about 68.6% of the population. There is a demand from other parts of the Municipality for the supply of regular and potable water to the consumers.

The water from the existing system is hardly treated. The people are mostly dependent on piped water supply directly from streams/springs, the quality of which is poor with bacteriological contamination.

At the same time due to the intermittent supply and improper jointings in this large pressure difference area, water distribution pipes sometimes suck nearby drainage water.

Considering the water demand and condition of the existing system, there is a need for a project to upgrade the existing water supply situation in the service area to meet the

growing demand for private connections and to make drinking water available to the people of service area throughout the year.

2.40. Willingness and Affordability to Pay

Although households may have the ability to pay, willingness to pay is usually related to the quality of service. An Urban household in Nepal, generally have access to less than adequate water supply. Thus among many urban dwellers, there is a willingness to pay a higher price for improved WS services.

Focusing on Affordability to Pay rather than a willingness to pay, households should be expected to be able to pay at least 2.0-2.8% of their household incomes for good quality WS services. That is, they should pay up to the accepted levels or Affordability to Pay. The reasoning behind this is that consumers receive a service that is not only convenient but which also results in clear health-related benefits when coupled with a sanitation and hygiene education program designed to maximize the health benefits of the improved WS services.

2.41. Water Tariff

The determination of water tariff is based on the consumption-based system. The tariff structure is designed by affordability and willingness to pay, and tariff has also been set to ensure benefits to sustain the project after the design period.

The tariff structure has been set out for the households consuming 65 LPCD or average 10.01 cum per month for yard tap connections and 100 LPCD or 15.40 cum for fully plumbed tap connections depending upon the household size.

The water tariff for Alternative I have been set at NRs. 210 for the first band HHs consuming water up to 6 cum, NRs. 53 per cum for 7 to 10 cum per month and NRs. 79 per cum per HHs consuming water more than 11 cum of water. The tariff structure is based on the weighted average of all the categories.

Table 2-15: Tariff Band for Different Alternatives

Description	Water Volume Band (cum)				
Consumption of water in Cum	0-6 cum	7-10 Cum	11-20 Cum	21-30Cum	>30Cum
Proposed Tariff/cum	210 (as min.)	53 per cum	79 per cum	118 per cum	177 per cum

2.42. Poverty Alleviation Aspects

The socio-economic survey shows that 11% of the total HHs in the project area is below the poverty line. Wardwise distribution has been given in the social profile.

2.43. Need of the Sanitation Component

Diktel Municipality was not declared as Open Defecation Free (ODF) area. About 0.4% of the HHs does not have toilets, and the percentage of a pit latrine is 9.5, which demand up-gradation or renovation. Institutional toilets & public toilets will be dealt in the totality of the sanitation components. These sub-components of sanitation help for the betterment of sanitation facilities in this area. These facilities also inculcate behavior of toilet use among students and the general public.

Proper and effective management of stormwater drainage needs to be addressed holistically with correct remedial measures. It is envisaged to formulate and prepare a Master Plan for the Municipality area in close consultation and collaboration with the newly formed Municipal Office.

Since significant work and procedures have been felt necessary for the development of the septage treatment concept, the septage bed would be dealt separately, and an additional separate contract package would be developed for implementation. It requires extensive work to manage septage collection, conveyance, treatment, and disposal. Hence, a separate study should be conducted. Similarly, a Solid Waste Management Master Plan will be prepared and submitted. All sanitation activities could be done in the second phase only.

2.44. Description of the Environment

2.45. Hydrology and Climate

The project area has warm and cold temperate types of climate. A warm temperate type of climate is observed between 1,000-2,000 meter elevation, while a cold temperate type of climate exists in between 2,000-3,000 meter, particularly in the mid-hills of Nepal.

The rainy season starts from June and ends in September when the monsoon blows across the Bay of Bengal and delivers about 80 % of the annual rainfall. During the dry season, the northwest wind brings dry cold wind bearing little moisture and accounts for the remaining 20% of the annual rainfall. The annual average rainfall recorded at Diktel Station is 1,190.94 mm. The four years monthly average rainfall is presented in Table 2-16 and maximum daily rainfall at different Return Periods (in mm) in Table 2-17.

Table 2-16: Average Monthly Rainfall at Diktel (Station no. 1222)

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Average Rainfall (mm)	14.46	14.64	30.2	44.66	160.04	241.88	282.6	212.8	152.06	33.24	4.36	0.0

Source: DHM, 2016

Table 2-17: Maximum daily rainfall at different Return Periods (in mm)

Rainfall Stations (Index)	Return Period, T (years)					
	2	5	10	20	50	100
1206_ Okhaldhunga	89.93	113.53	131.35	149.24	172.64	190.70
1211_Khotang	96.10	135.93	166.06	196.19	236.03	266.16
1222_Diktel	71.62	95.45	116.59	135.74	165.36	185.51
Average Daily	85.95	115.97	138.66	161.39	191.41	214.12

Source: DHM, 2016

The temperature within the project area varies according to the elevation. July and August are the hottest months with a monthly average temperature 22° C and December and January are cooler months with average temperatures of 13 and 10° C respectively. The monthly average temperature is presented in Table 2-18.

Table 2-18: Average Monthly Temperature at Khotang (°C)

Average Monthly Temperature	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	10	14	18	20	21	21	22	22	21	19	15	13

Source: DHM, 2016

Though there is a lack of secondary information on air quality for the project area, the ambient air quality is expected to be within the National Ambient Air Quality Standards of Nepal as there is no industries and traffic volume is very low. Due to a similar reason, noise levels in the project area are expected to be within permissible standards prescribed by the Ministry of Environment of the GON.

2.46. Ecological Resources

About 90,000 ha. of the Khotang district has vegetation cover. According to local informants, the forest vegetation cover in the district is increasing since the handover of forests to Community Forest Users Groups (CFUGs).

The project area offers limited habitat for aquatic life and fisheries due to the absence of abundant perpetual sources of water. A limited number of species of aquatic life and fishes are available within the project area.

The forest surrounding the project area provides refuge to many species of mammals as presented in Table 2-19. Discussions with residents and several site visits have confirmed that other than monkeys none of the protected species listed were observed along or near the project site in recent years.

Table 2-19: Mammals in the Project Area

Name			Family	CITES	IUCN	Forest Act
Local	English	Scientific				
Ban Biralo	Jungle cat	*Felis Chaus*	Felidae	2	LR/lc	
Bandar	Monkey	*Macaca Assamensis*	Cercopithecidae	2	VU	Protected
Chari Bagh	Leopard cat	*Felis bengalensis*	Felidae	1	LR/nt	-
Chiluwa	Common Leopard	*Panthera Pardus*	Felidae	1	LR/nt	-
Dhedu	Langur Monkey	*Semnopithecus entellus*	Cercopithecidae	1	LR/nt	-
Dumsi	Porcupine	*Hystrix hodgsoni*	Hystricidae			-
Fayuro	Fox	*Vulpes bengalensis*	Canidae	3	DD	-
Ghoral	Ghoral	*Naemorhedus goral*	Bovidae	1	LR/lc	-
Kharayo	Indian hare	*Lepus nigricollis*	Leporidae		-	-
Lokharke	Squirrel	*Funambulus pennati*	Sciuridae		-	-
Mal samproo	Yellow throated marten	*Martes flavigula*	Mustelidae	3	-	-
Sayal	Jackal	*canis aureus*	Canidae	3	-	-

LR/LC= Lower Risk/Least Concern; VU= Vulnerable; nt= Near Threatened; DD=Data Deficient; and EN=Endangered *(Source: Field Survey, 2016)*

According to local people, local and migratory birds are found within the project area. However, none of these are protected or endangered.Species The commonly found species of birds are given in Table 2-20.

Table 2-20: Bird Species in the project area

Name			Family	CITES
Local	English	Scientific Name		
Bhangera	Sparrow	*Passer domesticus*	Passeridae	
Dhukur	Red Turtle Dove	*Streptopelia tranquebarica*	Columbidae	
Huchil	Owl Barn	*Tyto alba*	Tytonidae	2
Kag	Crow	*Corous macrorhynches*	Corvidae	
Kalij	Pheasant	*Lophura leucomelana*	Phasianidae	
Koili	Cuckoo	*Eudynamus scolopacea*	Cuculidae	
Luiche	Jungle Fowl	*Gallus gallus*	Phasianidae	
Mayur	Peacock	*Pavo cristatus*	Phasianidae	
Piura	Hill Patridge	*Arborophila hyperythra*	Phasianidae	
Sarung	Myna	*Gracula religiosa*	Sturnidae	3

Source: Field Survey, 2016

Of the 17,600 butterfly species known to exist, Nepal hosts about 645 species representing 4% of the total. The project area provides habitats for a variety of butterflies, and during the walkover surveys, various types of butterflies were observed.

The project area contains a variety of reptiles, among them, are snakes. In Nepal, three species of reptiles are categorized under the threatened species (*Gavialis gangeticus*, *Python molurus*, and *Varamus flavescens*). However, none of these reptiles were recorded during the study.

The dominant forest types existing in the project area include thin Salla -forests, mix-forest of Chilaune (*Schimaa wallichii*), and Uttis (*Alnus nepalensis*) dense mix forests, and Gobresalla. *Micheila champaca*, is a protected plant species found within the project area. This species is banned for felling, transportation, and export for commercial purposes. The major tree species available in the project area are given in Table 2-21.

Table 2-21: Major Tree Species Found in the Project Area

Local name	Botanical Name	Family	Forest Act	IUCN	CITES
Bans (Malingo, Bhalu)	*Bambusa nutans/ Dendrocalamus hookeri*	Gramineae			
Banjh	*Quercus lanata*	Fagaceae			
Bot dhayaro	*Lagerstroemia parviflora Roxb.*	Lythraceae			
Champ	*Micheila champaca*	Magnoliaceae	Protected	Listed	3
Chilaune	*Schima wallichi*	Theaceae			
Dhale Kutus	*Castanopsis indica*	Fagaceae			
Dudilo	*Ficus nerifolia*	Moraceae			
Gobre Salla	*Pinus wallichiana*	Pinaceae			
Gurans	*Rhododendran arboreum*	Ericaceae			
Kafal	*Myrica esculenta*	Myricaceae			
Kaulo	*Machilus odoratissima*	Lauraceae			
Khirra	*Sapium insigne (Royle) Benth. Ex Hook.f.*	Euphorbiaceae			
Khote salla	*Pinus roxburghii*	Pinaceae			
Kyamun	*Syzigium cerasoides*	Myrtaceae			
Lampate	*Daubanga sonneretidoes*	Lythraceae			
Mayal	*Pyrus pashia*	Rosaceae			
Mahuwa	*Engelhardtia spicata*	Juglandaceae			
Musure	*Castanopsis tribuloides*	Fagaceae			
Nibaro	*Ficus auriculata*	Moraceae			
Oak	*Quercus lamellose, incana, dilatata*	Fagaceae			
Paiyun	*Prunus ceratoides*	Rosaceae			
Phaledo	*Erythrina species*	Leguminosae			
Sissioo	*Dalbergia sissoo*	Leguminosae			
Tanki	*Bauhinia purpurea L.*	Leguminosae			
Uttis	*Alnus nepalensis*	Betulaceae			

Source: Field survey, 2016

The project area is rich in shrubs and small tree species with medicinal and aromatic values and performs important soil conservation functions. They provide close canopy cover to the ground and thereby prevent losses through surface run-off and soil erosion even during the high intensity of rainfall. The dominant shrub and small tree species existing in the project area are given in Table 2-22. None of them are endangered or rare.

Table 2-22: Dominant Shrub and Small Tree Species in the project area

Local Name	Botanical Name	Family
Aasuro	*Adhatoda vasica*	Acanthaceae
Aiselu	*Rubus ellipticus*	Rosaceae
Argeli	*Girardinia versifolia*	Urticaceae
Aasare	*Viburnum erubescens*	Caprifoliaceae
Bhogate	*Maesa macrophylla*	Myrsinaceae
Dhusure	*Colebrookea oppositifolia*	Labiatae
Ghodtapre	*Centella asiatica (L.) Urban.*	Umbelliferae
Lajjavati	*Mimosa pudica L.*	Leguminosae
Sajivan/Kadam	*Origanum vulgare L.*	Labiatae
Simali	*Vitex negundo*	Verbenaceae
Vanmara	*Eupatorium adenophorum Spreng*	Compositae

Source: Field survey, 2016

The grass species of plants belonging to the Gramineae family which provide wild and domestic animals roughage. The grass species are highly effective for protecting different types of soil from erosion. Morphologically, they are characterised by deep root systems and light shoot structures providing the function of armoring. They have a high potential for bioengineering purposes and can thrive in harsh conditions. Until recently, their potentialities are harnessed only in the natural state. The dominant grass species that were observed during field survey are presented in Table 2-23.

Table 2-23: Grass Species Available in the Project Area

Local Name	Botanical Name	Family
Arthunge	*Heteropogon contortus (L) Beauvois*	Gramineae
Babiyo	*Eulaliopsis binata (Retz.) C.E. Hubbard*	Gramineae
Banso	*Digitaria sps, Eragrostos sps*	Gramineae
Dubo	*Cynodon dactylon*	Gramineae
Kans	*Saccharum spontaneum*	Gramineae
Khar	*Saccharum spontaneum*	Gramineae
Salima	*Chrysopogon gryllus (L.) Trin.*	Gramineae
Siru	*Imperata cylindrical*	Gramineae
Ulla	*Themeda caudate (Ness)A. Camus*	Gramineae

Source: Field survey, 2016

2.47. Protected, Rare or Endangered Species

One protected wildlife, mammal species is reported in the project area, and rest of the existing species of mammals are commonly found species. Among the reported species, monkey, *Macaca assamensis*, is the protected and vulnerable species according to the Forest Act, and IUCN respectively.

2.48. Protected Areas

The project road is not located in or near any national park, wildlife reserve, conservation area, hunting area, including a buffer zone area, world heritage site, and other protected areas.

2.49. Infrastructure facilities

2.50. Transportation, Electricity, and Communication

Rupakot Majuwagadhi Municipality is located in the Eastern Region - about 257 km east of Kathmandu, the country's capital. The closest airport is Khanidanda Airport, 25 Km north of Diktel.

The other nearest airport with regular flights is Biratnagar Airport, which is about 106 km. The area is well connected to the national electricity grid. The project area is connected to national and international telecommunication networks. Major national daily newspapers print regional editions and are available to readers.

2.51. Educational Institutions

There are various public and private institutions such as schools and colleges, community-based organizations, NGOs, banks and financial institutions within the service area.

2.52. Other institutions

There are several government and non-government offices including private institutions in the project area.

2.53. Quality of Life Values

The Project is not expected to affect any cultural or recreational resources adversely but will increase the existing quality of life due to the improvement in personal, household and community hygiene practices and community health.

2.54. Cultural and religious sites

The Halesi Mahadev temple lies about 13 kilometers away from the Diktel market which is considered to be a sacred pilgrimage site for the Hindus as well as the Buddhists. Every year many pilgrims visit this temple.

Situated at the headquarters of Khotang district, Diktel, the temple of Kalikadevi is visited by the devotees throughout the year. The place also observes maximum goat sacrifice offered to the goddess by the devotees. A mysterious small cave housing the symbolic image of Lord Shiva near the Kalikadevi temple also adds up to the curiosity of the devotees visiting to pay their homage to the goddess.

Another popular religious destination is Baraha Pokhari situated at the Baraha Pokhari VDC in Khotang district. The Hindu mythology mentions the creation of the lake in the time immemorial by God Baraha (third incarnation of Lord Vishnu in the form of a wild boar). The lake, thus, has a high historical as well as religious significance. It is 800 m long and 500 m wide and located at an altitude of about 1700m above sea level. One of the major attractions of the place is that the color of the water in the lake changes along with the season and

colorful fish of various kinds are seen in the lake. The beautiful and green surrounding of the pond also adds up to its attractions.

2.55. Resettlement, Relocation and Compensation Issues

The proposed Project does not have any issues related to resettlement, relocation, and compensation.

2.56. Relevancy of the Project

As per TOR issued to DSMC, it is stated that the Project needs to be studied from the environmental point of view as per EPA 1997 and EPR 1997 (Amendments 1999 and 2007). The proposed water supply and sanitation project is intended to serve the water demand of the entire area of former Diktel Municipality, Khotang District. It is expected that on the implementation of the project the users of the area will be able to avail adequate amount of safe drinking water.

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 water sources. The Project does not involve the construction of any tunnels; relocation of people or households & there is no need to settle any households. The project is expected to benefit a design population of about 10,934 (2038).

As the proposed project falls within the definitions provided in the EPR 1997 (Amendments 1999 and 2007) Annex 1 (G) for drinking water projects; only an IEE shall be necessary. The regulation stated in Annex 1 (H) shall only be applicable if the proposal does not fall under categories (A) through (H) of Annex 3. Table 2-24 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 2-24: Criteria for requirement of IEE and/or EIA for Drinking water supply Projects

Condition described in the Act and Regulations	IEE Required as per the Regulation Annex 1 g	EIA Required as per the Regulation Annex 3 h	Conditions in the project
River Control (training)	Up to 1 kilometer	Over 1 kilometer	NA
Channeling Water from one Watershed to Another	Applicable	Applicable	NA
Rain Water Collection and Use of spewing Wetland	Up to 200 hectares	More than 200 hectares	NA
Supply of Water in Dry Season from Surface Water Source with	Up to 1 cusec and utilizing up to 50 % of	More than 1 cusec and utilizing the total	NA

Condition described in the Act and Regulations	IEE Required as per the Regulation Annex 1 g	EIA Required as per the Regulation Annex 3 h	Conditions in the project
a safe yield of	the available quantity	available quantity	
Ground Water Recharge	Up to 50 % of total aquifer	More than 50 % of aquifer	NA
Water Treatment	Up to 25 liter per sec		Within 25 liter per sec
Construction of Tunnel for Channeling Drinking Water	Tunnel constructed		Not constructed
Water Resource Development which Displaces People Permanent Residents)	25 to 100 people	Over 100 people	Not done
Settlement of People Upstream of Water Source	Settlement of up to 500 people	Settlement of above 500 people	Not done
Supply of water to a population of	5, 000 to 50, 000	Over 50, 000	This is an extension of the existing system. Newer service areas have been added and new sources are to be tapped.
Connection of New Source to Supply Water to existing water supply system for a population of	10, 000 - 100, 000	More than 100, 000	The current population is 7,822 in 2016, and the project is designed for a final population of 10,934 in 2038.
Operation of a drinking water supply system with inclusion of sewage disposal system with sewage treatment system	Installed	Installed	Sewage treatment plant not yet installed.
Extraction of groundwater from sources which are located at point and non-point sources of biological and chemical pollution and/or their influenced areas.	Not done	Applicable	No non-point and point sources of pollution in the vicinity of the water source
Operation of water supply project included in a multipurpose project utilizing a source of 25 litres per sec water. (Construction of Multiple Purpose Reservoir Required)	Not operated	Operated	This is not a multipurpose project and is solely for water supply

3. PROCEDURES TO BE ADOPTED FOR THE STUDY

The IEE approach, methodology, and procedure adopted to prepare a comprehensive IEE report will follow the provisions of the EPA & EPR and related national and sectoral guidelines. The IEE study will focus on impact identification, prediction and finally evaluating the extent and weight of the impact. The Consultant will follow the following methodology for preparation of the report:

Complete the Rapid Assessment Checklist for each subproject. It should cover water supply, sewerage, solid waste components.

Prepare a comprehensive database on the corridor of influence on the biophysical and socioeconomic environment.

