



नेपाल सरकार

खानेपानी मन्त्रालय

पत्र संख्या:- ०७६/७७

चलानी नं:- ०२०६

खानेपानी मन्त्रालय
सिंहदरबार, काठमाडौं

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सिंहदरबार,
काठमाडौं, नेपाल ।

मिति २०७६।०४।०७

श्री खानेपानी तथा ढल व्यवस्थापन विभाग,
पानीपोखरी, काठमाडौं ।

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

प्रस्तुत विषयमा तहां विभाग माफत स्वीकृतिका लागि मन्त्रालयमा प्राप्त भएको तेस्रो साना सहरी खानेपानी तथा सरसफाई आयोजना, पानीपोखरी काठमाण्डौं, प्रस्तावक रहेको दिक्तेल नगर साना सहरी खानेपानी तथा सरसफाई आयोजना (खोटाङ)को परिमार्जित प्रारम्भिक वातावरणीय परीक्षण (IEE) प्रतिवेदन नेपाल सरकार (सचिवस्तर) को मिति २०७६।०४।०७ को निर्णयानुसार स्वीकृत भएको व्यहोरा निर्देशानुसार अनुरोध छ ।

बोधार्थ :

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

संलग्न :

स्वीकृत प्रारम्भिक वातावरणीय परीक्षण (IEE) प्रतिवेदन २ प्रति ।

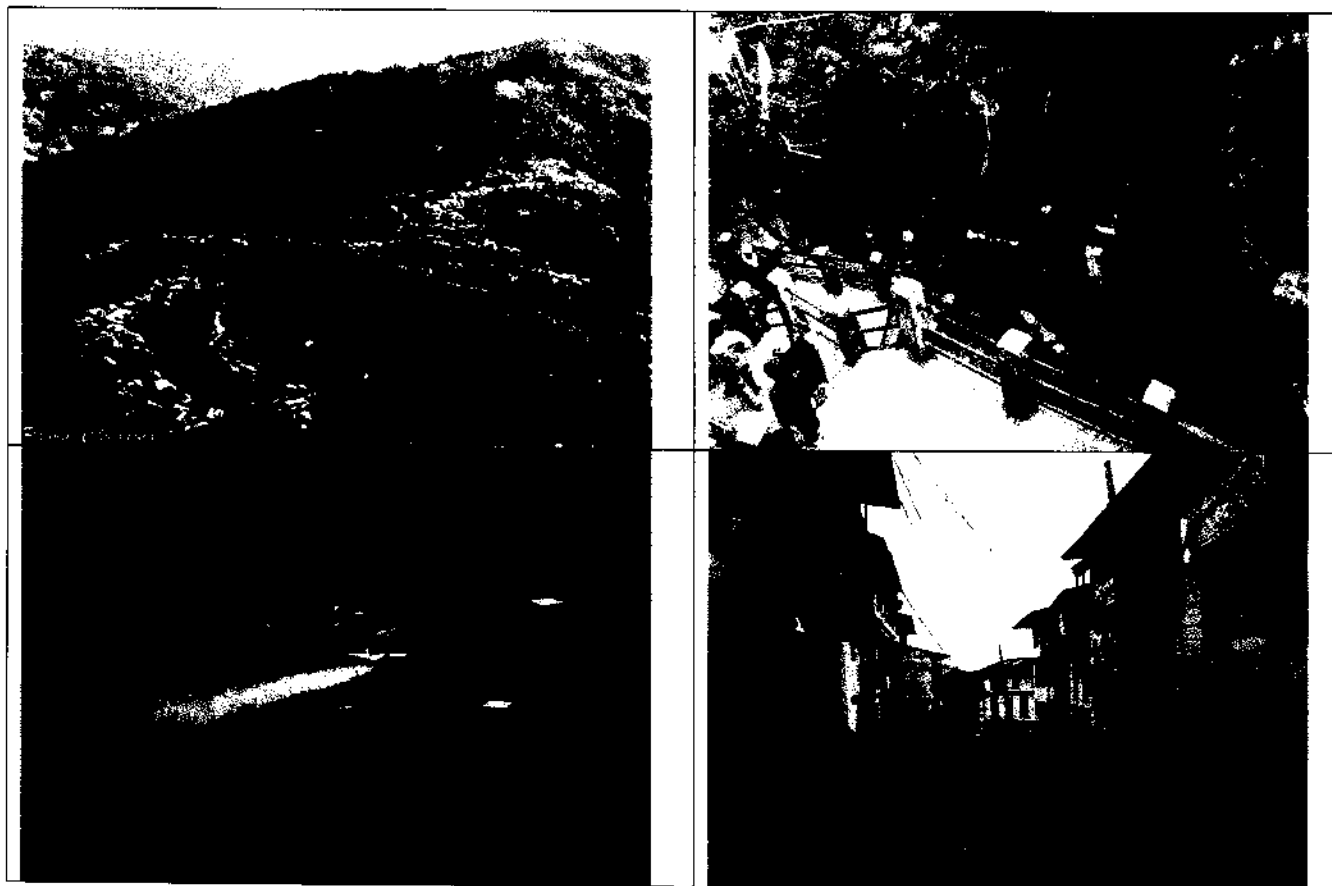
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ईन्जिनियर



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

Initial Environmental Examination (IEE)
Of
Diktel Water Supply and Sanitation Project
Khotang, Nepal

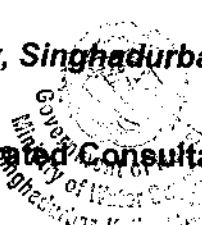


APRIL, 2019

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SUBMITTED TO: Ministry of Water Supply, Singhadurbar, Kathmandu