Collect secondary data from published and unpublished reports, maps, aerial photographs, newspaper articles, etc. from different Government and non-government organizations.

Prepare questionnaires/checklists/matrices for the collection of primary data for both the biophysical and socio-economic assessments.

Describe relevant parts of the town 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.

Information on mitigation; costs associated with construction activities (during design construction, and operation and maintenance activities) should also be included.

3.1. Environmental Assessment

The Consultant shall study the existing environmental constraints and potential impacts in the Project area through field surveys, complemented by secondary information from reports and interviews with some government officials, representatives of NGOs and international organizations (IOs) supported projects and researchers.

The Consultant shall collect primary and secondary data, evaluate them and describe the relevant environmental characteristics of the area along the pipeline routes and its corridor of influence, including the following information:

Physical Environment: topography, soils, climate, and meteorology, geology, surface and groundwater hydrology, noise, air and water quality.

Biological Environment: flora, fauna, rare and endangered species, religious trees and sensitive habitats (including parks and reserves).

Chemical Environment: Use of various chemicals including fuel, lubricants, oil, acids, cement, etc.

The Consultant will develop all necessary documents for field visits and collect data with the help of the survey team.

3.2. Socio-Economic Assessment

Social assessment of the project tries to determine the social implications (issues) regarding assumed positive and negative impacts related to location, design, construction, and operation. Preparation and actual implementation of the construction activities will create some nuisance and inconvenience for the communities in the area.

Primary data shall be obtained through Focus Group Discussions (FGDs) with communities, along with the pipeline routes under consideration. Additional data shall be collected from various Committees (Municipalities/VDCs, DDCs, NGOs, Community groups, etc.) through which the respective pipe alignments pass.

The Consultant shall collect primary and secondary data, evaluate them and describe the relevant environmental characteristics along the pipe routes and its corridor of influence, along with the following information:

Population, land use, planned development activities, community structure, government services, demography, employment, distribution of income and sources of livelihood, goods and services produced, water supply, public health, education, extension services, cultural sites and heritage, tribal people, customs, aspirations and attitudes, expected water users and those benefitting from it, different needs and demands of VDCs, and the present quality of life (QOL), etc.

3.3. Report Preparation

An IEE report as per the revised format combining formats of both GoN and ADB shall be prepared by contents given in Chapter 9 of this TOR. The draft report shall be presented to MoWSS and after receiving the comments and suggestion from MoWSS, a final report will be prepared after incorporating the comments on the draft report.

4. POLICIES, LAWS, RULES, DIRECTIVES, AND GUIDELINES

The consultant shall describe the pertinent regulations, standards that govern environmental quality, health and safety, protection of sensitive areas and endangered species, etc. at international, regional, district, VDC and Ward levels. Nepal is a signatory to many international conventions, including those concerning habitat, biodiversity, cultural heritage protection. These issues shall be considered during IEE, and their avoidance/mitigation measures shall be identified. The IEE should also be conducted in compliance with the following Laws, Acts, Rules & Regulation, Standard, Manuals, and Strategies:

Law

- Constitution of Nepal 2072 B.S. (2015 A.D.)
- Interim Constitution of Nepal 2063 B.S. (2007 A.D.)

Acts

- Land Acquisition Act 2034 B.S. (1977 A.D.)
- Solid Waste Management and Resource Mobilization Acts 2044 (1987)
- Water Resources Act 2049 B.S. (1992 A.D.)
- Water Tax Act 2023 (1966)
- Soil and Water Conservation Act, (1995)
- Nepal Water Supply Corporation Act, (1989)
- Water Supply Management Board Act, (2006)
- Labor Act 2048 B.S. (1992 A.D.)
- Forest Act 2049 (1993 A.D.)
- Forest Regulations 2050 (1995 A.D.)
- Environmental Protection Act 2053 B.S. (1997 A.D.)
- Local Self Governance Act 2055 B.S. (1999 A.D.)
- Drinking Water Regulations 2055 B.S. (1998 A.D.)
- Child Labor Prohibition and Regulation Act 2056 B.S. (2001 A.D.)
- Town Development Act 2045 B.S. (1988 A.D.)

Rules & Regulations

- Solid Waste (Management & Resource Mobilization), Rules, 2047 B.S. (1990 A.D.)
- Water Resources Regulations 2049 B.S. (1993 A.D.)
- Forest Regulation 2052 B.S. (1995 A.D.)
- Environmental Protection Rules 2054 B.S. (1997 A.D.) with Amendment

- Drinking Water Regulations 2055 B.S. (1998 A.D.)
- Child Labor Prohibition & Regulation Act 2056 B.S. (2001 A.D.)
- Urban Water Supply & Sanitation Policy 2066 B.S. (2009 A.D.)

Plans and Policies

- Rural Water Supply & Sanitation National Policy, Strategy & Action Plan 2060 B.S. (2004 A.D.)
- Three Year Interim Plan 2063 B.S. (2007 A.D.)
- ADB's "Safeguard Policy Statement (SPS)" 2066 B.S. (2009 A.D.)

Standards, Manuals, Strategies & Guidelines

- National IEE Guideline 2049 B.S. (1993 A.D.)
- National Drinking Water Quality Standards 2062 B.S. (2005 A.D.)
- Water Resources Strategy, 2059 (2002)

5. REQUIRED TIME, ESTIMATED BUDGET AND SPECIALISTS REQUIRED FOR PREPARING THE REPORT

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

5.1. Time Schedule

Considering the time limitations, the study has to be completed within about 9 weeks. The work schedule is presented in Table 5-1.

Table 5-1: Proposed Work Schedule

Activity / Work	Weeks								
	1	2	3	4	5	6	7	8	9
Desk Study									
Preparation and Approval of TOR									
Public Notification									
Field Work									
Data Compilation/Evaluation									
Preparation of Draft IEE Report									
Submission of Final IEE Report									

5.2. Estimated Budget

The total estimated cost for the Initial Environmental Examination (IEE) work of Diktel Small Town Water Supply and Sanitation sub-project is approximately NRs. 500,000.00.

5.3. Human Resources Required

As the IEE requires different personnel for specific tasks, the following inter-disciplinary team will be required. A team leader will be required to coordinate the different tasks of the personnel involved. The Team will consist of:

1. Environmental Specialist
2. Water Supply and Sanitation Engineer
3. Sociologist

4. Geo-hydrologist
5. Botanist/Forester

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

6. ANTICIPATED IMPACTS OF THE PROPOSED PROJECT ON ENVIRONMENT

The impacts shall be identified for different phases of project activities, i.e., project design, pre-construction, construction and post-construction, operation & maintenance phase on the existing physical, biological and socio-economic resources. A distinction will have to be made between potentially significant positive and adverse impacts, direct and indirect impacts. The impacts shall be characterized as (i) low, high & medium regarding magnitude, (ii) long term, short term & medium term regarding duration and (iii) site-specific, local & regional/national regarding extent. As a part of the study, enhancement of the positive impacts shall also be carried out. The potential physical, biological and socio-economic impacts should be considered as follows:

6.1. Physical Impacts

Design Stage

i. Soil erosion and slope stability due to incorporation of sloped areas in project design

ii. Cracking of structure (leading to facility failure & hazard to public) due to construction of reservoirs in high earthquake zone

iii. Inadequate disposal of sludge from reservoirs and treatment plant

iv. Construction of intakes in high earthquake zones

v. Location of pipes and existing utilities particularly in heritage areas

Pre-Construction Stage

i) Inadequate protection of reservoir area/source

ii) Deterioration in the water quality in the storage reservoirs

iii) Delivery of unsafe/ raw water to distribution system

Construction Stage

i) Changes in land use pattern along the alignment due to the construction of different component structures.

ii) Land instabilities, soil erosion, silt runoff, landslides and setting off street surfaces due to excavation works, and other construction-related activities during the construction phase of the project.

iii) Changes in landform and drainage pattern due to spoil dumping, excavating and aggregate mining, etc.

iv) Possible loss of agriculture land, cereal crops and settlements due to laying of pipes, reservoirs and construction activities and thus need of compensation at market price.

v) Disposal of solid waste, waste materials, and construction spoils in the productive land.

vi) Issue related to the groundwater extraction and associated offshore erosion, silt runoff, and sedimentation.

Post-Construction and Operation Stage

i) Changes in land use patterns and the economic impacts on the affected people

ii) Natural hazards associated with the reservoir due to reservoir induced seismic effects.

6.2. Biological Issues

Design Stage

Forest clearance due to construction of different project structures in the forest area

Pre-Construction Stage

i) Forest clearance

ii) Tree cutting and forest clearance process/permits

Construction Stage

i) Encroachment of vegetation as well as wildlife habitats and biodiversity of the protected species.

ii) Loss of vegetation and terrestrial habitat due to project component and facility placements.

iii) Loss of local vegetation and wildlife habitats due to illegal exploitation of the resources like felling, hunting and poaching activities by the construction workforce.

iv) Impacts on groundwater resource/water resources

v) Extinction/impacts of rare and endangered species of flora species

Post Construction and Operation Stage

i) Permanent disturbances and losses to the local wildlife habitat and natural vegetation.

ii) Impacts on groundwater due to extraction of the water for project

iii) Protection and ecological balance of groundwater resources

6.3. Socioeconomic, Cultural and Chemical Issue

Design Stage

i) Health & safety of community & workers

Pre-Construction Stage

ii) Water use conflicts due to source dispute

iii) Land acquisition, resettlement, and compensation

iv) Impairment of historical/ cultural monuments/ areas

Construction Stage

v) Effects of land and property acquisition on the social and economic status of the people.

vi) Impacts on the social structures, social amenities and community resources due to exposition to outside workforce.

vii) Impacts on sanitation and health of the community due to increase in disease vector and transmission of disease from outside workforce.

viii) Loss of cultural values and norms due to outside workforce.

ix) Impacts due to encroachment to religious and cultural sites having historical significance by the project structures and associated facilities.

x) Changes in migration pattern, the influx of the workers and impact on vulnerable groups of the community.

xi) Possibility of employment (income) generation activities amongst the community people of the project area.

Post-Construction and Operation Stage

i) Impacts due to the withdrawal of economic activities after the completion of construction.

ii) Changes in aesthetic values of landscape due to project structures and facilities associated.

iii) Impacts of permanent loss of production from the project occupied areas.

iv) Changes in religious values of the area due to project

The water supply and sanitation project will have numerous beneficial issues. The proposed project shall enhance the access to safe drinking water facility and improved sanitation and help transfer the rural settings to the semi-urban market centers. The project will also increase the quality of life in the project area.

7. ALTERNATIVE ANALYSIS

An alternative analysis of the project shall be considered as an integral part of the IEE study, which involves alternative ways of achieving the objectives of a proposed project. Alternative analysis will aim to arrive at a development option, which shall be conducted during the study to minimize the possible negative environmental impacts. Alternative measures to the proposed project to meet the same project objectives will be described under the following aspects:

- **No action option**
- **Alternative design**
- **Alternative location**
- **Alternative schedule and process**

Alternatives regarding potential environmental impacts, capital and operating costs and institutional training and monitoring requirements should be described. Costs and benefits of each alternative should be quantified (wherever possible), and incorporating the estimated costs of any associated mitigation measures. The "no project" option is always open.

The mitigation measures for potential adverse impacts due to location, design, construction and post-construction will have to be proposed during the preparation of the IEE report for all the perceived impacts to minimize the environmental impacts of project implementation after the prediction of extent, magnitude and duration of the impacts. Mitigation measures will have to be incorporated from the planning stage onwards. In general the following area shall be covered while preparing mitigation measures:

a. Project design/pre-construction phase

b. Project construction phase

c. Project operation and maintenance phase

Concerned agencies like STWSSSP, DWSS, WUSC and local agencies, local administration, police officers shall be consulted during the implementation of mitigation measures. The proponent is required to prepare the Environmental Management Plan (EMP), and these measures should be outlined in EMP to implement the proposed measures during project implementation.

7.1. Alternative System Analysis

System alternatives need to be developed to assess the most cost effective, reliable and efficient system that can serve the design population. Optimization of a proposed water supply system can be done in terms of system layout, alternative technology, alternative materials and alternative source. However, in case of the Diktel Town Project, the system design has been done under two scenarios.

7.2. Alternative Assessment

In the feasibility study of Diktel water supply system, two alternatives have been considered using alternate system layouts – keeping other parameters constant. First proposed alterative is fully gravity systems whereas second alternative is mixed (partly pumped and partly gravity).

The distribution system and storage system has been proposed identical for both alternatives. However, intakes, water treatment facilities, transmission system and allied structures for the transmission system has been considered different for these alternatives.

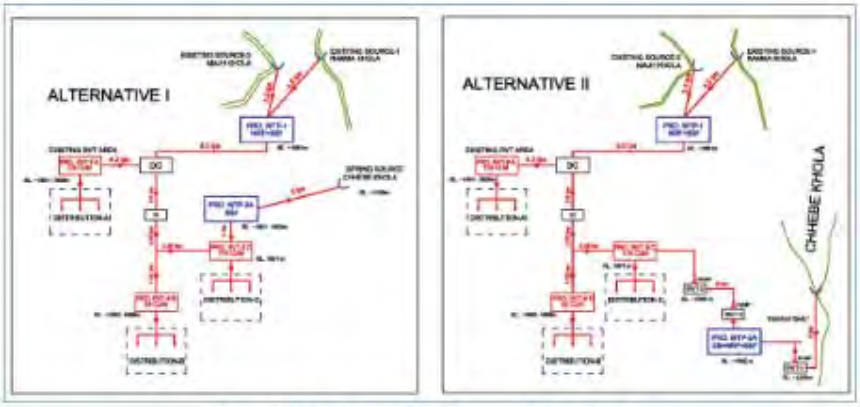

Figure 4-1:The Proposed Two System Alternatives

7.2.1 System Alternative I

In this system alternative, additional spring source nearby Chhebe Khola has been proposed to supplement water discharge to the existing system supported by Ramba and Majh Khola. The transmission line is about 7.5 km and diverts water of 5 lps. As this source is at a lower elevation than the main water treatment plant (WTP-1), a separate

water treatment plant (WTP-2A) has been proposed for this source. The treated water from this WTP has been transported to a storage reservoir located at the main bazaar (RVT-C)

7.2.2 System Alternative II

In this system, alternative additional water required for the Town Project has been abstracted from at lower elevation of Chebbe Khola near Triveni. Water from this source has been proposed for pumping to transfer to Diktel Bazaar since this source is located at a lower elevation (1201m).

7.1.3 Selected/Proposed Sub Project

The analysis of alternative show that Alternative I has been lest cost options. In terms of capital cost, operation cost and various cost parameters Alternative I is the best among alternatives. Similarly, the proposed tariffs in both alternatives were compared with the affordability data from the socio-economic survey of the town. The analysis, indicates that the proposed water tariffs are affordable and fall below 5% of the monthly income for all income categories in first alternative (Alternative I) However, in second alternative monthly tariffs are not affordable in all income categories. Alternative II is un-feasible option for the project town. So Alternative I, has been selected as the best feasible option. The comparisons of two options have been presented in Table below.

Table 7-1: Cost Comparisons of Various Alternatives Based on Feasibility Report

S.N.	Particular	Alternative I	Alternative II
1	Total Capital Cost in NPR	322,402,783	420,034,926
2	Annual O&M Costs in NPR	4,232,360	7,215,156
3	Total Base Year Population (No)	8,069	8,069
4	No. of Service Connection (No.)	1,049	1,049
5	Length of Transmission Main (m)	26.55	22.87
6	Length of Distribution main (m)	23,572	23,572
7	Capital Cost/Pop served	39,956	52,055
8	Capital Cost per HH	307,343	400,415
8	O&M Cost/Pop Served	524.52	894.18
9	Affordable in all income categories (monthly)	<5%	> 5%
10	Remark	Feasible Option	

8. MATTERS TO BE IMPLEMENTED WHILE IMPLEMENTING THE PROJECT

8.1. Environmental Management Plan

The project proponent has to develop an Environmental Management Plan (EMP) to manage all the perceived environmental impacts of the project systematically. 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. EMP, therefore, provides the necessary feedback required for correcting potentially serious Project deficiencies, and for the planning of other projects. 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 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. EMP will include proposed work programs, budget estimates, schedules, staffing and training requirements and other support services to implement the mitigating measures.

8.2. Environmental Monitoring Plan

The project will develop an Environmental Monitoring Plan 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) the overall effectiveness of EMP. The environmental monitoring of the project includes field supervision and reporting of project activities before and during the project construction and operation to ensure that the works are being carried out by the approved design and that the environmental mitigation measures are fully implemented by EMP. A monitoring system will be developed involving (i) front line monitoring (ii) monitoring by the government line agencies or independent monitors

8.3. Information Disclosure, Public Consultation, and Participation

Public consultation is the process of exchanging information with those persons and organizations with a legitimate interest in a project and 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. The consultation and disclosure involve 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. Information is disclosed through public consultation and more formally by making documents and other materials available and at a location in which stakeholders can easily access them. This normally involves making draft reports available (in the local language) at public locations in the community and providing a mechanism for the receipt of comments and making documents available more widely.

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

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.

8.4. Grievance Redress Mechanism

A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate and facilitate the resolution of affected persons' concerns, complaints, and grievances related to social, environmental and other concerns on the project. GRM will aim to provide a time-bound and transparent mechanism to resolve such concerns.

A Grievance Redress Committee (GRC) will be formed at the town/VDC/Municipality level, comprising the Chairperson of V/M/D WASH CC as the chairperson of GRC, and Secretary of the concerned WUA or local bodies as the GRC secretary. The GRC members will comprise of (1) RPMO social development/environmental (as relevant) officer, (2) representative of affected persons, (3) DSMC's safeguards specialist (social/environment as relevant), (4) a representative of reputable CBO/SHG/organization working in the project area, and (5) contractor's representative. The secretary of the GRC will be responsible for convening timely meetings and maintaining

minutes of meetings. The concerned social safeguards expert of DSMC will support the RPMO safeguard's officer and Project Manager of RPMO to ensure that grievances, including those of the poor and vulnerable, are addressed. All GRCs shall have at least two women committee members. Along with representatives of the APs, civil society and eminent citizens can be invited as observers in GRC meetings. A three-tier GRC will be operative as per PAM, TSTWSSSP.

The Social Development Officer at the Regional Project Management Office (RPMO) will be the focal person for facilitating the grievance redress at the local level.

9. REPORT

The IEE report shall be prepared as per this ToR. The IEE report, whenever applicable, shall contain maps, graphs, photographs, tables, and matrix. The format of the report will be by the format provided by PMO, SSTWSSSP. However, the IEE report should include the following:

Executive Summary (in English and Nepali)

Table of Contents

List of Tables

List of Figures/Photographs

Annex

List of Abbreviations

Introduction

Description of the Project

Description of the Environment

Anticipated environment impacts and mitigation measures

Analysis of alternatives with and without project situations

Information disclosure, consultation, and participation

Grievance and redress mechanism

Environmental Management Plan

Environmental Monitoring Plan

Conclusions and Recommendations

References

Annexes

10. OTHER NECESSARY MATTERS

Other necessary matters to be included in the IEE report will be relevant information, reference lists, annexes, maps, photographs, tables and charts, and questionnaires to be used at the time of carrying out the baseline survey. The report will clearly recommend whether an Environmental Impact Assessment (EIA) is required or whether an Initial Environmental Examination (IEE) is sufficient for the proposed project.

11. LITERATURE REVIEWED

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ANNEXES

ANNEX I
Project Location Map

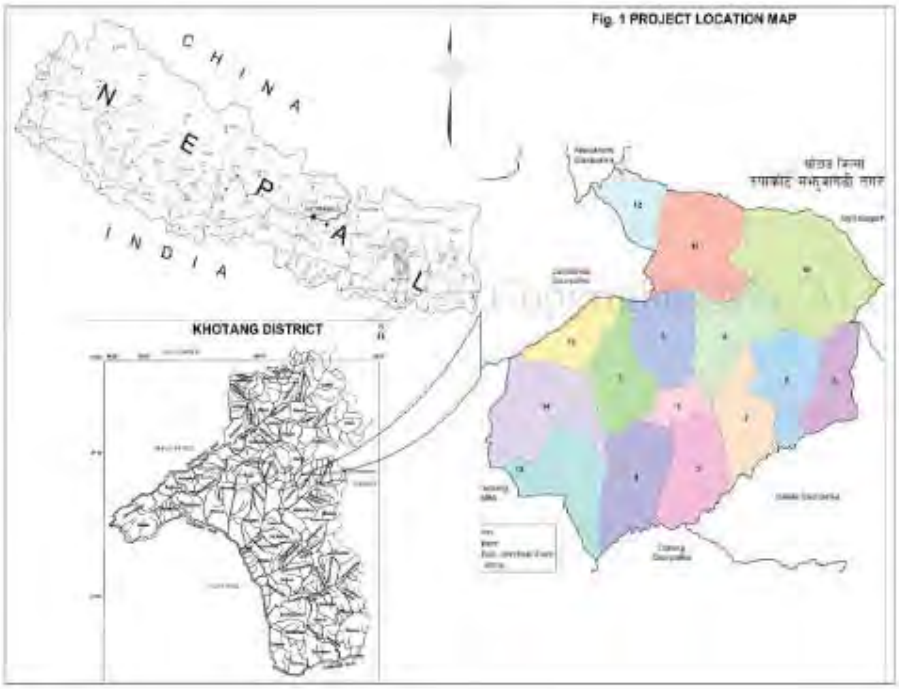
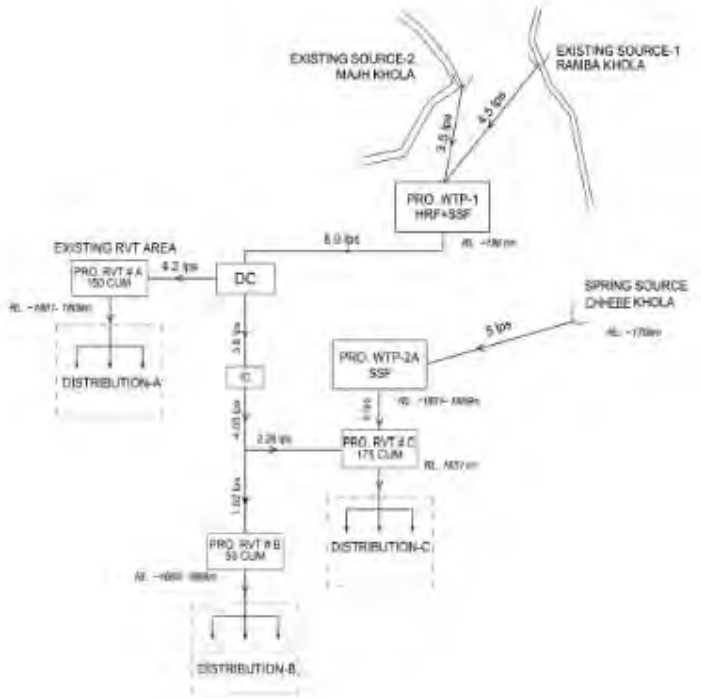


Fig. 1 PROJECT LOCATION MAP

ANNEX II
Schematic & Layout Plan for the Proposed Project


EXISTING SOURCE-2
MAJH KHOLA
EXISTING SOURCE-1
RAMBA KHOLA
PRO. WTP-1
HRF+SSF
EXISTING RVT AREA
PRO. RVT # A
150 CUM
DC
SPRING SOURCE
DHEEE KHOLA
5 lps
PRO. WTP-2A
SSF
DISTRIBUTION-A
PRO. RVT # C
175 CUM
DISTRIBUTION-C
PRO. RVT # B
50 CUM
DISTRIBUTION-B

ANNEX III

ADB's REA Checklist, Environmental Checklists & Socioeconomic Questionnaires for IEE Study

ANNEX A:

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST FOR KATARI SUB PROJECTS AND PRELIMINARY CLIMATE RISK SCREENING CHECKLIST FOR SAMPLE SUB PROJECT TOWNS

Instructions

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

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: NEP: Third Small Towns Water Supply and Sanitation Sector Project

Subproject: Diktel Water Supply and Sanitation Subproject

Screening Questions	Yes	No	Remarks
A. Project Siting **Is the project area**			
Densely populated?	√		The distribution pipeline will partially go through RoW of road in Diktel Municipality, with moderate population density
Heavy with development activities?	√		The distribution pipeline will partially go through the RoW in bazaars areas of Diktel Municipality. Development activities are of low moderate intensity.
Adjacent to or within any environmentally sensitive areas?			
Cultural heritage site		√	
Protected Area		√	

Screening Questions	Yes	No	Remarks
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	
B Potential Environmental Impacts Will the Project cause…			
Pollution of raw water supply from upstream wastewater discharge from communities industries, agriculture, and soil erosion runoff?		√	
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	
Hazard of land subsidence caused by excessive ground water pumping?		√	
Social conflicts arising from displacement of communities?		√	
Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		√	
Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	√		Basic water treatment is proposed under the Subproject. EMP recommends water quality monitoring as prescribed in the NDWQS & its Directives.
Delivery of unsafe water to distribution system?	√		Design proposes monitoring kits, a lab room. EMP recommends continuing training of WUSC in water quality monitoring, as prescribed in the NDWQS Directives.
Inadequate protection of intake works or wells, leading to pollution of water supply?	√		Design has considered the safest site for intake regarding environmental pollution and proposes enough measures to milligate contamination

Screening Questions	Yes	No	Remarks
Over pumping of ground water, leading to salinization and ground subsidence?		√	
Excessive algal growth in storage reservoir?		√	EMP provides mitigation measures.
Increase in production of sewage beyond capabilities of community facilities?		√	EMP provides mitigation measures
Inadequate disposal of sludge from water treatment plants?		√	Minimal sludge expected. EMP provides mitigation measures.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	
Impairments associated with transmission lines and access roads?	√		EMP provides measures to mitigate impacts on power supply poles in the bazaar that are immediately adjacent to, or onto, road carriageways.
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals	√		EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.
Health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants and biological and physical hazards during project construction and operation?		√	EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.
Dislocation or involuntary resettlement of people?		√	
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
Noise and dust from construction activities?	√		EMP provides mitigation measures.
Increased road traffic due to interference of construction activities?		√	EMP provides mitigation measures
Continuing soil erosion/silt runoff from construction operations?		√	

Screening Questions	Yes	No	Remarks
Delivery of unsafe water due to poor O&M treatment processes (especially MWSS accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√		EMP incorporates monitoring of distributed water according to the Directives for the NDWQS.
Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	√		Concern for corrosion of G.I. pipes caused by the chlorine content in treated water is low. EMP provides mitigation measures.
Accidental leakage of chlorine gas?		√	
Excessive abstraction of water affecting downstream water users?		√	
Competing uses of water?		√	
Increased sewage flow due to increased water supply		√	
Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	√		There is no wastewater collection & treatment system. EMP provides mitigation measures.
Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	
Social conflicts if workers from other regions or countries are hired?	√		Expected as low concern. Priority will be given to local workers.
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?	√		EMP provides mitigation measures.
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project 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?	√		EMP provides mitigation measures.

Preliminary Climate Risk Screening Checklist for Sample Sub Project Towns

Screening Questions	Score	Remarks

Location and design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides	0	Investments in the sample sub project will not likely be affected by climate change and extreme weather events due to the siting of project. For example all pipes will be constructed below ground no investments will be sited in flood plains etc
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g. sea-level, peak river flow, reliable water level, peak wind speed etc.)	0	
Materials and maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity, and hydro metrological parameters) affect the selection of project inputs over the life of project outputs (i.e. construction materials)	0	
Performance of Project Outputs	Would climate/weather conditions and related extreme events likely to affect the performance throughout their design life time?	0	Climate conditions will unlikely affect water quantity and quality of water supply system. The water supply schemes will be designed to meet the current and future demand. Further water supply system will be operated and maintained efficiently to reduce system losses. Water safety plans will be implemented to ensure water supplied is safe and potable at all times

Options for answers and corresponding scores are given below

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

Checklist for Physical Environment

A. Topography/Physiography

1. Study of Topographic maps/ other available maps and identify the ground topographic characteristics of land covered by the proposed project
2. Verify the topographic characteristics of the land in the field
3. Soil Type

B. Climate and Meteorology

1. Study of published data of regarding temperature, rainfall, humidity, wind speed and direction, solar radiation
2. If possible classify the climatic zone and its verification
3. Visit the meteorological office of the district and get latest information

C. Air Quality

1. Collect any data on air quality of the area from previous literature
2. Investigate on the air polluting activities of the area (traffic, biomass burning, industries, other anthropogenic activities

D. Erosion and land Stability

1. Identification of erosion prone area along the road alignment
2. Investigate the erosion features and potentials of the local streams and gullies

E. Land Use

1. Investigate on the land use of the Project Blocks from the topo-maps, and other available land use maps
2. Investigate the land use affected by the project structures and subsidiary facilities
3. Investigate on the land use potentials of the area

CHECKLIST OF PLANT RESOURCES

Date:

S.No.	Name of plants	Uses			Others
		Fuel-wood	Fodder	Medicine	

Note:..

....

....

CHECKLIST OF WILDLIFE ANIMALS

Date:

S.N.	Wild Animals	Remarks

Note:.....

.....

.....

CHECKLIST OF (Birds)

Date:

S.No.	Birds	Remarks

Note:.....
.....
.....

Socioeconomic Questionnaire

१. परिचय

१.१ अन्तर्वार्ता दिने व्यक्तिको नाम ठेगाना:

(क) जिल्ला: (ख) गा वि स:

(ग) टोल स्थान: (घ) वार्ड नं:

१.२ पारिवारिक विवरण

(क) घरमुलिको नाम: श्रीमान् र श्रीमती

(ख) जाती: (ग) उमेर: (घ) लिङ्ग: □ पुरुष महिला □

(ङ) वैवाहिक स्थिति: (च) धर्म: (छ) व्यवसाय (घरमुलीको):

(ज) बसेको वर्ष: (झ) शिक्षा :

(ञ) कुल परिवार संख्या .....

उमेर समुह	पुरुष	पेशा	महिला	पेशा	जम्मा
०-५ वर्ष					
६-१० वर्ष					
११-१५ वर्ष					
१६-४५ वर्ष					
४५-६० वर्ष					
६० भन्दा माथि					
जम्मा					

१.३ विद्यालय जाने उमेरका बाल बालिका (६-१५ वर्ष)

जम्मा	विद्यालय गएका		विद्यालय नगएका	
	पुरुष	महिला	पुरुष	महिला

२. साक्षरता : (तपाईको परिवारमा)

	लेखपढ गर्न सक्ने	एस.एल.सी. उत्तिर्ण	स्नातक	स्नातकोत्तर	जम्मा
महिला					
पुरुष					
जम्मा					

३. कृषि (भु-उपयोग)

३.१ तपाई वा परिवार सदस्यको नाममा गा.वि.स.र वडा भित्र जग्गा छ रु

छ □ छैन □

३.२ यदि छ भने कति छ ? रोपनीमा भन्नुहोस :

क.सं.	स्वामित्व	खेत	बारी	खरवारी	वन	कैफियत
१	आफ्नै					
२	सगोलको					

क.सं.	स्वामित्व	खेत	बारी	खरबारी	वन	कैफियत
३	कमाई आएको					
४	कमाउन दिएको					
५	जम्मा					

३.३ गा.वि.स. वा वडा बाहिर कुन ठाउँमा जग्गा छ ?

क.सं.	ठाउँको नाम	जग्गा				कैफियत
		खेत	बारी	खरबारी	वन	

३.४ तपाईंको जग्गा आयोजना भित्र पर्छ ? ९(भिकक्म ?भलतष्यल तजभ अक्ञ्उयलभलत या ुचयवभअत धजभचभ क्ञ) ?वाँक्ञ्

घर
- ☐ लम्बाई (फिटमा)
- ☐ चौडाई (फिटमा)
- ☐ छाना
- ☐ तल्ला
- ☐ कोष

खेत
- ☐ पाखो बारी
- ☐ जंगल
- ☐ अन्य
- ☐ अन्दाजी मूल्य (चलनचल्तीमा) नेरु

(क) आयोजना क्षेत्र भित्र तपाईंको कतिवटा घर र गोठ छन् ।

घर ☐ गोठ ☐

क.सं.	किसिम	क्षेत्रफल
घर १		
घर २		
घर ३		

(१) कच्ची-खरले छाएको (२) पक्की (ढुङ्गा, ईटाको पर्खाल र ढलान झिगटी वा टिनको छानो)

	संख्या	क्षेत्रफल
गोठ		
अन्य (खुलाउने)		

३.५ (क) तपाईंको आयोजना क्षेत्र भित्र पर्ने जमिनमा कुन कुन फसल लगाउनु हुन्छ ?

क.सं.	खाद्यान्न बाली	बाली लगाएको क्षेत्रफल	उत्पादन परिणाम
१. खाद्यान्न बाली			
	धान		
	गहुँ		
	मकै		
	कोदो		

	दाल गेडागुडी		
	अन्य		
२. नगदे बाली			
	आलु		
	तोरी		
	तरकारी		
	अन्य		

(ख) उक्त जग्गामा लगाएको फलफुल र अन्य बोट बिरुवाको विवरण दिनुहोस

कंस.	बोटबिरुवा	बिरुवा संख्या		जम्मा
		फल लाएको	फल नलाएको	
१	फलफुल			
२	कागती			
३	सुन्तला			
४	आँप			
५	मेवा			
६	अम्बा			
७	लिच्ची			
८	कटहर			
९	केरा			
१०	आरु			
११	नास्पाती			
१२	आरुबखडा			
१३	अन्य			
१४	डालेघास			
१५	पाखुरी			
१६	काभो			
१७	बडहर			
१८	खनायो			
१९	टाकी			
२०	गिदरी			
२१	अन्य			
२२	इन्धनको लागि प्रयोग गर्ने बोट बिरुवा			
२३	काठमा प्रयोग हुने बोटबिरुवा			
२४	बाँस निगालो			

३.६ के तपाईको जग्गामा भएको गत वर्षको उत्पादनले तपाईको परिवारलाई खान पर्याप्त भयो रु

भयो ☐ भएन ☐

३.७ यदि अपर्याप्त भयो भने कति महिनाको लागि पुगेन रु महिना

(क) तिन महिना (ख) छ महिना

(ग) नौ महिना (घ) बाह महिना

३.८ आफ्नो उत्पादित खाद्यान्न अपर्याप्त भएको बेला आफ्नो परिवारलाई कसरी खुवाउनु हुन्छ ।

क ऋण गरेर ख नोकरीबाट भएको आम्दानीबाट
ग व्यापारीको आम्दानीबाट घ भारी बोकेर भएको आम्दानीबाट
ङ दैनिक मजदुरबाट भएको च अन्य .....

३.९ पशुपालन सम्बन्धी :
तपाईको घरमा कति /कस्ता पशु पक्षीहरु पालु भएको छ रु

क.सं.	पशुपंक्षी	संख्या
१	गाई	
२	गोरु	
३	भैसी	
४	बाछा	
५	बाछि	
६	पाडा	
७	पाडि	
८	रांगो	
९	घोडा	
१०	बाख्रा	
११	बोका	
१२	खसी	
१३	पाठा/ पाठी	
१४	सुंगर/ बंगर	
१५	हांस	
१६	कुखरा	
१८	अन्य (खुलाउने)	

४. घर परिवारको वार्षिक औषत आम्दानी :

श्रोत	वार्षिक आम्दानी (रु.)	श्रोत	वार्षिक आम्दानी (रु.)
कृषिबाट		अन्य श्रोतहरु	
खाद्यान्न		नोकरी, सेवा	
नगदेवाली		ज्याला मजदरी र भरीया	
फलफूल		निवृतिभरण	
जम्मा (१)		व्यापार	
पशुपालनबाट		घरेलु उद्योग	
दुग्ध उत्पादन		पेशागत सेवा	
अण्डा कुखरा हांस बिक्री		माछा बिक्री	
बाछा/ बाछी/ गोरु /बिक्रि		अन्य	
भैसि /रांगो बिक्रि		जम्मा (३)	
बोका/ खसी/ भेडा/ बाख्रा बिक्रि			
सुगर/ बंगुर बिक्रि			
कुखरा/ हांस बिक्रि			
जम्मा (२)			
जम्मा आय (१२३):			

५. घर परिवारको वार्षिक औषत खर्च :

विवरण	जम्मा रकम (रु.)	विवरण	जम्मा रकम (रु.)
चामल		चिया	
दाल		दाउरा	
मकै		बिजुली	
तरकारी		मट्टितेल	
दुध/दही		औषधि	
माछा/मास		शिक्षा	
तेल/घ्यु		कपडा	
मर-मसला		चाडपर्व	
नुन		अन्य	
चिनी			
		जम्मा खर्च	

६.पानीको आपूर्ति

(क) तपाईले यस खोलाको पानी उपयोग गर्नु हुन्छ कि हुदैन रु

गर्छु □ गर्दिन □

(ख) यदि खोलाको पानी प्रयोग गर्नु हुन्छ भने कुन प्रयोजनको लागि प्रयोग गर्नुहुन्छ रु

सिचाई □ नुहाउने, कपडा धुने □

पिउने □ अन्य □

७.स्वास्थ्य सम्बन्धि:

(क) तपाईको परिवारमा कुनै सदस्य विगत वर्षमा बिरामी भएका थिए रु

थिए □ थिएनन् □

(ख)यदि थिए भने निम्न विवरण दिनुहोस् रु

क्रसं	नाता	पुरुष	महिला	उमेर	रोग
१					
२					
३					
४					

(रोगको प्रकार:- दिसापखाला, आउ, टाइफाईड, हैजा, मलेरिया, टीबी, जन्डीस, छाला सम्बन्धी, निमोनिया, दम, रक्तचाप, एड्स र पीत रोग, अन्य)

(ग) बिरामी पर्दा सर्वप्रथम कहाँ जानुहुन्छ रु .....