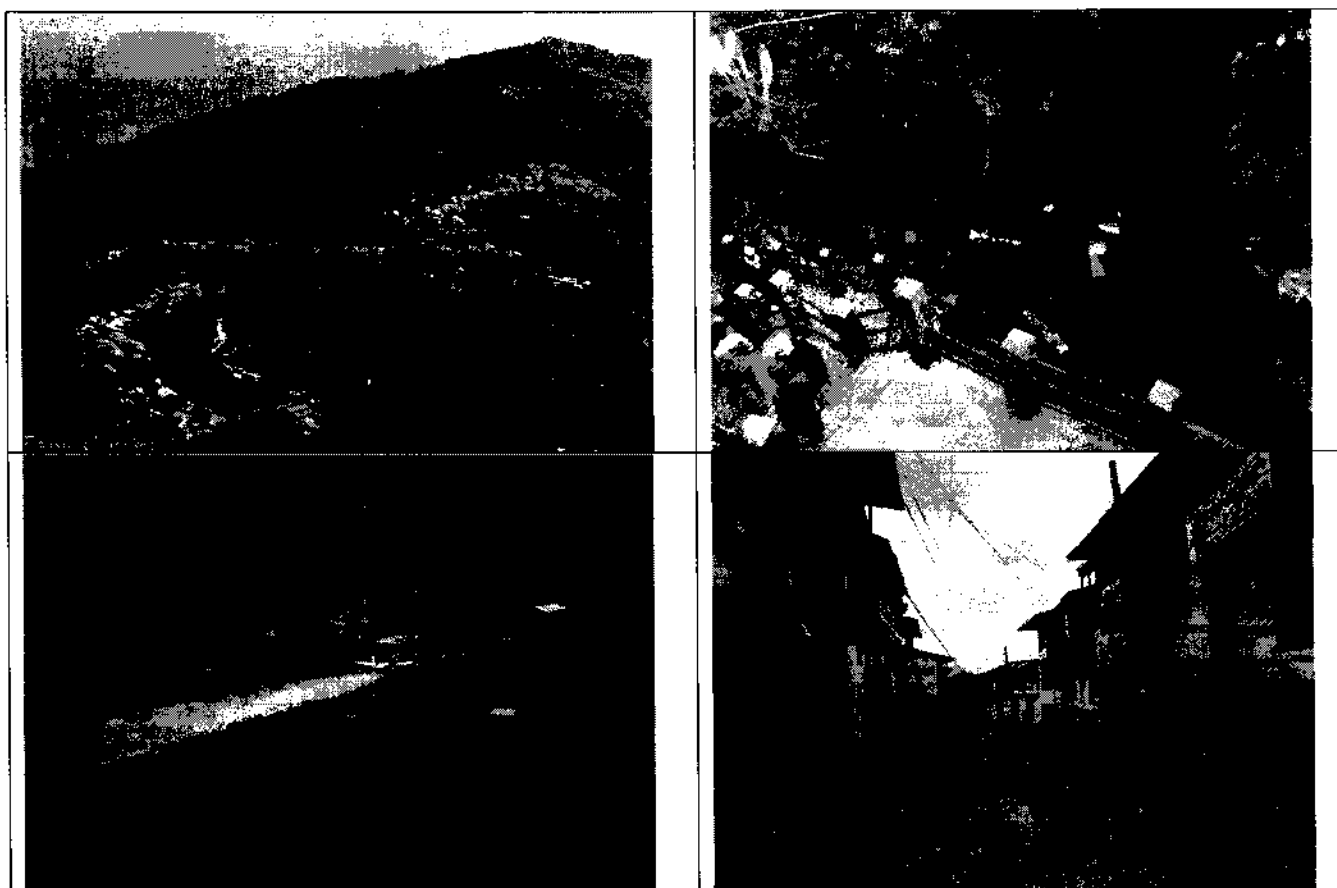
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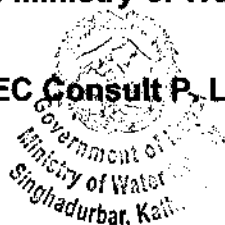


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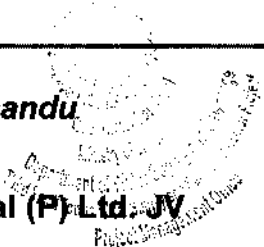
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ABBREVIATIONS

2ndSTWSSSP	Second Small Towns' Water Supply and Sanitation Sector Project
3R	Reduce, Reuse & Recycle
A.D.	Anno Domini
ADB	Asian Development Bank
AM	Accountability Mechanism
AP	Affected Person
BDS	Bulk Distribution System
BoQ	Bill of Quantities
B.S.	Bikram Sambat
BW	Brick Works
CAPP	Communication and Public Participation Plan
CBO	Community Based Organization
CBS	Central Bureau of Statistics
CDO	Chief District Officer
C-EMP	Contractor's Environmental Management Plan
CGI	Corrugated Galvanized Iron
CITES	Convention on International Trade in Endangered Species of Wild Fauna & Flora
CLBW	Chain Link Boundary Wall
CO	Carbon Monoxide
Coliform P/A	Coliform Presence/Absence
CRO	Complaint Receiving Officer
CSA	Concerned Sector Agency
DC	Distribution Chamber
DCC	District Coordination Committee
DDR	Due Diligence Report
DEDR	Detailed Engineering Design Report
DHM	Department of Hydrology & Meteorology
DI	Ductile Iron
DMA	District Metered Area
DMC	Developing Member Countries
DPC	Damp Proof Course
DPH	Dosing Pump House
DRTAC	Design Review and Technical Audit Consultant
DS	Distribution System
DSMC	Design, Supervision and Management Consultant