(घ) त्यहाँ निको नभए कहाँ जानुहुन्छ रु क्रमश उल्लेख गर्नुहोस ।

क्र.सं	जाने ठाउँ	रहेको स्थान	दूरी (कि.मी.)
१	अस्पताल		
२	हेल्थपोस्ट		

३	हेल्थ सेन्टर		
४	आयुर्वेदिक औषधालय		
५	निजि क्लिनिकरऔषधी पसल		
६	धामी झाक्री		
७	अन्य		

८.महिलाको अवस्था:

(क) श्रमको वर्गीकरण

क्र.सं	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
१	खनजोत		
२	मल राख्ने		
३	जमिन तयारी		
५	रोप्ने		
६	गोडमेल		
७	सिचाई		
८	काट्ने		
९	बोक्ने र बिक्राउने		
१०	अन्न प्रसोधन (कुटाई पिसाई)		
११	घांस दाउरा		
१२	गोठालो		
१३	मेलापात		
१४	खाना पकाउने		
१५	पानी पधेरो		
१६	बच्चाबच्ची र बृद्धाबृद्धी हेरविचार		

(ख) सम्पत्तिमा अधिकार

क्र.सं	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
१	घर		
२	जग्गा		
३	पशु		
५	गरगहना		
६	उद्योग धन्दा		
७	अन्य		

(ग) निर्णय प्रक्रियामा अधिकार

क्र.सं	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
१	बाली रोज्ने		

क्र.सं	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
२	पशु खरीदबिक्री		
३	गरगहना खरीदबिक्री		
५	अन्न खरीदबिक्री		
६	फलफूल खरीदबिक्री		
७	पशुजन्य पदार्थ खरीदबिक्री		
८	काठ दाउरा खरीदबिक्री		
९	विहाबारी		
१०	परिवार नियोजन		
११	छोराछोरी पढाई लेखाई		
१२	अन्य		

९. **मुआब्जा सम्बन्धी:**

(क) तपाईको घर र जग्गाको मुआब्जा के मा चाहनु हुन्छ ?

नगद ☐ जग्गाको सट्टा जग्गा ☐ अन्य ☐

(ख) यदि तपाईले मुआब्जा नगदमा पाउनु भयो भने उक्त मुआब्जा रकम के मा प्रयोग गर्नु हुन्छ ?

जग्गा किन्ने ☐ घर बनाउने ☐ ऋण तिर्ने ☐
व्यापार गर्ने ☐ अन्य ☐

१०. प्रस्ताव कार्यान्वयन गर्दा के कस्तो प्रभाव पर्ने सम्झन्छ सो सम्बन्धी राय सुझाव छ ?
सकारात्मक: नकारात्मक:

ANNEX IV
Comment Response Matrix

COMMENT RESPONSE MATRIX

S. No.	Comments	Response on Comments	Remarks
1	Improve Table of Contents (Page No. & Format)	Table of Contents has been improved accordingly	Refer III, IV & V
2	Put list of figures on separate page	It has been incorporated	Refer Page VII
3	Fix Table Numbers, Figure Numbers & Page Numbers	It has been incorporated	Refer Page III to VII
4	Clearly indicate ward numbers of service area in salient features	Ward numbers have been separately indicated	Refer Page 6
5	Check per capita cost in salient features	It has been checked and corrected accordingly	Refer Page 7
6	Fix the design population as its values are different in page 6 & page 36 of previous ToR	It has been fixed accordingly.	Refer Page 6 & 34
Note: This ToR has been revised according to the Revised Detailed Design Report			

Annex 2: Sample Forms, Formats and Report Template

Annex 2A:Rapid Environmental Assessment (REA) Checklist for Diktel Town Sub projects and Preliminary Climate Risk Screening Checklist for Sample Sub Project Towns

ANNEX A:

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST FOR KATARI SUB PROJECTS AND PRELIMINARY CLIMATE RISK SCREENING CHECKLIST FOR SAMPLE SUB PROJECT TOWNS

Instructions

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

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: NEP: Third Small Towns Water Supply and Sanitation Sector Project

Subproject: Diktel Water Supply and Sanitation Subproject

Screening Questions	Yes	No	Remarks
A. Project Siting **Is the project area**			
Densely populated?	√		The distribution pipeline will partially go through RoW of road in Diktel Municipality, with moderate population density
Heavy with development activities?	√		The distribution pipeline will partially go through the RoW in bazaars areas of Diktel Municipality. Development activities are of low moderate intensity.
Adjacent to or within any environmentally sensitive areas?			
Cultural heritage site		√	
Protected Area		√	

Screening Questions	Yes	No	Remarks
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	
B. Potential Environmental Impacts Will the Project cause…			
Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		√	
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	
Hazard of land subsidence caused by excessive ground water pumping?		√	
Social conflicts arising from displacement of communities?		√	
Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		√	
Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	√		Basic water treatment is proposed under the Subproject. EMP recommends water quality monitoring as prescribed in the NDWQS & its Directives.
Delivery of unsafe water to distribution system?	√		Design proposes monitoring kits, a lab room. EMP recommends continuing training of WUSC in water quality monitoring, as prescribed in the NDWQS Directives.
Inadequate protection of intake works or wells, leading to pollution of water supply?	√		Design has considered the safest site for intake regarding environmental pollution and proposes enough measures to mitigate contamination

Screening Questions	Yes	No	Remarks
Over pumping of ground water, leading to salinization and ground subsidence?		√	
Excessive algal growth in storage reservoir?		√	EMP provides mitigation measures.
Increase in production of sewage beyond capabilities of community facilities?		√	EMP provides mitigation measures.
Inadequate disposal of sludge from water treatment plants?		√	Minimal sludge expected. EMP provides mitigation measures.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	
Impairments associated with transmission lines and access roads?	√		EMP provides measures to mitigate impacts on power supply poles in the bazaar that are immediately adjacent to, or onto, road carriageways.
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	√		EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.
Health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?		√	EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.
Dislocation or involuntary resettlement of people?		√	
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
Noise and dust from construction activities?	√		EMP provides mitigation measures.
Increased road traffic due to interference of construction activities?		√	EMP provides mitigation measures.
Continuing soil erosion/silt runoff from construction operations?		√	

Screening Questions	Yes	No	Remarks
Delivery of unsafe water due to poor O&M treatment processes (especially MWSS accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√		EMP incorporates monitoring of distributed water according to the Directives for the NDWQS.
Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	√		Concern for corrosion of G.I. pipes caused by the chlorine content in treated water is low. EMP provides mitigation measures.
Accidental leakage of chlorine gas?		√	
Excessive abstraction of water affecting downstream water users?		√	
Competing uses of water?		√	
Increased sewage flow due to increased water supply		√	
Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	√		There is no wastewater collection & treatment system. EMP provides mitigation measures.
Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	
Social conflicts if workers from other regions or countries are hired?	√		Expected as low concern. Priority will be given to local workers.
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?	√		EMP provides mitigation measures.
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project 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?	√		EMP provides mitigation measures.

Preliminary Climate Risk Screening Checklist for Sample Sub Project Towns

Screening Questions		Score	Remarks
Location and design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides	0	Investments in the sample sub project will not likely be affected by climate change and extreme weather events due to the siting of project. For example all pipes will be constructed below ground no investments will be sited in flood plains etc.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g. sea-level, peak river flow, reliable water level, peak wind speed etc.)	0	
Materials and maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity, and hydro metrological parameters) affect the selection of project inputs over the life of project outputs (i.e. construction materials)	0	
Performance of Project Outputs	Would climate/weather conditions and related extreme events likely to affect the performance throughout their design life time?	0	Climate conditions will unlikely affect water quantity and quality of water supply system. The water supply schemes will be designed to meet the current and future demand. Further water supply system will be operated and maintained efficiently to reduce system losses. Water safety plans will be implemented to ensure water supplied is safe and potable at all times.

Options for answers and corresponding scores are given below.

Response	**Score**
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned as medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high risk project.
Result of Initial Screening (Low, Medium, High): Low Other comments: None

Annex 2B: Water Quality Standards

B.3 National Drinking Water Quality Standards, 2006

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

* Health-based guideline values

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

^ These standards indicate the maximum and minimum limits.

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

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

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

Annex 2C: Sample Grievance Redress Form

Sample Grievance Redress Form

(To be available in Nepalese and English)

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

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

FOR OFFICIAL USE ONLY

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

Annex 2D: Spoil Management Plan

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

Objectives of SMP: The objectives of SMP are:

- **A** To minimize spoil generation where possible
- **B** Maximize beneficial reuse of spoil from construction works in accordance with spoil management hierarchy
- **C** Mange onsite spoil handling to minimize environmental impacts on resident and other receivers
- **D** Minimize any further site contamination of land, water, soil
- **E** Manage the transportation of spoil with consideration of traffic impacts and transport related emissions

Structure of SMP:

Section 1: Introduction of SMP
Section 2: Legal and other requirements
Section 3: Roles and responsibilities
Section 4: Identification and assessment of spoil aspects and impacts
Section 5: Spoil volumes, characteristics and minimization
Section 6: Spoil reuses opportunities, identification and assessment
Section 7: On site spoil management approach
Section 8: Spoil transportation methodology
Section 9: Monitoring, Reporting, Review, and Improvements

Aspects and potential impacts

The key aspects of potential impacts in relation to SMP are listed in table below

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

Spoil volumes, Characteristics and Minimization

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

Characterization of spoil: Based on the type of spoil; characterization is done (sand stone, mud mix materials, reusable materials

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

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

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

Storage and stock piling Transportation and haulage route

Based on the above, the contractor will prepare a SMP as an integral part of EMP and submit it to the DSC for their review and approval.

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

Appendixes

F Photos

G Summary of consultations

H Copies of environmental clearances and permits

I Sample of environmental site inspection Report

J Others

Annex 2E: Sample Semi-Annual Environmental Monitoring Report Template

This template must be included as an appendix in the EIA/IEE that will be prepared for the project. It can be adapted to the specific project as necessary.

a. Introduction
b. Overall project description and objectives
c. Description of sub-projects
d. Environmental category of the sub-projects
e. Details of site personnel and/or consultants responsible for environmental monitoring
f. Overall project and sub-project progress and status

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

COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS

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

COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

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

COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

a. Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
b. There should be Reporting on the following items, which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual Report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:
c. What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
d. If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
e. adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;

f. Are their designated areas for concrete works, and refueling;
g. Are their spill kits on site and if there are site procedure for handling emergencies;
h. Is there any chemical stored on site and what is the storage condition?
i. Is there any dewatering activities if yes, where is the water being discharged;
j. How are the stockpiles being managed;
k. How is solid and liquid waste being handled on site;
l. Review of the complaint management system;
m. Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

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

Overall Compliance with CEMP/EMP

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

APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

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

MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (AMBIENT AIR, WATER QUALITY AND NOISE LEVELS)

a. Brief discussion on the basis for monitoring
b. Indicate type and location of environmental parameters to be monitored
c. Indicate the method of monitoring and equipment to be used
d. Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)

Water Quality Results

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

Noise Quality Results

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

Annex 2F: Sample Environmental Site Inspection Report

Annexes

Project Name
Contract Number

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

WEATHER CONDITION:

INITIAL SITE CONDITION:

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory_____ Incident_____ Resolved _____Unresolved _____

INCIDENT:
Nature of incident:

Intervention Steps:

Incident Issues

Resolution

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Inspection

Waste Minimization		
Reuse and Recycling		
Dust and Litter Control		
Hazardous Substances	Trees and Vegetation	
Site Restored to Original Condition Yes No		

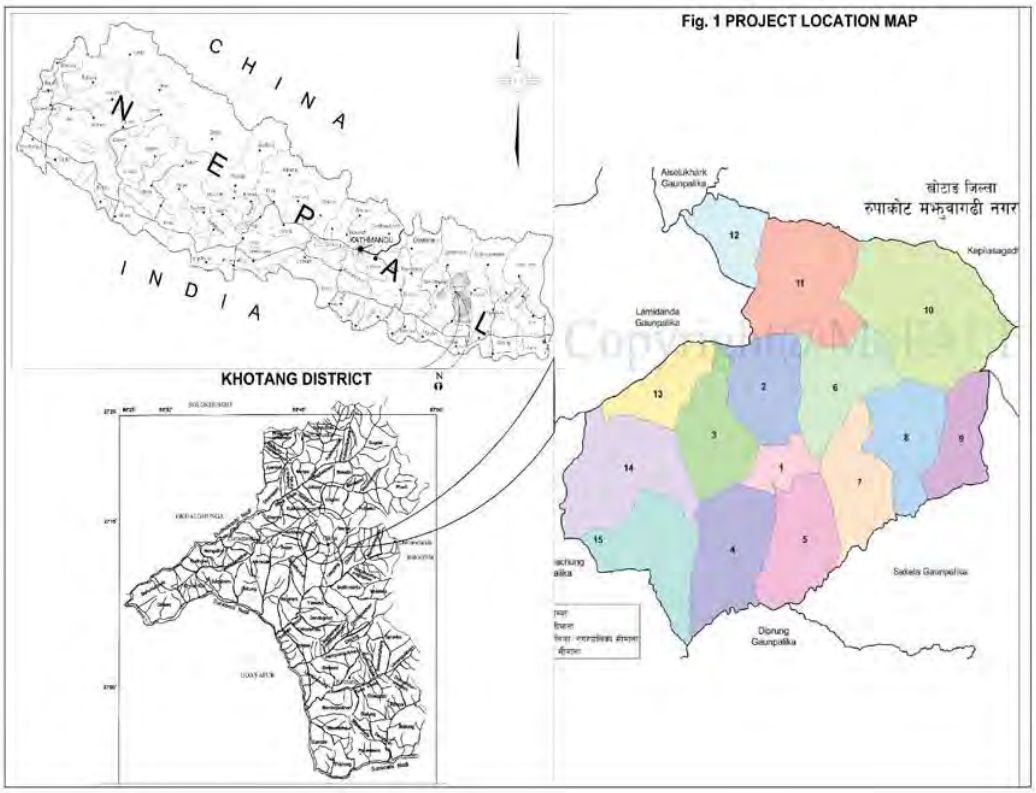
Annexes

Signature

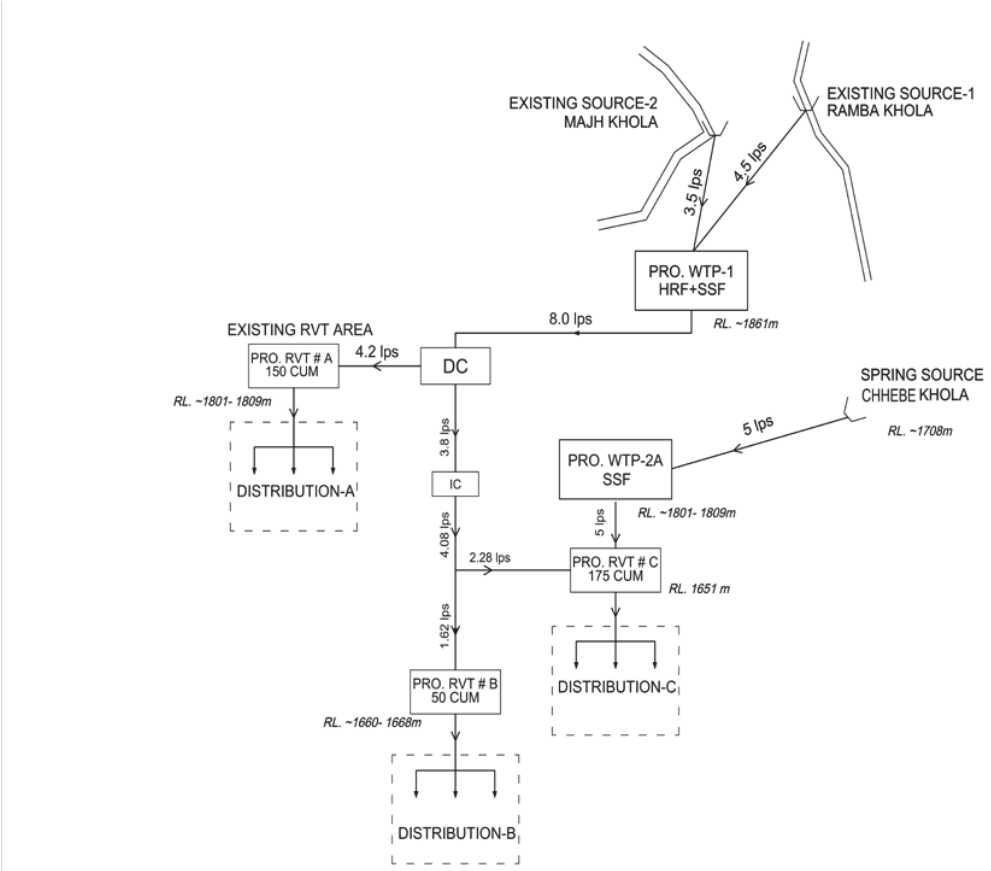
Sign off

Name Name
Position Position

Annex 3: Project Location Map & Schematic Layout of the Project



Project Location Map



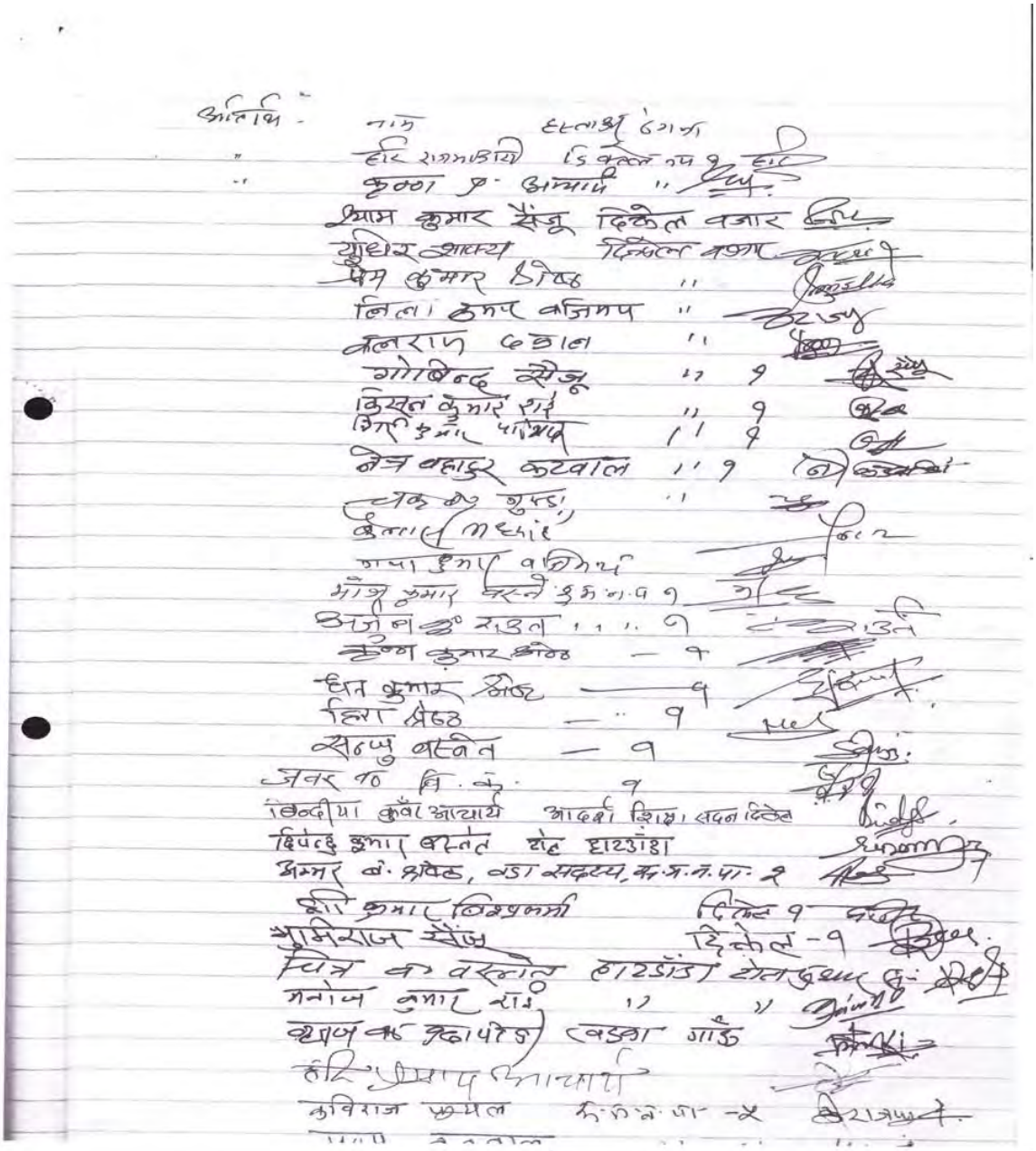
Schematic Layout of the Project

Annex 4: Public Notice, Muchulka, Recommendation Letter, Minutes of meeting

आज मिती २०६४।१०।८ गते यस स्था खोला गाउँ खोल
तेस्रो साना सहरी खानेपानी आयोजना का अध्यक्ष श्री गजुर
मान राईको सभापतित्वमा यस दिक्तेल रु.मि. नगर पालिकामा
संभाव्यता अध्ययन प्रतिवेदन प्रस्तुतिकरण कार्यक्रममा
निम्नानुसारको उपस्थिती रहि निम्न प्रस्तावहरुमा
छलफल गरि निम्नानुसारको निर्णयहरु गरियो ।

१ उपस्थिती

अध्यक्ष - श्री गजुरमान राई
प्रमुख अतिथि - श्री दिप नारायण रिजाल ज्यु मेयर दिक्तेल रु.मि.न.पा
विशेष अतिथि - प्रमुख जिल्ला अधिकारी श्री रुक देव अधिकारी ज्यु
" " उप-मेयर श्री मिना देवी राई
" " साना सहरी खानेपानी आयोजना उप आयोजना निर्देशक श्री नारायण प्रसाद आचार्य
" " DRTAC टिम कोअर्डिनेटर श्री हरी प्रसाद शर्मा
" " प्राविधिक सहयोग महाशाखा नगर विकास कोष प्रमुख श्री सुवास राज पन्त
" " ADB कन्सलटेन्स श्री केशव राज विष्ट
" " डिजाइन इन्जिनियर टेक आइकन श्री सिर्जन अर्याल
" " GEST इस्पेसलिष्ट टेक आइकन श्री रोशन सुवेदी
" " खानेपानी इन्जिनियर टेक आइकन श्री दुर्गा ब. बानिया
अतिथि - श्री. उत्तर वजिमय - खानेपानी तथा सरसफाई डि.डि.कं.
— " — श्री राम कु. राई - " " "
सन्तोष राई नेकपा (माओवादी) केन्द्र
— " — दुर्गा ब. ...
— " — दिप बहादुर तामाङ (हिलसाइड स्याम्पल एकेडेमी)
खुसनारायण राई दिक्तेल बजार
राज कुमार रिमाल बालप्रवो समाज नेपाल
...नाथ रिमाल वडा नं ०१ समना
केशव रमाइली
लक्ष्मी प्रसाद राई वडा नं ९ स्वावलम्बी ...
राजेश कुमार ...