DWSSM	Department of Water Supply and Sewerage Management
EA	Environmental Assessment
EARF	Environmental Assessment and Review Framework
e.g.	exempli gratia (For example)
EHS	Environmental Health Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMR	Environmental Monitoring Report
ENPHO	Environment and Public Health Organization
EO	Environmental Officer
EPA	Environment Protection Act
EPR	Environment Protection Rules
ES	Environmental Specialist
ESA	Environmental Safeguard Assistant
ESE	Environmental Safeguard Expert
ESO	Environmental Safeguard Officer
et. al	et alia
etc	et cetera
FGD	Focus Group Discussion
FIRR	Finanacial Internal Rate of Return
FRP	Ferro Reinforced Plastic
GH	Guard House
GI	Galvanized Iron
GoN	Government of Nepal
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HDPE	High Density Polyethylene
HHs	Households
HRF	Horizontal Roughening Filter
H ₂ S	Hydrogen Sulphide
IBAT	Integrated Biodiversity Assessment Tool
IC	Interruption Chamber
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICG	Implementation Core Group
ID	Indirect
IS	International Standard
IUCN	International Union for Conservation of Nature
IEC	Information Environment and Communication

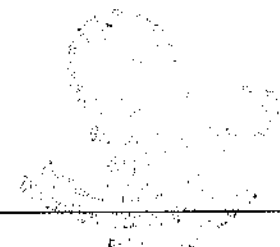
IEE	Initial Environmental Examination
LC	Least Concern
LGs	Local Groups
LT	Long Term
MoFE	Ministry of Forest and Environment
MoFLD	Ministry of Federal Affairs & Local Development
MoUD	Ministry of Urban Development
MoWS	Ministry of Water Supply
MT	Medium Term
MWSS	Manufacturer Waste Scrap Shingles
NAAQS	National Ambient Air Quality Standards
ND	Nominal Diameter
NDWQS	National Drinking Water Quality Standard
NEPAP	National Environment Policy & Action Plan
NGO	Non Governmental Organization
no.	Number
NO ₂	Nitrogen Dioxide
NPR	Nepalese Rupees
NRCS	Nepal Red Cross Society
NRW	Non Revenue Water
NT	Near Threatened
NTFP	Non Timber Forest Products
NVMES	Nepal Vehicles Mass Emission Standards
NWSC	Nepal Water Supply & Sewerage Corporation
OD	Outer Diameter
ODF	Open Defecation Free
OM	Operation Manual
O&M	Operation and Maintenance
PAF	Project Affected Families
Pb	Lead
PE	Polyethylene
PID	Project Information Datasheet
PM	Particulate Matter
PM _{2.5}	Particulate Matter 2.5 micrometers
PM ₁₀	Particulate Matter 10 micrometers
PMO	Project Management Office
PMQAC	Project Management and Quality Assurance Consultants
PN	Nominal Pressure Rating

PRO	Proposed
PPE	Personal Protective Equipment
PPTA	Project Preparation Technical Appraisal
PSC	Project Steering Committee
RCC	Reinforced Cement Concrete
RDSMC	Regional Design Supervision and Management Consultant
REA	Rapid Environmental Assessment
RL	Relative Level
RoW	Right of Way
RPMO	Regional Project Management Office
RRM	Random Rubble Masonry
RUDP	Regional Urban Development Project
RVT	Reservoir Tank
SB	Sedimentation Basin/Settling Basin
SDG	Sustainable Development Goal
SHG	Self Help Group
SO ₂	Sulphur Dioxide
SPS	Safeguard Policy Statement
SS	Site Specific
SSF	Slow Sand Filter
SSO	Social Safeguard Officer
ST	Short Term and Sedimentation Tank
STWSSSP	Small Towns' Water Supply and Sanitation Sector Project
TDF	Town Development Fund
ToR	Terms of Reference
TSP	Total Suspended Solids
TSTWSSSP	Third Small Town Water Supply & Sanitation Sector Project
USD	United States Dollar
UWSSSP	Urban Water Supply and Sanitation (Sector) Project
VDC	Village Development Committee
VU	Vulnerable
WGR	Weighted Growth Rate
WHO	World Health Organization
WN	Ward Number
WOV	Wash Out Valves
WS	Water Supply
WSP	Water Safety Plan
WSSDO	Water Supply and Sanitation Division Office

WTP	Water Treatment Plant
WUA	Water Users' Association
WUSC	Water Users' and Sanitation Committee
Yr.	Year



Signature



WEIGHTS AND MEASURES

amsl	Above mean sea level
cm	centimeter/s
cum	cubic meter
cum/hour	cubic meter per hour
cum/sqm/hr	cubic meter per square meter per hour
dBa	decibel audible
ft ²	square feet
Ha	hectare/s
kg	kilogram
kgf	kilogram force
Kg/sq.cm	Kilogram per square centimeter
km	kilometer/s
kW	Kilowatt/s
Kph	kilometer/s per hour
m	meter/s
kph	kilometer/s per hour
lpcd	liter per capita day
lps	liter per second
m	meter/s
m ³	cubic meter/s
mg/l	milligram/s per liter
mm	millimeter/s
NRs.	Nepalese Rupees
NTU	Nephelometric Turbidity Unit
PPHA	Population Per Hectare
Rs.	Rupees

NOTES

This Initial Environmental Examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff and may be preliminary in nature. The draft IEE and its environmental management plans will be updated during project implementation.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

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Government of India
Ministry of Water Supply
Singhdeoan, Kathmandu

Department
Taidoan

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EXECUTIVE SUMMARY

Introduction

1. Diktel WSSP is one of the projects proposed under UWSSSP which is currently being prepared to support further GoN's continuing efforts to provide water supply and sanitation services to selected urban municipalities of Nepal. In support of GoN's endeavor, the Asian Development Bank (ADB) funded this Urban Water Supply and Sanitation Sector Project (UWSSSP).
2. During field study, it has been identified that the existing transmission mains are said to be about 40 years old. As per field study, leakage problems at certain parts have been observed and requirement of replacement has been felt. Most of the existing distribution mains are found laid exposed to the ground and most of them are not properly laid. The existing stone masonry tank located at Diktel Bazaar is observed to be very old and need of rehabilitation or replacement has been felt. The water supplied is not sufficient to meet the current water demand of the service area. There is no provision of water treatment system and continuous water supply system. The proposed project expects to improve the existing water supply condition of the project town.
3. ADB and GoN require all projects to undergo environmental assessments. All projects funded by ADB must comply with the Safeguard Policy Statement (SPS) 2009 which will ensure the following mentioned points:
 - The projects are environmentally sound,
 - The projects are designed to operate in compliance with applicable regulatory requirements,
 - These projects are not likely to cause significant environmental, health, or safety hazards.

According to ADB's REA Checklist, the proposed project falls under 'Category B' that requires IEE study only. On the GoN side, the statutory requirement that has to be adhered to is the Environment Protection Act (1997), and Environment Protection Rules (1997) with latest amendments (2017). Based on EPR Schedule 1, the Project falls within the threshold of activities under **(H) drinking water sector** that indicates that the project requires IEE only. This IEE fulfills the policy requirements of both ADB and GoN.

4. The proposed project is the extension of the existing system. The proposed project will extend the distribution system to new areas of Diktel Bazaar area (partial areas of three wards viz; 1 to 3) which are not covered by the existing system. Similarly, two existing intakes of the existing system will be rehabilitated and used in this proposed

project. The field study shows that there is no provision of water treatment facility in the existing system. Likewise, the existing system has been providing water supply services for (4-6) hrs for public and 24 hours to major government offices till date. Hence, the inability of the existing system to provide continuous water supply service with treatment facility will be overcome by the proposed project.

5. This project has been conceptualized as a totally gravity surface water system. The overall concept has been developed with distribution system comprising of Bulk Distribution System (BDS) and Household Distribution System (DS). The main system comprises of three sub systems. The three reservoir systems will supply water to the entire distribution network system.

Description of the Project

6. Kaule Khola has been proposed as a new spring source for this project. Along with this, two existing sources viz., Rambha Khola and Majh Khola will be also used for this project. The existing intakes for these existing sources will be used for this project after their rehabilitation works. An additional spring intake has been proposed at the bank of the proposed new source. The proposed project will have two conventional type water treatment plants for this project. Similarly, there are about three service reservoirs proposed for this project. The cumulative capacity for these reservoirs proposed in the Diktel water supply sub-project is about 375 cubic meters. The main project components of the proposed project are Intakes, Transmission Mains, Water Treatment Plant, Service Reservoirs, Bulk Distribution Mains, Distribution Mains, House Connections, Appurtenances, Guard Quarter & Boundary Wall. This project also covers construction requirements like Land Requirement, Energy Requirement, Human Resource Requirement, Worker's Camp, and Stockpiling Site etc.

Methodology

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

Policy, Legal and Administrative Framework

8. The IEE study requires study of the concerned Policy, Legal & Administrative Framework to analyze their compliance with the project construction activities. The major environmental act, rules, plan, policies, guidelines that are relevant for IEE study of this project includes;
- a) Major Law, Acts & Rules:** i) Constitution of Nepal; ii) Environmental Protection Act (EPA), 2053 B.S. (1997 A.D.); iii) Environmental Protection Rules (EPR), 1997 AD, and its amendments in 2017 A.D.
- b) Plans, Policies & Strategies:** i) National Environmental Policy & Action Plan (NEPAP), 2050 B.S. (1993 A.D.); ii) Water Resources Strategy, 2059 B.S. (2002 A.D.); iii) Rural Water Supply and Sanitation National Policy and Rural Water Supply and Sanitation National Strategy 2060 B.S. (2004 A.D.); iv) Rural Water Supply and Sanitation Sectoral Strategic Action Plan; v) National Water Plan-Nepal 2062 B.S. (2005 B.S.); vi) National Urban Policy, 2063 B.S. (2007 A.D.); vii) National Urban Water Supply & Sanitation Sector Policy, 2065 B.S. (2009 A.D.); viii) Updated 15-yr Development Plan for Small Towns Water Supply and Sanitation Sector, 2066 B.S. (2009 A.D. and Amendments in 2015 A.D.); ix) National Water Supply & Sanitation Policy (Draft) ,2071 B.S. (2014 A.D.); x) Forest Policy, 2071 B.S. (2015 A.D.); xi) Land Use Policy, 2072 B.S. (2015 A.D.)
- c) Laws & Acts:** i) Essential Goods Protection Act, 2012 B.S. (1955 A.D.); ii) Aquatic Animal Protection Act, 2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.)); iii) Town Development Act , 2045 B.S. (1988 A.D.); iv) Water Resource Act, 2049 B.S. (1992 A.D.); v) Forest Act, 2049 B.S. (1993 A.D.) with amendments 2055 B.S. (1999 AD.); vi) Land Acquisition Act, 2049 B.S. (1993 A.D.); vii) Child Labor Prohibition and Regulation Act, 2056 B.S. (2001 A.D.); viii) Water Supply Management Board Act, 2063 B.S. (2006 A.D.); ix) Solid Waste Management Act, 2068 B.S. (2011 A.D.); x) Labour Act, 2074 B.S. (2017 A.D.); xi) Local Government Operation Act, 2074 B.S. (2017 A.D.)
- d) Rules & Regulations:** i) Solid Waste (Management & Resource Mobilization) Rules, 2044 B.S. (1987 A.D.) & Amendments 2049 B.S. (1992 A.D.); ii) Water Resource Regulations, 2050 B.S. (1993 A.D.); iii) Drinking Water Regulations, 2055 B.S. (1998 A.D.); iv) Solid Waste Management Rules, 2070 B.S. (2013 A.D.); iv) Labor Rules, 2075 B.S. (2018 A.D.)
- e) Guidelines & Manuals:** i) National EIA Guideline, 2049 B.S. (1993 A.D.); ii) WHO Air Quality Guidelines, Global Update, 2061 B.S. (2005 A.D.); iii) WHO Guidelines for Drinking Water Quality, Fourth Edition 2073 B.S. (2017 A.D.); iv) National Noise

Standard Guidelines, 2068 B.S. (2012 A.D.); v) Guidelines for Community Noise by WHO, 2055 B.S. (1999 A.D.)