उत्सव खैंजु का.म.न.पा.- ९
देवराज घिमिरे का.म.न.पा. वडा नं. ५
पशुराम आचार्य ,, ,, ९
करुणा [illegible] ,, ,, ९
[illegible] ,, ९
राजन [illegible] ,,
पदमप्रसाद आचार्य काठमाडौं - ६
चन्द्र [illegible] टिकेश्वर - ९
राजु श्रेष्ठ ,, ९
श्यामबहादुर थापा टिकेश्वर - ९
दुर्गाप्रसाद घिमिरे टिकेश्वर - ९
कुमारी [illegible] - इञ्जिनियर
कृष्ण आचार्य [illegible]
[illegible] टिकेश्वर - ९
[illegible] जोशी

प्रस्तावहरु

१. संभाव्यता अध्ययन प्रतिवेदन प्रस्तुतिकरण बारे ·
२. संरचना निर्माणका लागि आवश्यक जग्गा उपलब्ध गराउने बारे
३. आवश्यक अग्रिम रकम ५% उठाउने बारे
४. आयोजनाको वातावरणीय तथा सामाजिक सुरक्षा बारे ·
५. विविध

निर्णयहरु

प्रस्ताव नं. १ मा छलफल गर्दा टिकेश्वर नगर आयोजनाको संभाव्यता प्रतिवेदन परामर्शदाता TACE ICON JV को तर्फबाट प्रस्तुत भयो। डिजाइन इन्जिनियर श्री सुजन अर्याल, जेष्ठ विद रोशन सुवेदीले संभाव्यता अध्ययन प्रतिवेदन प्रस्तुत गर्नुभयो। सो प्रतिवेदन माथि सरोकारवाला हरु बिच व्यापक छलफल अन्तरक्रिया भए पश्चात विकल्प नं. १ अनुसार आयोजना अगाडी बढाउने निर्णय गरियो।

प्रस्ताव नं. २ मा छलफल गर्दा आयोजनाको आवश्यक संरचना निर्माणको लागि आवश्यक जग्गा उपलब्ध गराउन स्थानीय समिति तथा सम्बन्धित सरोकारवाला हरु बाट प्रतिबद्धता व्यक्त गरियो।

पस्ताव नं. ३ मा छलफल गर्दा दिकेल नगर आयोजना
निर्माण लागतको ५% अग्रिम रकम संकलन गर्ने खानेपानी
समिति तथा संबन्धित सरोकारवालाहरु बाट प्रतिबद्धता व्यक्त
गरियो ।
प्रस्ताव नं. ४ मा छलफल गर्दा तेश्रो साना सहरी खानेपानी
तथा सरसफाई आयोजनाले अपनाएको वातावरणीय
तथा सामाजिक सुरक्षा पद बारे जानकारी गराइयो ।
प्रस्ताव नं. ५ मा छलफल गर्नु पर्ने विषय नभएकोले
को कार्यक्रमको अन्त्य गरियो ।

Minutes of Meeting

English Translation of Minute of Meeting

A feasibility study report presentation was conducted under the chairmanship of the chairman of WUSC,Diktel town sub project, Mr. Gajur Man Rai on January 21, 2018 in the presence of the following mentioned participants. Similarly, discussions were made on the following mentioned topics and decisions were made accordingly under the consent of all.

Participants

Participants	Name	Designation
Chairman	Mr. Gajur Man Rai	Chairman of WUSC, Diktel
Chief guest	Mr Deep Narayan Rijal	Mayor of Rupakot Majuwa Gadhi Municipality
Special guest	Mr. Yek Dev Adhikari	CDO, Khotang
Special guest	Mrs. Bina Devi Rai	Deputy Mayor of Rupakot Majuwa Gadhi Municipality
Special guest	Mr.Narayan Prasad Acharya	Director, TSTWSSSP
Special guest	Mr. Hari Prasad Sharma	Team Coordinator, DRTAC
Special guest	Mr. Suman Raj Panta	Technical Assistant, Town Development Fund
Special guest	Mr. Keshab Raj Bista	ADB Consultant
Special guest	Mr. Shirjan Aryal	Design Engineer, TAEC/ICON
Special guest	Mr Roshan Subedi	GEST Specialist, TAEC/ICON
Special guest	Mr. Durga B. Baniya	Water Supply Engineer, TAEC/ICON
Special guest	Mr. Uttar Bajimaya	WSSDO
Special guest	Mr. Ram Kr. Rai	WSSDO
Invitee	Mr. Santosh Rai	Maoist Party Representative
Invitee	Mr. Nyutan B. Khatri	-
Invitee	Mr. Deep Bdr. Tamang	Hillside Sample Academy
Invitee	Mr. Khush Narayan Sainju	Diktel Bazar
Invitee	Mr. Raj Kumar Rijal	Bal Sewa Samaj Nepal
Invitee	Mr. Baija Nath Rijal	Ward No. 1
Invitee	Mr. Keshav Rasaeli	Ward No. 1
Invitee	Mr. Laxmi Das Sainju	Member, WUSC, Diktel
Invitee	Mr. Rajesh Kumar Shrestha	-
Invitee	Mr. Hari Rajbhandari	Diktel
Invitee	Mr. Krishna P. Archarya	Diktel
Invitee	Mr. Shyam Kumar Sainju	Diktel Bazaar
Invitee	Mr. Yudhir Skaya	Diktel Bazaar
Invitee	Mr. Prem Kumar Shrestha	‘’
Invitee	Mr. Lila Kumar Bajimaya	‘’
Invitee	Mr. Bal Ram Dhakal	‘’
Invitee	Mr. Gobinda Saiju	‘’
Invitee	Mr. Kisan Kumar Rai	‘’
Invitee	Mr. Giri Kumar Pariyar	‘’
Invitee	Mr. Netra Bdr. Katuwal	‘’
Invitee	Mr. Chakra Bdr. Gurung	‘’
Invitee	Mr. Kailash	‘’
Invitee	Mr. Ganga Kumar Bajimaya	‘’
Invitee	Mr. Bhoj Kumar Basnet	Rupakot Majuwagadhi Municipality-1
Invitee	Mr. Arjun K. Rai	‘’
Invitee	Mr. Krishna Kumar Shrestha	‘’
Invitee	Mr. Dhan Kumar Shrestha	‘’
Invitee	Mr. Hira Shrestha	‘’
Invitee	Mrs. Sanju Basnet	Rupakot Majuwagadhi Municipality-1

Participants	Name	Designation
Invitee	Mr. Jawar Bdr. Bishwokarma	Rupakot Majuwagadhi Municipality-1
Invitee	Mrs. Bindiya Kuwar Archarya	Adarsha Shikshya Sadan, Diktel
Invitee	Mr. Dipendra Kumar Basnet	Hatdanda Tol Sudhar Samiti
Invitee	Mr. Amar Bdr. Shrestha	Ward 2 Member
Invitee	Mr. Shree Kumar Biswakarma	Diktel-1
Invitee	Mr. Bhumiraj Saija	Diktel-1
Invitee	Mr. Chitra Bdr. Basnet	Hatdanda Tol Sudhar Samiti
Invitee	Mr. Manoj Kumar Rai	Hatdanda Tol Sudhar Samiti
Invitee	Mr. Shiva Bdr. Budhathoki	Khadkagaun
Invitee	Mr. Hari Prasad Archarya	-
Invitee	Mr. Kabiraj Phuyal	-
Invitee	Mr. Utsav Saiju	Rupakot Majuwagadhi Municipality-1
Invitee	Mr. Devraj Ghimire	Rupakot Majuwagadhi Municipality-5
Invitee	Mr. Pasu Ram Archarya	Rupakot Majuwagadhi Municipality-1
Invitee	Mr. Karan Bdr. Bajimaya	Rupakot Majuwagadhi Municipality-1
Invitee	Mr. Chatra Kumar Bajimaya	Rupakot Majuwagadhi Municipality-1
Invitee	Mr. Rajan Saiju	Rupakot Majuwagadhi Municipality-1
Invitee	Mr. Padam Prasad Acharya	Kathmandu-7
Invitee	Mr. Chandra Kumar Shrestha	Diktel-1
Invitee	Mr. Raju Shrestha	Diktel-1
Invitee	Mr. Dhyan Bdr. Rai	Diktel-1
Invitee	Mr. Durga Prasad Ghimire	Diktel-1
Invitee	Mr. Krishna Archarya	
Invitee	Mr. Netra Raj Joshi	

Discussions were made on the following mentioned proposals:

a. About the feasibility study report presentation
b. Land Requirement for the proposed project
c. Collection of 5% of required upfront cash contribution
d. Protection of Environment & Society from the potential impacts of the project
e. Others

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

a. Mr. Srijan Aryal, Design Engineer and Mr. Roshan Subedi, Social Expert from the consultant team (TAEC/ICON JV) presented on Feasibility Study Report regarding the proposed project and it has been decided that the proposed project will be implemented adopting alternative 1.
b. WUSC, Diktel and Concerned Stakeholders committed to provide land required for the construction of various structural components of this proposed project
c. WUSC, Diktel and Concerned Stakeholders also committed to collect 5% of total construction cost of the proposed project as an upfront cash contribution from the beneficiaries.
d. Information regarding the consideration of environment & social protection aspects with regard to the potential impacts of the project was delivered to all the participants.

Annex 5: Survey Questionnaire

तेस्रो साना शहरी खानेपानी तथा सरसफाई क्षेत्रगत आयोजना
घरधुरी सर्वेक्षण प्रश्नावली

जिल्ला..... नगरपालिका/गा.वि.स..... वडा नं.....
नगर आयोजना: ..... घर नं. .....
अन्तरवार्ता लिनेको नाम : ..... अन्तरवार्ता मिति : .....
सुपरिवेक्षकको नाम : .....

१. सामाजिक-आर्थिक विवरण

(उपयुक्त कोठामा (√) यो चिन्ह लगाउनु होस्)

१.१ अन्तरवार्ता दिनेको नाम :
१.२ घरमुलिको नाम ..... लिङ्ग : पुरुष ☐ महिला ☐ ☐
१.३ यस परिवारमा अपाङ्गता भएको कुनै सदस्य हुनु हुन्छ: छ ☐ छैन
१.४ जातजातिमध्ये कुन हो: क) आदिवासी जनजाति ☐ ख) दलित ☐ ग) अल्पसंख्यक ☐ घ) अन्य ☐
(अन्तर्वार्ता लिनेले थरको आधारमा उपयुक्त वर्गमा चिन्ह लगाउने ।)
१.५ अन्तरवार्ता दिने व्यक्तिको नाता: .....
१.६ यस परिवारका सदस्यहरुको विवरण दिनुस्

क्र.सं.	घरमुलिसितको नाता/नाम	उमेर	लिङ्ग	शिक्षा स्तर	पेशा
१					
२					
३					
४					
५					
६					
७					
८					
९					

नोट: पेशा : १. कृषि २. व्यापार ३. नोकरी ४. उद्योगधन्दा
५. रेमिटेन्स (वैदेशिक रोजगार) ६. ज्याला ७. अन्य
शिक्षा : १. निरक्षर २. साक्षर ३. प्राथमिकसम्म ४. माध्यमिकसम्म ५. एस.एल.सी. उतिर्ण
६. आई.ए. ७. बि.ए. ८. एम. ए. ९. अन्य
१.७ यस परिवारमा बसोबास गर्ने अन्य सदस्यहरुको सहयोगी डेराबाल कुल संख्या
१.८ यस नगर/शहरमा कहिले देखि बस्दै आउनु भएको छ ? वर्ष
स्ववासी बसाइ सरेको बसाई सरी आएको भए कुन जिल्लाबाट .....?
१.९ बसाई सर्नुको कारण: प्राकृतिक प्रकोप व्यापार/व्यवसाय शिक्षा द्वन्द जिविकोपार्जन सामाजिक विलयन
१.१० कहिले देखि यस घरमा बस्दै आउनु भएको हो ? साल/वर्ष
१.११ यो घर आफ्नै हो ? हो होइन यदि हो भने हालको मुल्य कति होला अनुमानित रु.
ख) भाडामा बसेको हो होइन हो भने मासिक घर भाँडा कति तिर्नुहुन्छ ? रु.
ग) सुकुम्बासी हो होइन
१.१२ यस घरमा भान्छा कोठा बाहेक अन्य कति वटा कोठाहरु छन् ?
१ कोठा २ कोठा ३ कोठा ४ कोठा वा सो भन्दा बढि
१.१३ घरको अवलोकन गरी घरको किसिम लेख्ने । पक्की अर्ध पक्की कच्ची
*(**पक्की** : छत ढलान, **अर्ध पक्की** : ढुङ्गा इङ्गाको गाह्रो, टीनको छाना, ढुङ्गा स्लेट,फिगाटी, टायल आदि, **कच्ची** : माटो गाह्रो र खर, टायलले छाएको)*
१.१४ यस परिवारसंग जग्गा जमीन छ ? छ छैन
यदि छ भने ५ रोपनी (०.२५ हेक्टर) भन्दा बढि वा ५ रोपनी भन्दा कम
१.१५ यहाँको जग्गाको किसिम: क) खेत वा बारी /असिंचित जग्गा (.....विघा/रोपनी)
ख) खेत वा बारी /सिंचित जग्गा (.....विघा/रोपनी)
१.१६ यहाँले गाई, भैसी पाल्नु भएकोछ ? छ छैन , छ भने कतिवटा ? एउटा दुईवटा वा बढि
१.१७ तपाईको परिवारमा तल उल्लेखित कुन कुन सामान छन् ? (भएको सामानको संख्या लेख्ने)

क्र.सं.	सम्पत्ती	संख्या	कैफियत
१	साइकल/रिक्सा		
२	मोटरसाईकल		
३	बैलगाडा		
४	कार/जिप		
५	मिनीबस/बस		
६	ट्रयाक्टर/ट्रक		
७	रेडियो/क्यासेट		
८	टेलिभिजन/भिडियोसेट		

९	स्टोभ/ग्यास चुलो		
१०	रेफ्रिजेटर		
११	वासिङ्ग मेशिन		
१२	वाटर फिल्टर		
१३	कम्प्युटर		
१४	इमेल/इन्टरनेटको पहुँच		
१५	अन्य भए उल्लेख गर्ने ।		

१.१८ यदि मुल पेशा कृषि भए कति महिना खान पुग्छ? ३ महिना ☐ ६ महिना ☐ १२ महिना ☐ यदि नपुग भएमा कसरी धान्नु हुन्छ ?
पसल/घरभाडा ☐ तलब ☐ पेन्सन ☐ अन्य ☐

१.१९ तपाईको परिवारको औसत मासिक खर्च कति छ उल्लेख गर्नुहोस ।

खर्चको शिर्षक र किसिम	मासिक खर्च रु.	कैफियत
(क) कृषि तर्फ		
रसायनिक मल, बिउ, किटनाशक आदी खरिद गर्ने		
माटोको तैयारी, रोप्ने, गोड्ने, बाली काट्ने, भित्राउने, दुवानी र बिक्री गर्दा हुने खर्च		
अन्य भए (उल्लेख गर्नुस्)		
(क) को जम्मा		
(ख) गैह्र कृषि तर्फ		
खाद्यान्न (अन्न र दैनिक उपभोग्य वस्तु)		
कपडा		
शिक्षा		
घर भाडा/घर मर्मत		
यातायात/संचार		
विद्युत		
पानी पीत /मर्मत सम्भार		
औषधि/उपचार (पानीबाट हुने रोग)		..... वार्षिक खर्च
औषधि/उपचार (अन्य रोग)		..... वार्षिक खर्च
अन्य: चाडपर्व कर्मकाण्ड संस्कार आदि उल्लेख गर्ने		..... वार्षिक खर्च
(ख) को जम्मा		
क+ख को कुल जम्मा		

१.२० तपाईको परिवारको औसत मासिक आय कति छ ? उल्लेख गर्नुहोस ।

आयस्रोत	संलग्न परिवार		प्राप्त हुने आय (रु. मासिक)	कैफियत
	पुरुष	महिला		
(क) कृषि तर्फ				
कृषि उत्पादनको बिक्रीबाट आय (मकै, गहुँ, धान, तरकारी, फलफूल)				
पशुजन्य उत्पादन (दुध, दही, घ्यु, बाख्रा, कुखुरा आदि)				
(क) को जम्मा				
(ख) गैह्र कृषि तर्फ				
नोकरी / जागिर				
ज्याला मजदुरी				
पेन्सन/उपदान आदी				
वैदेशीक रोजगार (रेमिटेन्स)				
पसल/व्यापार				
उद्योग				
पसल/घर भाडा				
गाडी/दुवानी व्यवसाय				
अन्य भए उल्लेख गर्ने				
(ख) को जम्मा				
क+ख कुल जम्मा				