Existing Environment

9. This IEE study requires information on the existing environment of the project town to identify the susceptibility of the environmental aspects of the project town towards the anticipated environmental impacts of the proposed project. Regarding this, the secondary information of the existing environment was collected through literature review during desk study. However, the secondary information is not sufficient for IEE study. Hence, the field study was carried out to collect primary information on the existing environmental aspects.
10. Regarding this, details on various physical environmental aspects like Landforms & Topography, Land Use Pattern, Geology & Soil, Water Resources, Climate, Air Quality, Acoustic Environment, Landslide Susceptibility etc and biological features like Flora, Fauna, Protected Areas & Community Forest Areas were collected through simple checklist, REA checklist, professional judgement and interaction with the locals & the concerned bodies during field study. No existence of protected areas as well as community forest areas within the project area were observed during the field study.
11. Similarly, details on water quality were collected through sampling process followed by water quality tests on approved laboratory. The test result shows that the water sample taken from Majh Khola has high turbidity value which is 42 NTU and slightly higher iron content i.e., 3.42 mg/L. Hence, this indicates the necessity of provision of water treatment plant for the proposed project. Except this Majh Khola, other two sources found to meet NDWQS requirements.
12. During field study, details on the socio-economic environment that includes Demographic Features, Caste/Ethnic Groups, Economic Features, Education & Skills and Community Infrastructures were collected through simple questionnaire method followed by household survey and interaction with the locals. Regarding this, Willingness to Pay for Monthly Tariff, Willingness for Up-front Cash Contribution and Affordability has also been assessed. As per the sampled household survey, 100% of 43 sampled HHs expressed willingness to pay for Monthly tariff and to contribute for up-front cash contribution. This indicates their demand for the proposed project to get rid of their acute water shortage problem. The survey also shows that only 4.% of 930 HHs fall under poor category and only 12.36% of 930 HHs expend less than Rs. 7,500 per month. Hence, this indicates the affordability of the community in terms of monthly income level and the expenditure level.

Analysis of Alternatives

13. Analysis on the alternatives of the proposed project is another important process of IEE study that will help to assess the feasibility of the project in regard to technical, environmental & social aspects. Primarily, this involves two alternatives that includes "Without Project" or "Do-nothing" Alternative and "With Project" Alternative. The limitation of "Without Project" Alternatives regarding continuous water supply system, treatment system and susceptibility to water borne diseases leads to opt for "With Project" Alternative. This "With Project" Alternative analysis shows that there are two alternatives proposed for the design of the proposed project. The Alternative I is fully gravity systems whereas Alternative II is mixed (partly pumped and partly gravity). The analysis further shows that both alternatives are technically & environmentally feasible. However, the financial study shows that monthly tariffs in second alternative are not affordable in all income categories. Hence, Alternative II is economically unfeasible alternative for the project and Alternative I has been selected as the best alternative for the project.

Anticipated Environmental Impacts

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

Bodies, Impacts on Flora & Fauna, Impact on Aquatic Life, Workers & Community Health & Safety Hazards, and Damage to the existing Utilities, Traffic Congestion, Disruption to Local Vendor's Business, Occupational Health & Safety Hazards, Delivery of Unsafe Water, Impact of Sustainability of Works etc.

Mitigation & Augmentation Measures

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

Information Disclosure, Consultation & Participation

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

Grievance Redress Mechanism

19. The Project-specific grievance redress mechanism (GRM) is also an essential process of the IEE study which is meant for persons seeking satisfactory resolution to their complaints on the social and environmental performance of the projects under UWSSSP. The mechanism, developed in consultation with key stakeholders, will ensure the following mentioned pointsd
- (i) the basic rights and interests of every person adversely affected by the social and environmental performance of a Project are protected; and
 - (ii) their concerns are effectively and timely addressed.

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

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

Environmental Management Plan

20. Preparation and Implementation of the environmental management plan (EMP) is another essential process of the IEE study. The main purpose of EMP is to ensure that the activities are undertaken in a responsible and non-detrimental manner. Similarly, the other objectives of EMP are as follows:
- (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site;
 - (ii) guiding and controlling the implementation of findings and recommendations of the environmental assignment conducted for the project;
 - (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impacts of the project; and
 - (iv) ensuring that safety recommendations are complied with.
21. The total estimated local level monitoring and mitigation cost for the project is NRs. 1,000,000.00.

Monitoring & Reporting

22. PMO & RPMO will be responsible for environmental monitoring & reporting. RPMO will monitor and measure the progress of EMP implementation. RPMO will submit a monthly monitoring and implementation reports to PMO, who will take follow-up actions, if necessary. PMO will submit semi-annual monitoring reports to ADB. ADB will review project performance against the MoWS's commitments as agreed in the legal documents. ADB will monitor projects on an ongoing basis until a project completion report is issued. Ministry of Water Supply (MoWS) under Government of Nepal will also undertake monitoring process through random field visits to review the project performance.