१.२१ यहाँको परिवारले कुनै ठुलो ऋण बोक्नु परेको छ ? छ ☐ ☐

२. खानेपानी तथा सरसफाई व्यवस्थापन

२.१ तपाईको परिवारको लागी खान, खाना पकाउन, नुहाउन, भाँडावर्तन तथा लुगा धुनका लागी प्रयोग गरिने पानीको श्रोत एउटै हो ? हो ☐ होइन ☐

२.२ तपाईंको ☐ नपानीको ☐ श्रोत कहाँ छ ? घर कम्पाउण्ड भित्रै ☐ सार्वजनिक स्थलमा ☐

२.३ तपाईको परिवारले पिउन, खाना पकाउनको लागी प्रयोग गर्ने पानीको श्रोत कुन हो ? दैनिक कति लिटर पानी खर्चनु हुन्छ ? कृपया तलको कोठामा (✓) चिन्ह लगाउनुहोस् ।

क्र.सं.	वर्षायाममा	✓	लिटर/ दैनिक	सुख्खा याममा	✓	लिटर/ दैनिक
१.	इनार/कुवा (खुल्ला)	Á		इनार/कुवा (खुल्ला)	Á	
२.	इनार/कुवा (ढक्कन भएको)	Á		इनार/कुवा ढक्कन भएको)	Á	
३.	ट्युबेल/हयाण्डपम्प	Á		ट्युबेल हयाण्डपम्प	Á	
४.	डिप ट्युबेल	Á		डिप ट्युबेल	Á	
५.	इनार/कुवा मेसीनले तान्ने	Á		इनार/कुवा मेसीनले तान्ने	Á	
६.	सार्वजनिक धारा	Á		सार्वजनिक धारा	Á	
७.	निजी धारा	Á		निजी धारा	Á	
८.	मूल, खोला, नदी, पोखरी	Á		मूल खोला, नदी, पोखरी	Á	
९.	बिक्रेतासँग पानी किनेर	Á		बिक्रेतासँग पानी किनेर	Á	
१०.	वर्षातको पानी संकलन गरेर	Á		वर्षातको पानी संकलन गरेर	Á	
११.	अन्य	Á		अन्य	Á	
१२.	थाहा छैन	Á		थाहा छैन	Á	

२.४ दैनिक खानेपानी आवश्यक पूर्ति पानी संकलनबारे निम्न विस्तृत विवरण दिनुहोस् ।

क्र.सं.	विवरण	वर्षा याममा				सुख्खा याममा			
		पुरुष	महिला	बालिका	बालक	पुरुष	महिला	बालिका	बालक
१.	कति खेप/पटक								
२.	लिटर/खेप								
३.	कुल परिमाण								
४.	पानी ल्याउन लाग्ने समय (मिनेट)/खेप								
	• पानीको मुहान सम्म पुग्न								
	• मुहानमा पर्खनु पर्ने समय								
	• फर्कदा लाग्ने समय								
५	प्रति खेप लाग्ने समय								

नोट : *अन्तरवार्ता लिने व्यक्तिले पानीको भाँडो हेरी सोको क्षमता यकिन गरि उल्लेख गर्ने ।*

२.५ भाँडा माझ्न, नुहाउन र लुगा धुन तथा अन्य कामको लागी कुन श्रोतको पानी प्रयोग गर्नुहुन्छ ? कति पानी खपत गर्नुहुन्छ? कृपया ☑ चिन्ह लगाउनुहोस् ।

क्र.सं.	वर्षायाममा	✓	लिटर/ दैनिक	सुख्खा याममा	✓	लिटर/ दैनिक
१.	इनार/कुवा (खुल्ला)	Á		इनार/कुवा (खुल्ला)	Á	
२.	इनार/कुवा ढक्कन सहित	Á		इनार/कुवा ढक्कन सहित	Á	
३.	ट्युबेल हयाण्डपम्प सहित	Á		ट्युबेल हयाण्डपम्प सहित	Á	
४.	डिप ट्युबेल	Á		डिप ट्युबेल	Á	
५.	इनार/कुवा मेसीनबाट तान्ने	Á		इनार/कुवा मेसीनबाट तान्ने	Á	
६	सार्वजनिक धारा	Á		सार्वजनिक धारा	Á	

७.	घरकै निजी धारा	Á		घरकै निजी धारा	Á	
८.	मूल,खोला, नदी, पोखरी	Á		मूल खोला, नदी, पोखरी	Á	
९.	पानी बिक्रेतासँग किनेर	Á		पानी बिक्रेतासँग किनेर	Á	
१०.	आकासे पानी संकलन गरेर	Á		आकासे पानी संकलन गरेर	Á	
११.	अन्य	Á		अन्य	Á	
१२.	थहा छैन	Á		थहा छैन	Á	

२.६ लुगा धुन र नुहाउन घरबाट पानीको मुहान सम्म जान कति समय लाग्दछ । (यदि श्रोत/मुहान छुट्टाछुट्टै भएमा समय (मिनेटमा) उल्लेख गर्ने)

क। लुगा धुन जाने [ ] नुहाउन [ ] भाँडा माझ्न [ ]

ख। वर्षायाममा लाग्ने समय [ ] मिनेट सुख्खा याममा लाग्ने समय [ ] ट

२.७ यदि धाराको पानी यहाँको आवश्यकता परिपुर्तिगर्न पर्याप्त छैन भने कसरी आपूर्ति गर्नु हुन्छ?

पानीको श्रोत	परिमाण लिटर	खर्चनु पर्ने समय (घण्टा) दैनिक	थप खर्च मासिक
कुवा इनार			
आकासे पानी संकलन			
निजी टैंकरबाट पानी किन्ने			
हाण्ड् पम्प,ट्युबवेल			
मिनलर वाटर जार			
अन्य			

२.८ गाईबस्तुको लागि चाहिने पानी कुन श्रोतबाट कति मात्रामा उपभोग गर्नुहुन्छ ।

क। प्रयोग भएको स्रोत.....

ख। परिमाण (लिटर/दैनिक) .....

ग। श्रोतसम्म जान आउन लाग्ने समय (मिनेट).....

३. निजी धारा जडान

३.१ के तपाईले घरमा पाइप धारा जडान गर्नु भएको छ ? छ [ ] छैन [ ] यदि छ भने कति खर्च लाग्यो? रु.

३.२ के तपाई आफ्नो घरमा धारा जोड्न चाहनु हुन्छ ? चाहन्छु [ ] चाहन्न [ ] चाहनु हुन्छ भने कस्तो प्रक [ ] जडान गर्न इच्छा राख्नु हुन्छ ?

क। घरभित्र निजी धारा [ ]

ख। कम्पाउण्डभित्र निजी धारा

ग। सामुदायिक धारा [ ] [ ]

३.३ यदि तपाइको घरमा निजी धारा जडान भएको छैन भने, किन जडान नगरेको ?

क। खर्च गर्ने क्षमता नभएकोले [ ]

ख। जडान शुल्क धेरै पर्ने भएकोले [ ]

ग। मासिक पानी बिल धेरै आउने भएकोले [ ]

घ। पानीको मात्रा पर्याप्त नभएकोले [ ]

ङ। पानीको आपूर्ति नियमित नभएकोले [ ]

च। यस क्षेत्रमा पाइपलाइन जडान गर्ने व्यवस्था उपलब्ध नभएकोले [ ]

छ। पानीको गुणस्तर राम्रो नभएकोले [ ]

ज। अन्य कारण उल्लेख गर्ने [ ]

झ। थाहा छैन

३.४ हाल तपाईले पानजी धारा बापत गएको महिनामा पानीको महशुल कति तिर्नु भयो ? रु [ ]

३.५ गएको महिनामा तिरेको बिल देखाउन सक्नु हुन्छ ? (बिल उपलब्ध भए सोको विवरण भर्ने)

क। तिरेको रकम रु [ ] ख। खपत भएको पानीको मात्रा [ ] लिटर

३.६ पानीको बिल कु [ ] तिर्नुहुन्छ ? ☑ चिन्ह लगाउनुहोस् ।

क। मासिक निश्चित तोकिएको रकम [ ]

ख। मिटर रिडिङ्ग बमोजिम [ ]

ग। खानेपानी कार्यालयले भने जति [ ]

घ। तिर्नु पर्दैन [ ]

ङ। अन्य [ ]

च। थाहा छैन [ ]

३.७ तपाईलाई पानीको बिल तिर्न कुन तरिका मन पर्छ ? [ ]

क। निश्चित तोकिएको मासिक शुल्क

ख। मिटर रिडिङ्ग बिल अनुसार

३.८ घरको धारामा पानी नआउँदा पनि पानी महशुल तिर्नु पर्छ ? पर्छ [ ]

३.९ निजी धाराको पानी बाहेक तपाईले कहिले थप पानी किन्नु पर्ने भएको [ ] [ ] [ ]

वर्षायाममा लिटर ______ सुख्खायाममा लिटर ______ पर्दैन

३.१० निजीस्तरका ______ केताबाट किन्दा कति प ______ दरमा पानी किन्नु भएको छ?

लिटर ______ ______ /प्रति लिटरको दर रु. ______

३.११ तपाइका घरका धारा कति भरपर्दा छ ?

क) पानी निरन्तर आउछ ☐

ख) पानी कहिले आउंछ र कहिले आउदैन ☐

ग) पानी एक दिन बिराएर आउंछ ☐

घ) पानी प्रत्येक दिन केही घण्टा आउंछ ☐

३.१२ खानेपानी वितरण प्रणाली अवरुद्ध हुदा मर्मत सम्भार गर्दा लाग्ने खर्च व्यहान जिम्मा कसको हो ?

क) नेपाल सरकार ☐

ख) खानेपानी उपभोक्ता सरसफाइ समिति ☐

ग) समुदाय / छर छिमेकी ☐

घ) अन्य उल्लेख गर्ने ....

३.१३ खानेपानीको पाइप/धारा मर्मत सुधारको लागि वार्षिक कति रकम खर्च गर्नुहुन्छ ? गर्छु ☐ गर्दिन ☐

३.१४ सार्वजनिक धारा प्रयोग गरे बापत पानी पोत तिर्नु पर्छ?

पर्दैन ☐ , ☐ भने कति ? रकम ______ मासिक/वार्षिक

३.१५ पानीका गुणस्तर: तपाईले प्रयोग गर्ने पानीको गुणस्तरबाट सन्तुष्ट हुनुहुन्छ? छ ☐ छैन ☐

यदि छैन भने, पानीको गुणस्तर सम्बन्धि समस्या कस्ता छन ?

अ) पानी गन्हाउंछ ☐

आ) स्वाद नराम्रो छ ☐

इ) पानी प्रदूषित/धमिलो छ ☐

ई) अन्य केहि समस्या भए उल्लेख गर्ने ....

३.१६ यसरी प्रयोग गर्ने पानीको गुणस्तर कायम गर्न के गर्नु हुन्छ

पानीको प्रशोधनका घरेलु विधि	थप खर्च मासिक
उमाल्ने	
फिल्टर गर्ने	
छान्ने	
क्लोरिन (पियुस), आलम, पोटास	
युरो गार्ड	
सोडिस	

सह-लगानी अवधारणा सम्बन्धी प्राथमिकता

४.१ यदि तपाईको नगरपालिका/गा.बि.स. मा विभिन्न योजना सञ्चालन गर्न रकम उपलब्ध छ भने निम्नलिखित मध्ये कुन कुन २ योजनालाई पहिलो प्राथमिकता दिनुहुन्छ ?

क) सडक बत्ती ☐

ख) कालोपत्रे सडक ☐

ग) विद्यालय ☐

घ) अस्पताल ☐

ङ) व्यवस्थित खानेपानी प्रणाली ☐

च) पैदलयात्री सडक ☐

छ) विद्युत ☐

ज) संचार ☐

झ) सरसफाई/सुविधा ☐

ञ) सिचाई ☐

ट) पाटीपौवा धर्मशाला ☐

ठ) अन्य ....

४.२ यदि तपाई व्यवस्थित खानेपानी वितरण प्रणालीलाई महत्वपूर्ण ठान्नु हुन्छ भने, कस्तो किसिमको खानेपानी वितरण प्रणालीको चाहना गर्नु भएको छ ?

क) घर/ कम्पाउण्डभित्रै व्यक्तिगत/निजी धारा जडान ☐

ग) शुल्क सहितको सामुदायिक धारा जडान ☐

घ) सुधारिएको कुवा, हयाण्डपम्प जडित ☐

ङ) सुधारिएको कुवा, विद्युतीय यन्त्र जडित ☐

च) हाल उपलब्ध सेवामा सुधार आवश्यक छैन ☐

छ) अन्य (उल्लेख गर्नुहोस्).......... ☐

४.३ यदि तपाईको घरमा धारा छैन र निजी धारा राख्न इच्छुक हुनुहुन्छ भने, कति रकम सह-लगानी गर्न सक्नुहुन्छ ? कृपया तल दिईएको तालिकामा निजि धारा राख्न कति रकम सम्म लगानी गर्नुहुन्छ लगानीको रकमको सीमामा ☑चिन्ह लगाउनुहोस ।

क.सं.	लगानीको विवरण	☑ चिन्ह लगाउने

१.	१५००० भन्दा माथी	☐
२.	९००१ देखि १५००० सम्म	☐
३.	६००१ देखि ९००० सम्म	☐
४.	३००१ देखि ६००० सम्म	☐
५.	१५०१ देखि ३००० सम्म	☐
६.	१५०० भन्दा कम	☐

४.४ निजी धारा जडान बापत लाग्ने शुल्क व्यहोर्नु पर्नेछ? मन्जुर छ ☐मन्जुर छैन ☐

४.५ नयाँ खानेपानी योजना शुरु भएमा र सो योजनाबाट चौबिसै घण्टा पर्याप्त मात्रामा गुणस्तरयुक्त पानी उपलब्ध भएको खण्डमा के तपाईले आफ्नो घरमा धारा जडान गर्न इच्छुक हुनु हुन्छ? छु छैन

यदि इच्छुक भए नयाँ नियमानुसार मासिक पानी महशुल तिर्नु बुझाउनु हुन्छ? ☐

छु ☐ छैन ☐ यदि इच्छुक हुनु हुन्छ भने तल दिईएको तालिकामा पानी महशुलको सीमामा ☑ चिन्ह लगाएर आफ्नो इच्छा व्यक्त गर्नुहोस् ।

क्र.सं.	मासिक पानी महशुल	☑ चिन्ह लगाउने
१.	रु ५०० भन्दा माथी	☐
२.	रु ४५१ देखि ५००	☐
३.	रु ४०१ देखि ४५०	☐
४.	रु ३५१ देखि ४००	☐
५.	रु ३०१ देखि ३५०	☐
६.	रु २५१ देखि ३००	☐
६.	रु २०१ देखि २५०	☐
७.	रु १५१ देखि २००	☐

४.६ नयाँ खानेपानी वितरण प्रणालीको व्यवस्था हुन तपाईको परिवारबाट पनि प्रतिवद्धता स्वरुप अग्रिम रकम योगदान गर्नु पर्ने हुन्छ, यहाँको विचारमा कति प्रतिशत योगदान हुन सक्छ?

लागतको ५% ☐ १०% ☐ १५% ☐

४.७ नयाँ सरसफाई सुविधा (सामुदायिक शौचालय तथा सतही ढल) निर्माणको लागि सह लगानी स्वरुप १५% स्थानीय निकाय र उपभोक्ताले सहलगानी गर्न इच्छुक हुनुहुन्छ? छु छैन

यदि चाहनुहुन्छ भने, कति सम्म? ☐ ☐

४.८ यहाँलाई नभइ नहुने तथा भए राम्रो हुने प्राथमिक आवश्यकता कुन हो?

निजी धारा जडान ☐ निजी चर्पी निर्माण ☐ दुवै ☐

५.लैङ्गिक दृष्टिकोणबाट महिला सहभागिता

(आयोजनाको विभिन्न चरणमा महिला सहभागिता सम्बन्धि जानकारी संकलन गर्न प्रत्येक घरदैलोमा, लक्षित समुह छलफलबाट र छुट्टै महिला समुहसँग मात्र सोधिने प्रश्नहरु)

क) महिलाहरुको उपस्थिति र सहभागीता

५.१ आयोजनाकोबारेमा छलफल गर्न कुनै बैठक बोलाईएको थियो ?

थियो ☐ थिएन ☐

५.२ के आयोजनाको छनौट गर्न बैठकमा महिला उपभोक्ताहरुको उपस्थिती थियो ?

थियो ☐ थिएन ☐

यदि थियो भने महिला उपभोक्ताहरुको भूमिका कस्तो थियो ?

सुन्ने मात्र अन्तर्क्रियात्मक निर्णायक

५.३ आयो☐को क्रियाकलापहरुको रेखदे☐ मा के खानेपानी उपभो☐ तथा सरसफाई समिति/ संस्था गठन भएको छ ? छ ☐ छैन ☐

५.४ खा.पा.उ.स.समितिका सदस्यहरु मध्ये कति महिला सदस्यहरु छन्? (अन्तर्वार्ता लिने व्यक्तिले खा.पा.उ.स.सित समितिको पदाधिकारी तथा सदस्यहरुको नामावली तथा तलबि कर्मचारीको विवरण माग गरी उपलब्ध गराउने)

ख) लैङ्गिकताका आधारमा कार्य विभाजन

५.५ तलको तालिकामा दिइएको कामहरु अक्सर कस्ले गर्ने गर्दछ?(√)चिन्ह लगाउनुस्

दैनिक घण्टामा

क्र सं	घरायसि क्रियाकलापहरु	पुरुष	महिला	कुल समय
१	खानेपानी भर्ने, बोक्ने, भण्डारण र प्रयोग गर्ने			
२	भान्छा तयार गर्ने, भाडाँ माझ्ने			
३	बालबालिका र वृद्धवृद्धाको स्याहार			
४	लुगा धुने घर सफा गर्ने			
५	खाद्यान्न भण्डारण तथा तयारी			
६	अन्य			

ग) **पारिवारिक व्यवस्थापन, आय श्रोत र अन्य विषयमा महिलाहरुको नियन्त्रण र पहुँच**

५.६ तलको तालिकामा उल्लेखित पारिवारीक विषय वा क्षेत्रहरुमा निर्णय गर्दा यहाँको घर परिवारमा महिला/पुरुषको भनाईको सुनुवाई हुन्छ ?