Conclusion

23. In conclusion, the IEE study shows that the proposed project is not an environmentally critical undertaking. The proposed project, its components, are not within or adjacent to environmentally sensitive areas. The few adverse impacts of

high magnitude during construction will be temporary and short-term (i.e., most likely to occur only during peak construction periods). The proposed project will bring about the following mentioned benefits:

- (i) Access to reliable supply of safe and potable water;
- (ii) Promotion of good hygiene and sanitation practices and reduced health and safety risks;
- (iii) Liberation from the hardship for continuous drinking water supply for years and
- (iv) Enhanced community health, improved quality of life and safe communities as outcomes.

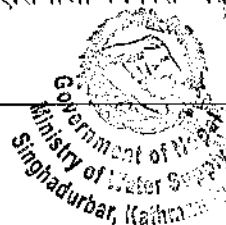
24. In conclusion, there are no significant negative impacts of the proposed project, and the classification of the project as Category "B" is confirmed as per ADB and as Schedule -1 is confirmed as per Environment Protection Rules, 2054 (1997) and 2017 (Latest Amendments). No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) and Environment Protection Rules, 2054 (1997) of Nepal.



कार्यकारी सारांश

परिचय

१. यस दित्तेल खानेपानी आपूर्ति तथा सरसफाई आयोजना , छनौट गरिएका नेपालका शहरी नगरपालिकाहरुमा खानेपानी आपूर्ति तथा सरसफाई सेवा वितरणमा सुधार ल्याउने नेपाल सरकारको निरन्तर थप प्रयासलाई सहायता गर्ने हेतुले शुरु गरिएको शहरी खानेपानी तथा सरसफाई आयोजना अर्न्तगत प्रस्ताव गरिएको परियोजना मध्ये एक हो । नेपाल सरकारको यही प्रयासलाई समर्थन गर्दै एसियाली विकास बैंकले शहरी खानेपानी तथा सरसफाई आयोजनाका निम्ति लगानी गरेको छ ।
२. स्थलगत अध्ययनको क्रममा यस रुपाकोट मझुवागढी नगरपालिकामा सञ्चालन भइरहेको वर्तमान खानेपानी आपूर्ति प्रणाली लगभग ४० वर्ष पुरानो प्रणाली रहेको पहिचान गरिएको छ । तसर्थ, स्थलगत अध्ययनअनुसार यसका केही भागहरुमा चुहावटको समस्या देखिएको छ भने यसको प्रतिस्थापनाको आवश्यकता महसुस गरिएको छ । वर्तमान वितरण प्रणालीका प्रायः पाइपहरु जमिनमाथि नै उजागर गरी विछ्याइएको पाइएको छ भने तीमध्ये धेरैलाई सही ढंगले विछ्याइएका छैन । दित्तेल बजारमा अवस्थित ढुंगाबाट बनेको टेकी धेरै पुरानो रहेको र पुर्नस्थापना वा प्रतिस्थापनाको आवश्यकताको महसुस गरिएको छ । यस वर्तमान प्रणालीले वर्तमान खानेपानीको बढ्दो मागलाई पूरा गर्न सकेको छैन । वर्तमान खानेपानी आपूर्ति प्रणालीमा पानी प्रशोधन प्रणाली तथा निरन्तर खानेपानी आपूर्ति प्रणालीको व्यवस्था गरिएको छैन । प्रस्तावित आयोजनाले हाल अवस्थित खानेपानी आपूर्ति प्रणालीको अवस्था सुधार गर्ने अपेक्षा गर्दछ ।
३. एसियाली विकास बैंक तथा नेपाल सरकारको नीति अनुसार सबै परियोजनाहरुको वातावरणीय मूल्यांकन गर्न आवश्यक छ । एसियाली विकास बैंकद्वारा लगानी गरिएको आयोजनाहरुले सन् २००९ मा लागू गरिएको सुरक्षा नीति विवरण (SPS) को अनुपालन गरेको हुनुपर्छ जसले निम्न उल्लेखित बुँदाहरुको सुनिश्चितता तय गर्दछ :
 - यी आयोजनाहरु वातावरणीय पक्षको हिसाबले राम्रो अवस्थामा रहेको छ ।
 - यी आयोजनाहरुको सम्बन्धित नियामक आवश्यकताहरुको अनुपालन गर्दै सञ्चालन गर्नको लागि डिजाइन गरिएको छ ।
 - यी आयोजनाहरुले वातावरण, स्वास्थ्य वा सुरक्षा क्षेत्रमा उल्लेखनीय रुपमा कुनै खतरा पैदा गर्दैन ।
 एसियाली विकास बैंकको REA चेकलिस्ट अनुसार प्रस्तावित आयोजना, प्रारम्भिक वातावरणीय परीक्षण मात्र आवश्यक पर्ने Category 'B' अर्न्तगत पर्दछ । नेपाल सरकारको वैधानिक आवश्यकता अनुसार प्रस्तावित आयोजनाले वातावरण संरक्षण एन, २०५४, वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको पालना गरेको हुनुपर्छ । प्रस्तावित आयोजना, वातावरण संरक्षण नियमावलीको अनुसूची १ को प्रारम्भिक वातावरणीय परीक्षण मात्र आवश्यक पर्ने भनेर उल्लेख गरिएको (ऐ) खानेपानी क्षेत्र अर्न्तगत पर्दछ । तसर्थ, प्रस्तावित आयोजनाले एसियाली विकास बैंक तथा नेपाल सरकार दुवैका नीति आवश्यकताहरु पूर्ति गर्दछ ।