उपयुक्त कोठामा ९√०चिन्ह लगाउनुस्

क्र.सं	विषय वा कार्यक्षेत्रहरु	हुन्छ ९√०	हुदैन ९√०
१	आर्थिक सरोकारका कुराहरु		
२	केटाकेटीको शिक्षा दिक्षा		
३	केटाकेटी र वृद्धवृद्धाको स्वास्थ्य र स्याहार		
४	अचल सम्पति किनबेच (घर जग्गा)		
५	दैनिक क्रियाकलापहरु		
६	सामाजिक विधि व्यवहार, विवाह, बर्तबन्ध, चाडपर्व तथा सामाजिक/पारिवारीक सुसम्बन्धन आदि		
७	अन्य		

५.७ यहाँको परिवारमा पारिवारीक सम्पतिका निम्न विषयमा महिलाको पहुँच र स्वामित्व रहेको छ छैन तलको तालिकामा उपयुक्त कोठामा ९√०चिन्ह लगाउनुस्

क्र सं	विवरण	पहुँच	स्वामित्व
१	जग्गा जमिन		
२	घर तथा अन्य संरचनाहरु		
३	चल सम्पति/सचित पैसा		
४	दैनिक क्रियाकलापहरु		
५	अन्य		

घ) **खा.पा.उ.स.स. तथा समुदायमा महिलाको स्तर (हैसियत)** (निम्न बुँदाहरु अन्तरवार्ता लिने व्यक्तिले गरेको अवलोकनका आधार हुनेछ ।

क्रसं	विषय	उच्च	मध्यम	निम्न
१	आत्मसम्मानबोध			
२	आत्मविश्वास नेतृत्व शीप			
३	दायित्वबोध र क्षमता			
४	व्याकत, तर्क संगत, धैर्य र मेहनत			
५	अन्य			

६. सम विकासमा पहुँचका आधारमा सामाजिक समावेशी सहभागिता

(आयोजनाको विभिन्न चरणमा गैरलाभान्वित विपन्न वर्गको, आदिवासी जनजाति, दलित तथा पछाडि परेका वर्गको समावेशी सहभागिता सम्बन्धि जानकारी संकलन गर्ने प्रत्येक घरदैलोमा, लक्षित समुह छलफलबाट र छुट्टै महिला समुहसँग छलफल गर्दा सोध्ने प्रश्नहरु)

क) **आयोजना क्रियाकलापमा गैरलाभान्वित विपन्न वर्गहरु, जातजाति, दलित, अपाङ्गता भएको व्यक्तिको उपस्थिति**

६.१ आयोजनाकोबारेमा छलफल गर्ने कुनै भेला/बैठकमा समावेशी तवरले बोलाईएको थियो ?

थियो ☐ थिएन ☐

६.२ के आयोजनाको छनौट गर्ने बैठकमा समावेशीताको आधारमा सहभागीहरुको उपस्थिती थियो? थियो ☐ थिएन ☐

६.३ के खा पा उ स स को गठनमा समावेशीता अंगीकार भएको थियो? थियो ☐ थिएन ☐

ख) **निर्णय प्रक्रियामा समावेशी प्रकृया अपनाएको थियो ?**

६.४ आयोजना छनौट गर्ने जातजातिहरुको कस्तो भूमिका कस्तो थियो ?

उच्च ☐ मध्यम ☐ निम्न ☐

६.५ साना सहरी खानेपानी आयोजना कार्यान्वयन गर्ने सामाजिक समावेशी आधारमा उपभोक्ताहरुको परिचालन गर्ने भएको प्रयास कस्तो थियो?

राम्रो ☐ मध्यम ☐ निम्न ☐

७. स्वास्थ्य र सरसफाइ

क. खानेपानी

९तपाईको विचारमा पानीको गुणस्तर तपाँको (खराब) भएमा के समस्याहरु देखिन सक्छ ?

(एक भन्दा बढी उत्तर आउन सक्ने)

९.१ दुर्गन्ध आउने ☐ नमिठो स्वाद ☐

१.२ दाँत बिग्रिने/रंगीने
१.३ बिरामी बनाउने
१.४ अन्य (उल्लेख गर्ने) .....
२. के तपाईंलाई पानी भर्ने र राख्ने भाँडो पानी भर्नु र भण्डार गर्नु पूर्व सफा
थाहा छ ? छ छैन
यदि छ भने, पानी राख्ने भाँडो कसरी सफा गर्नु हुन्छ ?
खाली पानी मात्रले खरानी पानीले भुस/पिठो र पानीले
साबुन पानीले अन्य (उल्लेख गर्नुस्) .....
३. तपाई घरमा पानी कसरी राख्नु हुन्छ ?
(एक भन्दा बढी उत्तर आउन सक्ने)
३.१ पानी भर्नु पहिले भाँडा सफा गर्ने
३.२ बासी पानी फ्याँक्ने
३.३ पानी राख्ने भाँडो राम्रोसँग ढाकेर/छोपेर राख्ने
३.४ अन्य (उल्लेख गर्ने).....
४. तपाई गाग्रो वा घैंटोबाट पानी कसरी निकाल्नुहुन्छ ?
४.१ पानी सार्नु अघि अम्खोरा, लौटा, करुवा, मग धोएर
४.२ गिलास, मग, कप गाग्रीमा डुबाएर
४.३ गाग्रोबाट लोटा, अम्खोरा, करुवा, गिलासमा पानी सारेर
४.४ अन्य (उल्लेख गर्ने) .....

ख. चर्पी

१. चर्पी प्रयोगका फाईदाहरु के के छन् ? (एकभन्दा बढी उत्तर आउन सक्ने)
१.१ बुढा, बालक तथा बिरामीलाई सुविधा
१.२ घर तथा वातावरण सफा हुने
१.३ गोप्यता हुने
१.४ रोगबाट बचाबट हुने
१.५ अन्य (उल्लेख गर्ने).....
२. के तपाईंलाई दिसाबाट रोग सर्छ भन्ने लाग्छ ? लाग्छ लाग्दैन
यदि लाग्छ भने, मानिसको दिसाबाट सर्ने रोगहरुको नाम भन्नुहोस् ? .....
३. के तपाईको घरमा चर्पी छ ? छ छैन
३.१ यदि छ भने, कस्तो प्रकारको चर्पी छ ?
१ खाल्डे चर्पी
२ भेन्टिलेटेड खाल्डे चर्पी
३ वाटर सिल/पोर फ्लस
४ सिस्टर्न फ्लस
५ अन्य .....
.२ यदि छ भने, तपाईको घरमा चर्पी कसकसले प्रयोग गर्नुहुन्छ ?
(१. सबैले, २. बच्चा बाहेक सबैले ३. वयस्क र प्रौढले मात्रै ४. बिरामी मात्रैले)
३.३ यदि छैन भने, किन चर्पी नबनाउनु भएको हो ?
(क. बनाउने तरिका थाहा नभएर, ख. लगानी गर्न नसकेर, ग. खुल्ला मैदानमा दिसा गर्ने बानी भएर, घ. जग्गाको अभावले ङ अन्य (उल्लेख गर्ने).....)
३.४ यदि छैन भने, दिसा गर्ने कहाँ जानुहुन्छ ?
(क. खोला/जङ्गल/किनार ख. खुल्ला मैदान/ठाउँ ग. घर/सडक छेउ घ. जहाँ सजिलो हुन्छ)
३.५ यदि छैन भने, चर्पी बनाउन कति लगानी गर्न सक्नु हुन्छ ? रु

ग. खानेकुराको सरसफाइ

१. खाद्यपदार्थ दूषित हुनबाट कसरी बचाउनुहुन्छ ? (एक भन्दा बढी उत्तर आउनसक्ने)
१.१ पकाएको खाना छोपेर/ढाकेर राख्ने
१.२ बासी बच्ने गरी धेरै नपकाएर
१.३ काँचै खाइने खानेकुरा राम्रोसँग पखालेर धोएर मात्र खाने
१.४ हात गोडा सफा गरेर मात्र भान्सामा पस्ने
१.५ सफा हातले खाना पस्कने
१.६ डाडु पन्यु, थाल, भाँडाकुँडा सफा गरेर मात्र खाना पस्कने खाने
१.७ चल्ने चौकी पकाउने भाडा, ढक्नहरु सफा राख्ने
१.८ धेरै बासी वा सडे गलेका फलफुल तरकारी नखाने
२. के तपाई खानेकुरा छोपेर/ढाकेर राख्नुहुन्छ ? राख्छु राख्दिन
यदि राख्नुहुन्छ भने, त्यसबाट के के फाइदाहरु छन् ? (एक भन्दा बढी उत्तर आउन सक्ने)
२.१ धुलो मैलो, झिंगा, साइला, किरा, तथा घरपालुवा पशुपन्छीबाट बचाबट
२.२ मूसा, छुचुन्द्रो/माउसुली/बिरालोबाट बच्न
२.३ खाद्य प्रदुषणबाट हुने रोगबाट बच्न

२.४ अन्य (उल्लेख गर्ने).....

जीवनजल बनाउने तरिका थाहा छ छैन सोध्ने, यदि थाहा भएमा सहि तरिकाले जीवनजल बनाउने । जीवनजल बनाउने सहि तरिका निम्नअनुसारको छ ।

१. पहिला साबुन पानिले हात सफा गर्ने, २. चिया गिलासको ६ गिलास (एक लिटर) पानी एउटा सफा भाँडोमा हाल्ने (यदि पानी उमालेको भएमा सेलाउन दिने), ३.जीवनजलको एक प्याकेटभित्र भएको धुलो पूरै पानीमा हाली पानीलाई राम्ररी चलाएर धुलोलाई घुल्न दिने ।

घ. व्यक्तिगत सरसफाइ

१. तपाई र परिवारका अन्य सदस्यले कहिले र के गरेपछि हात धुनुहुन्छ ? धुने भए यस्तो (✓) चिन्ह लगाउनुहोस् र नधुने भए यस्तो (×) चिन्ह लगाउनुहोस । (एक भन्दा बढी उत्तर आउन सक्ने)

क्र. सं.	क्रियाकलाप	५ वर्ष मुनिका बालबालिका		महिला		पुरुष	
		धुने (✓)	नधुने (×)	धुने (✓)	नधुने (×)	धुने (✓)	नधुने (×)
१	खाना खानु अघि						
२	खाना खाएपछि						
३	दिसा गएपछि						
४	फोहर मैला छोएपछि						
५	कामबाट फर्केपछि						
६	केटाकेटीलाई दिसा पिसाब गराइ सकेपछि						
७	अन्य (उल्लेख गर्ने)						

२. तपाई र परिवारका अन्य सदस्यले के के ले हात धुनुहुन्छ ? धुनेमा यस्तो (✓) चिन्ह लगाउनुहोस् र नधुनेमा यस्तो (×) चिन्ह लगाउनुहोस ।

क्र. सं.	क्रियाकलाप	५ वर्ष मुनिका बालबालिका		महिला		पुरुष	
		धुने (✓)	नधुने (×)	धुने (✓)	नधुने (×)	धुने (✓)	नधुने (×)
१.	पानी मात्रै						
२.	खरानी पानी						
३.	भुस/पिठो पानी						
४.	साबुन पानी						
५.	अन्य (उल्लेख गर्ने)						
जम्मा							

३. तपाई र परिवारका अन्य सदस्यले कहिले कहिले नुहाउनुहुन्छ ?

नुहाउने भए यस्तो (✓) चिन्ह लगाउनुहोस् र ननुहाउने भए यस्तो (×) चिन्ह लगाउनुहोस ।

क्र.सं.	प्रक्रियाकलाप	बालबालिका	महिला	पुरुष
		(✓) (×)	(✓) (×)	(✓) (×)
१.	प्रत्येक दिन			
२.	एक दिन बिराएर			
३.	हप्तामा २ पटक			
४.	हप्तामा १ पटक			
५.	२ हप्तामा १ पटक			
६.	महिनामा एक पटक			
जम्मा				

ङ. फोहर मैला व्यवस्थापन

१. तपाईको घरबाट निस्कने ठोस फोहर मैला कहाँ विसर्जन गर्नुहुन्छ ?

१.१ घर नजिक खाल्डोमा

१.२ निजी फोहर संकलनकर्तालाई दिने

१.३ गा.वि.स. /नगरपालिकाले व्यवस्था गरेको खाल्डो वा व्यवस्था

१.४ अन्य (उल्लेख गर्ने).....

२. ठोस तथा तरल फोहर वस्तुलाई अव्यवस्थित तरिकाले विसर्जन गर्नाले हुने नराम्रा असरहरु के के हुन् ? (एक भन्दा बढी उत्तर आउनस् सक्ने)

२.१ फोहोर वातावरणमा वृद्धि

२.२ लामखुट्टे, झिंगा, किराहरुको वृद्धि

२.३ रोग सर्नेमा वृद्धि
२.४ अन्य (उल्लेख गर्ने) .....

३. तपाईको घरबाट निस्कने फोहोर पानी कहाँ विसर्जन गर्नुहुन्छ ?
३.१ खाल्डोमा९क्यवप उष्त०
३.२ तरकारी बारीमा/करेसा बारीमा
३.३ सार्वजनिक ढलमा
३.४ अन्य (उल्लेख गर्ने) .....

च. वस्तुभाउको फोहर व्यवस्थापन

१. के तपाईले वस्तुभाउ पाल्नु भएको छ ? छ छैन
(यदि छैन भने पानी जन्य सरुवा रोगमा जाने)

यदि छ भने कुन कुन प्रकारका छन् र तिनीहरुलाई कहाँ राख्नु हुन्छ ?

क्र. सं.	वस्तुभाउको प्रकार	घरभित्रै राख्ने	बाहिर छुट्टै गोठमा राख्ने
१	गाई/भैंसी		
२	बंगुर/संगुर		
३	बाख्रा		
४	कुखुरा/हाँस		
५	अन्य		

२. वस्तुभाउबाट निस्कने फोहोर कहाँ र कसरी विसर्जन गर्नुहुन्छ ?
२.१ मलखादमा
२.२ आगो बाल्ने/गुईंठा बनाउने
२.३ गोवर ग्यास प्लान्टमा प्रयोग गर्ने
२.४ अन्य (उल्लेख गर्ने) .....

३. वस्तुभाउको फोहोर मैलाको जथाभावि अव्यवस्थित तवरले विसर्जन गर्दा हुने खराव असरहरु के के हुन् ? (एक भन्दा वढी उत्तर आउन सक्ने)
३.१ वातावरणी फोहोरमा वृद्धि हुने
३.२ लामखुट्टे, झिंगा, किराहरुको वृद्धि हुने
३.३ रोगव्याधि वढ्ने तथा सर्ने
३.४ गाँउ, छरछिमेक तथा नगर अशोभनिय देखिने
३.५ अन्य (उल्लेख गर्ने) .....

छ. पानीजन्य सरुवा रोगहरु

१. पानीजन्य सरुवा रोगको कारणहरु के के हुन् ? (एक भन्दा वढी उत्तर आउन सक्ने)
१.१ दूषित पानी प्रयोग गर्दा
१.२ दूषित खाना खाँदा
१.३ घर तथा सार्वजनिक स्थलमा फोहर वढ्नाले
१.४ मानिसको मलमूत्र जथाभावी फ्याक्ने गर्दा
१.५ फोहोर मैला जथाभावी फ्याँक्ने गर्दा
१.६ स्वास्थ्य शिक्षा तथा स्वस्थ वानीको अभाव
१.७ सरसफाइ र स्वास्थ्य सम्वन्धी ज्ञान र चेतनाको अभावले
१.८ अन्य .....

२. तपाईको परिवारमा कोही विरामी परेमा के गर्नुहुन्छ ?(प्राथमिकता अनुसार नम्वर लेख्ने)
२.१ घरायसी उपचार गर्ने
२.२ धामी, झाँक्री, पुजारी कहाँ लाने
२.३ औषधि पसलमा जाने
२.४ स्वस्थ्य चौकि वा अस्पतालमा जाने
२.५ अन्य (उल्लेख गर्ने)

३ यदि परिवारमा कसैलाई झाडापखाला लागेमा के गर्नुहुन्छ ? (प्राथमिकता अनुसार नम्वर लेख्ने)
३.१ जीवनजल खुवाउने
३.२ घरायसी उपचार गर्ने
३.३ धामी, झाँक्री वा पुजारी कहाँ जाने
३.४ औषधि पसलमा जाने
३.५ स्वास्थ्य चौकि वा अस्पतालमा जाने
३.६ अन्य (उल्लेख गर्ने).....

४. गत एक वर्षभित्र परिवारका सदस्यहरु तलका रोगहरु मध्ये कुन कुन रोगवाट विरामी भए ? (मोर्विडिटि को स्थिति)

५. तपाईको परिवारमा पानीजन्य निम्नलिखित सरुवा रोगवाट कोहि विरामी परेको थियो? तलको तालिकामा संख्या उल्लेख गर्नुस् ।

क्र. सं.	रोग	५ वर्ष मुनिका बालबालिका	महिला	पुरुष	वार्षिक खर्च रु.
१	झाडापखाला				
२	आउँ				
३	जुका				
४	टाईफाईड				
५	हैजा				
६	छाला सम्बन्धी रोग				
७	औलोरोग (मलेरिया)				
८	कमलपित्त (जण्डीस)				
९	अन्य				
	जम्मा				

६. गत एक वर्षभित्र तपाईंका परिवारमा कोही झाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरुबाट मृत्यु भएको छ ? (मृत्यु अवस्था)

रोग	५ वर्ष मुनिका बालबालिका	महिला	पुरुष
झाडा पखाला			
आउँ			
पानीजन्य अन्य सरुवा रोगहरु			
जम्मा			

७ गत एक वर्षभित्र तपाईंको परिवारका सदस्यलाई झाडापखाला र पानीजन्य अन्य सरुवा रोगहरुको उपचारमा कति रकम खर्च गर्नु भयो ?

रोग	खर्च रकम (रु.मा)			
	२००० सम्म	२००१–३०००	३००१–५०००	५००० भन्दा माथि
झाडापखाला				
पानीजन्य अन्य सरुवा रोगहरु				
जम्मा				

सहयोगका लागी धन्यवाद ।

Annex 6: Chlorine Use Guidelines

GUIDELINE VALUE

In humans and animals exposed to chlorine in drinking-water, specific adverse treatment related effects have not been observed.

Chlorine in drinking water is safe for consumption .The small amount of chlorine typically used to disinfect water does not pose risks to human health. The World Health Organization (WHO) has established a guideline value of 5 mg/L for chlorine in drinking water, meaning that such concentrations are considered acceptable for lifelong human consumption. Furthermore, WHO concludes that this value is "conservative," as no adverse effects from chlorine in drinking water were observed in studies reviewed by WHO.

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

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

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

Chlorination does not harm aquatic environments

Chlorinated drinking water is unlikely to be harmful when discharged into aquatic environments. An extensive risk assessment conducted under European Union guidelines examined potential harm from various processes to make drinking water using sodium hypochlorite. This assessment found no significant environmental risks from chlorine or byproducts formed during drinking water chlorination. The DBPs formed in drinking water depend on the nature and quantity of organic matter present as well as on the disinfectant and other treatments used. In drinking water the principal byproducts are trihalomethanes (THMs; mainly chloroform) and haloacetic acids (HAAs), with smaller amounts of other byproducts. Direct 'whole effluent' experiments representing various uses, including drinking water, have shown that no significant amounts of persistent and potentially bioaccumulative substances are formed. Toxicity tests on these mixtures demonstrated that the presence of DBPs did not increase the toxicity.

A major concern from the past was the formation of some highly-chlorinated, high-hazard molecules, such as dioxins, resulting from chlorine used in paper pulp bleaching. However, dioxins were only formed from 'active chlorine' under specific conditions: acid pH and in the presence of certain phenols such as those abundant in the lignin component of wood. There is no significant formation of dioxins or other high-hazard molecules at neutral or alkaline pH. All current uses of 'active chlorine' for microbial control and cleaning take place at alkaline or neutral pH.

Annex 7: Water Quality Test Reports

NS Lab Accreditation No.: 09-2068/69 Regd. No. 53875/064/065

AASTHA SCIENTIFIC RESEARCH SERVICE PVT. LTD

P.O. Box No. 4316, Dillibazar, Kathmandu, Nepal
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(Center for complete scientific solution)

Test Report/Certificate

Report No. : 167/2074
Entry No. : AASTHA – 109A – 2074
Sample : Water
Client : TAEC-ICON JV
Source : Chhepe Khola, Khotang

Date received : 23 – 02 – 2074
Date completed : 02 – 03 – 2074
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 26°C	4500-H⁺ APHA-AWWA-WEF 2012, 22nd Edition	7.2	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	235	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	1.2	5 (10)
4.	Taste and Odor	-	N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.13	500
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	112	5(15)
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	145	1000
8.	Total Residual Chlorine, (mg/l)	4500 - Cl B, APHA - AWWA - WEF 2012, 22nd Edition	N.D. (<0.10)	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl- B, APHA-AWWA-WEF 2012, 22nd Edition	3.72	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.08	1.5
11.	Nitrate, (mg/l)	4500-NO_3-B, APHA-AWWA-WEF 2012, 22nd Edition	0.73	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	0.08	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	0.08	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	8.62	250
15.	Mercury*, (mg/l)	3500-Hg-C, APHA-AWWA-WEF, WPCF, 17th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WEF 2012, 22nd Edition	30.4	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	<0.05	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		0.10	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd Edition	<0.01	0.05

Remarks: Water quality meets NDWQS required limit.