४. प्रस्तावित दिक्तेल आयोजना हाल सञ्चालन भइरहेको वर्तमान खानेपानी प्रणालीको विस्तारित रूप हो । वर्तमान प्रणालीको दायरा भित्र समावेश नभएका दिक्तेल बजारको नयाँ क्षेत्रहरु (वडा नं १ देखि ३ का आंशिक क्षेत्रहरु)मा प्रस्तावित आयोजनाले आफ्नो वितरण प्रणाली विस्तार गर्नेछ । त्यस्तैगरी, यस वर्तमान प्रणालीका दुई इन्टेकहरु प्रस्तावित आयोजनामा पुर्नस्थापना गरि प्रयोगमा ल्याइनेछ । वर्तमान प्रणालीमा पानी प्रशोधनको सुविधाको कुनै प्रावधान नरहेको स्थलगत अध्ययनले देखाएको छ । त्यसै गरी, वर्तमान प्रणालीले हाल सम्म त्यहाँका जनताका लागि दैनिक ४ देखि ६ घण्टा सम्म र मुख्य सरकारी कार्यालयहरुका लागि भने चौबिसै घण्टा खानेपानी आपूर्ति सेवा प्रदान गर्दै आएको छ । तसर्थ, यस वर्तमान प्रणालीको पानी प्रशोधन व्यवस्था सहित निरन्तर खानेपानी आपूर्ति सेवा प्रदान गर्ने असक्षमतालाई प्रस्तावित आयोजनाले तोड्नेछ ।
५. यस प्रस्तावित दिक्तेल आयोजना पूर्णरूपमा ग्रेभिटी प्रणालीको रूपमा परिकल्पना गरिएको हो । यस आयोजनाको वितरण प्रणाली अन्तर्गत थोक वितरण प्रणाली (BDS) र घरायसी वितरण प्रणाली (DS) समावेश छन् । यस आयोजनाको मुख्य प्रणाली अन्तर्गत तीन उप-प्रणालीहरु समावेश छन् । केन्द्रहरुले मुख्य वितरकको भुमिका निर्वाह गर्दछ । प्रत्येक रिजर्भोयर (पानी टेंकी)को मागको व्यवस्थापन गर्नको निम्ति प्रत्येक उप प्रणालीको कुल आपूर्तिलाई यी दशवटा रिजर्भोयरहरुमा विभाजित गरिएको छ । यस आयोजनाको सम्पूर्ण वितरण सञ्जालमा तीनवटा रिजर्भोयर (पानी टेंकी) प्रणाली माफत खानेपानी आपूर्ति गरिनेछ ।

आयोजनाको विवरण

६. यस आयोजनाको लागि नयाँ स्रोतको रूपमा काउले खोलालाई प्रस्ताव गरिएको छ । यसका साथै वर्तमान प्रणालीमा प्रयोग भइरहेको दुई स्रोतहरु रम्भा खोला र माझ खोला प्रस्तावित आयोजनामा पनि प्रयोग गरिनेछन् । यी दुई पुराना स्रोतहरुका लागि प्रयोग भइरहेको पुरानो इन्टेकहरु यस आयोजनाको लागि पुर्नस्थापना पश्चात् प्रयोगमा ल्याइनेछ । त्यस्तैगरी, प्रस्तावित नयाँ स्रोतको किनारमा थप स्पीड इन्टेकको प्रस्ताव गरिएको छ । र, यस आयोजनामा तीनवटा रिजर्भोयर तथा दुईवटा पानी प्रशोधन केन्द्रहरु प्रस्तावित छन् । यी रिजर्भोयरहरुको समग्र क्षमता लगभग ३७५ घ.मि. रहेको छ । इन्टेक, ट्रान्समिसन पाइपहरु, पानी प्रशोधन केन्द्र, पानी टेंकी, वितरण पाइपहरु, निजी धारा, पाले घर आदि यस आयोजनाका मुख्य खानेपानी संरचनाहरुका रूपमा समावेश छन् । त्यस्तैगरी, यस आयोजनाले जमिन, उर्जा, मानव संसाधन, श्रम शिविर, निर्माण सामग्री सञ्चय क्षेत्र जस्ता निर्माणाधीन आवश्यकताहरुका विषयलाई पनि महत्व दिइएको छ ।

पद्धति

७. वातावरण संरक्षण नियमावली अनुसार यस प्रारम्भिक वातावरणीय परीक्षणका आधारभूत कार्यविधिमा आयोजनास्थल बारे जानकारी हासिल प्राप्त गर्न लेख-रचनाहरुको समीक्षा र आयोजनास्थलको प्रत्यक्ष र अप्रत्यक्ष प्रभावकारी क्षेत्रहरुको भौतिक, सांस्कृतिक, रासायनिक, जैविक र सामाजिक अवस्थाहरुबारे

आधारभूत जानकारी एकत्रित गर्न स्थलगत अध्ययन समावेश छन् । यस कार्यविधिमा सरोकारवालाबाट सल्लाह सुझाव प्राप्त गर्न कुनै पनि राष्ट्रिय अखबार दैनिकमा पन्ध्र दिने सार्वजनिक सूचना प्रकाशन पनि समावेश छन् । त्यसपछि, इच्छुक सरोकारवालाबाट सुझाव एकत्रित गर्न सार्वजनिक परामर्श कार्यक्रम सञ्चालन गरिएको छ । यसका साथै प्रत्याशित प्रभावहरूको प्रतिकूलता निर्धारण गर्नको लागि साधारण चेकलिस्ट प्रक्रियामार्फत प्रभावहरूको पहिचान, पुर्वानुमान र मूल्यांकन गरिएको छ । यस प्रारम्भिकवातावरणीय परीक्षणले अनुमोदित सन्दर्भका सर्तहरू (ToR) मा उल्लिखित प्रक्रियाहरूको पालना गरेको छ ।