Analyzed By

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Authorized By

Note :- 1. The above report refers only to the tested sample and applicable parameters. Endorsement of products is neither inferred nor implied.
2. This report is neither to be reproduced wholly or partially nor can be used as an evidence in the court of law. 186/212
3. Liability of our institute is limited to the invoiced detriments and amount only.
4. Even in the case of stable samples such as limestone, minerals, soil etc. they will not be stored more than six months.

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Test Report/Certificate

Report No. : 166/2074
Entry No. : AASTHA – 109A– 2074
Sample : Water
Client : TAEC-ICON JV
Source : Ramba Khola, Khotang

Date received : 23 – 02 – 2074
Date completed : 02 – 03 – 2074
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 25°C	4500-H+ APHA-AWWA-WEF 2012, 22nd Edition	7.1	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	129	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	1.3	5 (10)
4.	Taste and Odor	-	N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.19	500
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	60	5(15)
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	78	1000
8.	Total Residual Chlorine, (mg/l)	4500 - Cl B, APHA - AWWA - WEF 2012, 22nd Edition	N.D (<0.10)	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl- B, APHA-AWWA-WEF 2012, 22nd Edition	1.85	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.15	1.5
11.	Nitrate, (mg/l)	4500-NO_3 B, APHA-AWWA-WEF 2012, 22nd Edition	0.44	50.0
12.	Aluminum, (mg/l)	3500 Al B, APHA, AWWA, WEF, 22nd Edition	0.06	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	0.08	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	9.45	250
15.	Mercury*, (mg/l)	3500-Hg-C, APHA-AWWA-WEF , WPCF, 17th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA AWWA WEF 2012, 22nd Edition	22.4	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	<0.05	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		0.13	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd edition	<0.01	0.05

Remarks: *Water quality meets NDWQS required limit.*

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Test Report/Certificate

Report No. : 165/2074
Entry No. : AASTHA – 109A– 2074
Sample : Water
Client : TAEC-ICON JV
Source : Majh Khola, Khotang

Date received : 23 – 02 – 2074
Date completed : 02 – 03 – 2074
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 26°C	4500-H+ APHA-AWWA-WEF 2012, 22nd Edition	6.7	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	51	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	42	5 (10)
4.	Taste and Odor	-	N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.17	300
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	16	5(15)
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	32	1000
8.	Total Residual Chlorine, (mg/l)	4500 - Cl B, APHA - AWWA - WEF 2012, 22nd Edition	<0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl- B, APHA-AWWA-WEF 2012, 22nd Edition	3.72	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.28	1.5
11.	Nitrate, (mg/l)	4500-NO_3-B, APHA-AWWA-WEF 2012, 22nd Edition	6.60	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	0.13	0.20
13.	Fluoride, (mg/l)	4500-F D, APHA - AWWA - WEF 2012, 22nd Edition	0.07	0.5-1.5
14.	Sulfate, (mg/l)	4500 SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	8.74	250
15.	Mercury*, (mg/l)	3500-Hg-C, APHA-AWWA-WEF, WPCF, 17th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500 Ca B, APHA-AWWA-WEF 2012, 22nd Edition	4.0	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	3.42	0.3(3)
18.	Manganese*, (mg/l)		0.16	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		0.11	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd Edition	<0.01	0.05

Remarks: *Observed value of turbidity and iron do not meet NDWQS required limit.*

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(C e n t e r f o r c o m p l e t e s c i e n t i f i c s o l u t i o n)

Nepal Laboratory Accreditation Scheme — Accredited Laboratory — No - 09 - 2066

Test Report/Certificate

Report No. : 87/2073
Entry No. : AASTHA – 43– 2073
Sample : Surface Water
Client : ICON - TAEC JV
Location : Khotang (RVT)

Date received : 29 – 01 – 2073
Date completed : 07 – 02 – 2073
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 26°C	4500-H⁺ APHA-AWWA-WEF 2012, 22nd Edition	6.6	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	58	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	1.4	5 (10)
4.	Taste and Odor	-	N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.14	500
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	32	5(15)
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	38	1000
8.	Total Residual Chlorine, (mg/l)	4500 - Cl B, APHA - AWWA - WEF 2012, 22nd Edition	<0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl⁻ B, APHA-AWWA-WEF 2012, 22nd Edition	0.99	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.42	1.5
11.	Nitrate, (mg/l)	4500-NO_3-B, APHA-AWWA-WEF 2012, 22nd Edition	0.40	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	0.03	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	0.46	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	6.4	250
15.	Mercury*, (mg/l)	3500-Hg-C, APHA-AWWA-WEF, WPCF, 17th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WEF 2012, 22nd Edition	3.2	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	<0.05	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg.l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		<0.02	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd Edition	<0.01	0.05

Remarks: *Water quality meets NDWQS required limit.*

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5. Parameters in * are not accreditated by NBSM

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Test Report/Certificate

Report No. : 267/2073
Entry No. : AASTHA – 204– 2073
Sample : Water
Client : ICON - TAEC JV
Project : Wallo Khola, Khotang

Date received : 27 – 04 – 2073
Date completed : 32 – 04 – 2073
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 26°C	4500-H⁺ APHA-AWWA-WEF 2012, 22nd Edition	6.8	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	74	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	4.6	5 (10)
4.	Taste and Odor		N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.23	500
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	36	5(15)
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	43	1000
8.	Total Residual Chlorine, (mg/l)	4500 Cl B, APHA - AWWA - WEF 2012, 22nd Edition	<0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl- B, APHA-AWWA-WEF 2012, 22nd Edition	5.96	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.39	1.5
11.	Nitrate, (mg/l)	4500-NO_3-B, APHA-AWWA-WEF 2012, 22nd Edition	2.11	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	0.08	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	<0.10	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	8.24	250
15.	Mercury*, (mg/l)	3500-Hg C, APHA-AWWA-WEF, WPCF, 17th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WEF 2012, 22nd Edition	9.6	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	0.56	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		<0.05	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd Edition	<0.01	0.05

Remarks: *Observed value of iron do not meet NDWQS required limit.*

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Test Report/Certificate

Report No. : 266/2073
Entry No. : AASTHA – 204– 2073
Sample : Water
Client : ICON - TAEC JV
Project : Pallo Khola, Khotang

Date received : 27 – 04 – 2073
Date completed : 32 – 04 – 2073
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 26°C	4500-H⁺ APHA-AWWA-WEF 2012, 22nd Edition	6.3	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	35	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	2.3	5 (10)
4.	Taste and Odor		N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.30	500
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	20	5(15)
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	22	1000
8.	Total Residual Chlorine, (mg/l)	4500 - Cl B, APHA - AWWA - WEF 2012, 22nd Edition	<0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl- B, APHA-AWWA-WEF 2012, 22nd Edition	5.96	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.32	1.5
11.	Nitrate, (mg/l)	4500-NO_3-B, APHA-AWWA-WEF 2012, 22nd Edition	6.9	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	0.02	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	0.30	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	17.72	250
15.	Mercury*, (mg/l)	3500-Hg-C, APHA-AWWA-WEF, WPCF, 17th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WEF 2012, 22nd Edition	3.2	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	<0.05	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		0.21	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd Edition	<0.01	0.05

Remarks: *Observed value of pH does not meet NDWQS required limit.*

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Annex 8: Checklists

Checklist for Physical Environment

A. Topography/Physiography

1. Study of Topographic maps/ other available maps and identify the ground topographic characteristics of land covered by the proposed project
2. Verify the topographic characteristics of the land in the field
3. Soil Type

B. Climate and Meteorology

1. Study of published data of regarding temperature, rainfall, humidity, wind speed and direction, solar radiation
2. If possible classify the climatic zone and its verification
3. Visit the meteorological office of the district and get latest information

C. Air Quality

1. Collect any data on air quality of the area from previous literature
2. Investigate on the air polluting activities of the area (traffic, biomass burning, industries, other anthropogenic activities

D. Erosion and land Stability

1. Identification of erosion prone area along the road alignment
2. Investigate the erosion features and potentials of the local streams and gullies

E. Land Use

1. Investigate on the land use of the Project Blocks from the topo-maps, and other available land use maps
2. Investigate the land use affected by the project structures and subsidiary facilities
3. Investigate on the land use potentials of the area

CHECKLIST OF PLANT RESOURCES

Date:

S.No.	Name of plants	Uses			Others
		Fuel-wood	Fodder	Medicine	

Note:……
……
……
……

CHECKLIST OF WILDLIFE ANIMALS

Date:

S.N.	Wild Animals	Remarks

Note:……
……
……
……

CHECKLIST OF BIRDS

Date:

S.No.	Birds	Remarks

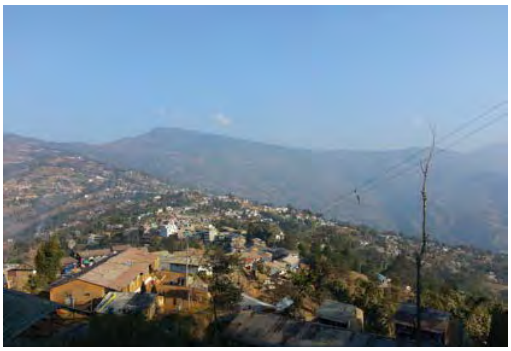
Note:……
……
……

Annex 9: Photographs

1. Intake of the existing system

2. Existing RVT at Base Camp

3. Existing RVT near Police office, to be replaced by 50cum capacity proposed tank



4. Service Area of Diktel Town Project

5. Existing Condition of Distribution Pipelines

6. Meeting with the concerned stakeholders

Annex 10
SOUTH ASIA REGIONAL DEPARTMENT
SAFEGUARDS INFORMATION LOG FOR SAUW PROJECTS

Project:	**Nepal: Urban Water Supply and Sanitation Project (UWSSP): Diktel (Khotang) Small Town Water Supply and Sanitation Subproject**		
Loan No.:	3711	**Package No.:** W04	
Components:	**Construction of a Piped Water Supply System as follows:**		
	Rehabilitation and construction of intakes	(i) 2 existing intakes to be rehabilitated (ii) 1 new intakes to be constructed	
	Rehabilitation and construction of water treatment plants (WTPs)	2 WTPs with total capacity of 1.882 MLD	
	Construction of transmission mains	Length = 10.66 km	
	Rehabilitation and construction of service reservoirs	3 service reservoirs with total capacity of 375 cu. m.	
	Construction of Bulk Distribution System	Length = 7.518 km	
	Construction of distribution network	Length = 24.351 km with pipe diameter ranging from 50 mm to 110 mm.	
	Other small allied components	Valve chambers, guard house, office, and household connection appurtenances.	
Contract Type:	NCB		
Date of IEE:	March 2018		

Draft IEE	**Updated/Revised IEE**	**Others**
		This is final IEE. The IEE is based on final detailed design per bidding documents prepared.

	Section	**Status**		**Comments/Remarks (include date accomplished or obtained, if applicable)**
1.	Environmental assessment report (EIA/IEE/envi due diligence) has been prepared?	**Yes**: X	**No**:	
2.	EIA/IEE/envi due diligence based on project components and detailed engineering design?	**Yes**: X	**No**:	
3.	Statutory Requirements		Forest Clearance	Table 1 page 9 mentions that the District Office has granted the use of water resource. **Further actions:** (Attach in the first semi-annual environmental monitoring report (SEMR) to ADB the following: (i) Permit from the District Office on the use of water resource; and (ii) all other permits and/or NOCs issued by local government for the implementation of the subproject.
			No Objection Certificate	
			Site Location Clearance	
		???	Environmental Compliance Certificate	
		???	Permit to Construct (or equivalent)	
		???	Permit to Operate (or equivalent)	
		???	Others	

5.	Policy, legal, and administrative framework	Adequate	Not Adequate	
		X		
		EIA/IEE/envi due diligence included discussion on:		
		X	National regulation/law on EIA	
		X	Environmental agency	
		X	Relevant international environmental agreements	

	Section	Status		Comments/Remarks (include date accomplished or obtained, if applicable)
		???	Environmental standards (IFC's EHS Guidelines)	ADB SPS requirements on environmental standards are not discussed. Insufficient information that contractor's measures and practices are in line with internationally-accepted practices (as required by ADB SPS). **Further action:** Confirm in the first SEMR that contractor's site-specific EMP satisfactorily meet ADB SPS requirements.
6.	Anticipated environmental impacts and mitigation measures	EIA/IEE/envi due diligence satisfactorily discussed impacts and risks on:	Mitigation measures provided? Yes / No	
		Biodiversity conservation	n/a	Endangered species and habitats not present in subproject area.
		Pollution prevention and abatement	???	Section VI discusses impacts and mitigation measures applicable to the subproject. However, reference to the EHS guidelines on pollution control and prevention has not been included. **Further action:** Confirm in the first SEMR that EHS guidelines on pollution control and prevention are being followed under the subproject.
		Health and safety	X	Section VI discusses impacts and mitigation measures of all health and safety issues that may arise in the implementation of the subproject.
		Physical cultural resources (PCR)	X	The IEE explicitly mentions that no PCRs in the subproject area.
		Cumulative impacts	X	No mitigation measures required.
		Transboundary impacts	n/a	Not applicable
7.	Impacts from Associated Facilities	Addressed	Not Addressed / Not applicable	Considered as associated facilities are the existing water supply systems of Bodjpur Municipality. However, all these existing facilities will be rehabilitated and part of the various components of the subproject.
		X		

8.	Analysis of Alternatives	**Yes** X	**No**	Section III provides discussion on alternatives. However, this is not required for Cat B and no need to include in IEE.
9.	EMP budget included	**Yes** X	**No**	Excluding human resources costs, the EMP provides indicative budget of NPR 2.160,000 for EMP implementation. **Further action:** Prior to award of contract, ensure that this amount is included in the contract.

	Section	**Status**		**Comments/Remarks (include date accomplished or obtained, if applicable)**
10.	EMP implementation integrated in PAM, and in bid and contract documents	**Yes** X	**No**	Included in PAM during loan processing. Included in Section 8 of bid documents. Section IX includes discussion on the inclusion of the EMP in the bid and contract documents. PMO and the RPMO will have the responsibility to ensure compliance with this requirement.
11.	Consultation and Participation	**Yes** X	**No**	A preliminary consultation was done on 21 January 2018 and no other consultations have been made after that. - Minutes of this consultation is in Annex 4. - The minutes includes list of attendees the their gender. However, only 3 out of the 66 participants are women. - Translation of the minutes in the English language is provided. **Further action:** Continue to conduct meaningful consultations as defined by ADB SPS throughout the duration of the subproject implementation. Ensure to include the participation of more women from the communities to be consulted.
12.	Grievance Redress Mechanism	**Yes** X	**No**	GRM mechanism included in IEE. **Further action:** Confirm in the first SEMR that GRM is notified and GRC members have the capacity to address project-related grievances/complaints. Confirm in the first SEMR that contractors are given instructions and orientation on GRM. Attach in the first SEMR copy of GRM notification.
		Description of GRM		Included in IEE (main text)

		Identification of GRC members		Done.
13.	Disclosure		Endorsement to disclose on ADB website	Pending. This will be requested when the IEE has been cleared by ADB.
			Disclosed on project website	Pending. This will be requested when the IEE has been cleared by ADB.
			Relevant information available to stakeholders and affected people in language and form they understand	Pending. This will be requested when the IEE has been cleared by ADB.
14.	Mobilized PMO Environment Officer	**Yes**	**No**	**Further action:** Include in the first SEMR the status of appointment PMO Envi Officer.
		???		
15.	Mobilized RPMO Environment Specialist	**Yes**	**No**	**Further action:** Include in the first SEMR the status of appointment RPMO Envi Specialist.
		???		
16.	Mobilized DSMC Environment Specialist	**Yes**	**No**	**Further action:** Include in the first SEMR the status of DSMC
		???		

	Section	**Status**		**Comments/Remarks (include date accomplished or obtained, if applicable)**
				Environment Specialist. If he/she is not available, provide reasons and include corrective actions with timeframe to appoint DSMC Environment Specialist.
17.	Confirm bid and contract documents and/or EMP include requirement for the contractor to appoint EHS supervisor and/or nodal person for environmental safeguards	**Yes**	**No**	This role and responsibility of the contractor is discussed in Section IX.
		X		
18.	If contract awarded already, confirm contractor's appointment of EHS supervisor and/or nodal person for environmental safeguards	Yes	No	This role and responsibility of the contractor is discussed in Section IX.
		X		
19.	Awareness training on compliance to safeguard requirements	**Yes**	**No**	Section IX discusses the institutional capacity development program, schedule, and topics for the subproject, which DRTAC-ESS will supervise for the entire UWSSP.
		X		
20.	Monitoring and Reporting	**Yes**	**No**	
		???		Section X discusses the roles and responsibilities of PMO and RPMO in reporting the implementation of EMP. However, the role of contractors on reporting is not included. **Further action:** Include in the first SEMR discussion on the role of contractors in the reporting to RPMO, including the frequency of reporting.

<table>
<tr><td>21.</td><td>Others/Remarks</td><td colspan="2"><u>Summary of PMO's Next Steps:</u>

<u>Include in the first semi-annual environmental monitoring report (SEMR) to ADB the following:</u>

1. Confirmation that contractor's site-specific EMP satisfactorily meet ADB SPS requirements.
2. The document from the District Office approving the use of water resource;
3. All other permits and/or NOCs issued by local government for the implementation of the subproject;
4. Confirmation that the GRM is notified and GRC members have the capacity to address project-related grievances/complaints.
5. Confirmation that contractors are given instructions and orientation on GRM.
6. Copy of GRM notification.
7. Confirmation on the status of appointment PMO Envi Officer, RPMO Envi Specialist, and DSMC Envi Specialist.
8. Discussion on the role of contractors in the reporting to RPMO, including the frequency of reporting.
9. English translation of Survey Questionnaire.

<u>Prior to award of contract:</u>
1. Ensure that the contract includes provisions on the responsibilities of contractor in the implementation of the EMP.
2. Ensure SEMP is submitted by contractor and approved by RPMO.</td></tr>
<tr><td></td><td>Section</td><td>Status</td><td>Comments/Remarks (include date accomplished or obtained, if applicable)</td></tr>
<tr><td></td><td></td><td colspan="2">3. Ensure that the amount for EMP/SEMP implementation is included in the contract.

<u>Other actions:</u>

1. Continue to conduct meaningful consultations as defined by ADB SPS throughout the duration of the subproject implementation. Ensure to include participation of more women from the communities to be consulted.</td></tr>
</table>

Prepared by: Miguel B. Diangan, Jr., ADB Consultant, Contract No. S22361

Noted and Checked By: Zarah Pilapil, ADB SAUW Safeguards Officer
Ninette Pajarillaga, ADB SAUW Environment Specialist

Documents/References: 1. Draft IEE for Diktel Water Supply Subproject sent by UWSSP
2. EARF of UWSSP