नीति, कानूनी र प्रशासनिक रूपरेखा

८. प्रारम्भिक वातावरणीय अध्ययनको अवधिमा प्रस्तावित आयोजना निर्माणका गतिविधिहरूले सम्बन्धित नीति तथा कानूनको अनुपालना गरेको छ कि छैन भनेर मूल्यांकन गर्नका निम्ति ती सम्बन्धित नीति, कानूनी र प्रशासनिक रूपरेखाको अध्ययनको आवश्यकता पर्दछ । यस आयोजनाको प्रारम्भिक वातावरणीय परीक्षणसँग सम्बन्धित मुख्य वातावरणीय ऐन, नियमहरू, योजना, नीतिहरू, दिशानिर्देशहरू निम्न उल्लिखित छन् :

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

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

ग) कानून तथा ऐनहरू : i) आवश्यक वस्तु संरक्षण ऐन, वि.सं २०१२ (ई.स. १९५५); ii) जलचर संरक्षण ऐन, वि.सं २०१७ (ई.स. १९६९) तथा संशोधन वि.सं २०५५ (ई.स. १९९७); iii) शहरी विकास ऐन, वि.सं २०४५ (ई.स. १९९८); iv) जल स्रोत ऐन, वि.सं २०४९ (ई.स. १९९२); v) वन ऐन, वि.सं २०४९ (ई.स. १९९३); vi) भू-अतिक्रमण ऐन, वि.सं २०४९ (ई.स. १९९३); vii) बालिश्रम निषेध तथा विनियमन ऐन, वि.सं २०५६ (ई.स. २००१); viii) खानेपानी व्यवस्थापन बोर्ड ऐन, वि.सं २०६३ (ई.स. २००९)

२००६); ix) फोहोर मैला व्यवस्थापन ऐन, वि.सं २०६८ (ई.स. २०११); X) श्रम ऐन, वि.सं २०७४ (ई.स. २०१७); xi) स्थानिय सरकार सञ्चालन ऐन, वि.सं २०७४ (ई.स. २०१७)

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

ङ) निर्देशिका तथा पुस्तिका : i) राष्ट्रिय वातावरणीय प्रभाव मूल्यांकन दिशानिर्देश, वि.सं २०४९ (ई.स. १९९३); ii) विश्व स्वास्थ्य संस्थाको वायु गुणस्तर दिशानिर्देश, वि.सं २०६१ (ई.स. २००५); iii) खानेपानी गुणस्तरका लागि विश्व स्वास्थ्य संस्थाको दिशानिर्देश, चौथो संस्करण, वि.सं २०७३ (ई.स. २०१७); iv) राष्ट्रिय ध्वनि मानक दिशानिर्देश, वि.सं २०६८ (ई.स. २०१२); V) सामुदायिक ध्वनिका लागि विश्व स्वास्थ्य संस्थाको दिशानिर्देश, वि.सं २०५५ (ई.स. १९९९)

वर्तमान वातावरण

९. प्रस्तावित आयोजनाका प्रत्यासित वातावरणीय प्रभावहरुप्रति यस आयोजना शहरका वातावरणीय पक्षहरुको संवेदनशीलताको पहिचान गर्न यस आयोजना शहरको वर्तमान वातावरणीय अवस्थाबारे जानकारी लिन आवश्यक पर्दछ । यसै सन्दर्भमा, डेस्क अध्ययनको क्रममा साहित्य समीक्षाको माध्यममार्फत वर्तमान वातावरणको माध्यमिक जानकारी प्राप्त गरिएको छ । यद्यपि, प्रारम्भिक वातावरणीय परीक्षणका लागि यी माध्यमिक तहको जानकारी पर्याप्त भने छैन । तसर्थ, वर्तमान वातावरणीय अवस्थाबारे प्राथमिक जानकारी एकत्रित गर्न स्थलगत अध्ययन सञ्चालन गरियो ।
१०. यसै सन्दर्भमा स्थलगत अध्ययनको समयमा क) भौतिक वातावरणीय पक्ष अर्न्तगत स्थलाकृति, भूमि प्रयोगका ढाँचा, भूविज्ञान, जलस्रोतहरु, जलवायु, वायुको गुणस्तर, ध्वनिक वातावरण, भुक्षय संवेदनशीलता; ख) जैविक वातावरण अर्न्तगत वनस्पति, वन्यजन्तु, संरक्षित क्षेत्र, सामुदायिक वन क्षेत्र; जस्ता बारे आवश्यक विवरणहरु साधारण चेकलिस्ट, REA चेकलिस्ट, विशेषज्ञ निर्णय तथा स्थानिय एवं सम्बन्धित निकाय सँगको अर्न्तक्रिया मार्फत संकलन गरियो । आयोजना क्षेत्रभित्र कुनै पनि संरक्षित क्षेत्र तथा सामुदायिक वन क्षेत्रहरु अवस्थित नरहेको स्थलगत अध्ययनको क्रममा देखिएको छ ।
११. त्यस्तैगरी, पानीको गुणस्तरबारे विवरण संकलन गर्न पानीको नमुना संकलन गरी स्वीकृति प्राप्त प्रयोगशालामा परीक्षण गरियो । यस परीक्षणले माफ्र खोलाबाट संकलित पानीको नमुनामा बढी टर्बिडिटी अर्थात ४२ NTU र थोरै बढी आइरनको मात्रा देखिएको छ। तसर्थ, यसले प्रस्तावित आयोजनामा पानी प्रशोधन केन्द्रको आवश्यकताको संकेत गर्दछ । यी बाहेक यस परीक्षणले अरु दुई स्रोतहरुले राष्ट्रिय खानेपानी गुणस्तरको मापदण्डको आवश्यकताहरुको पूर्ति गरेको देखाएको छ ।

१२. स्थलगत अध्ययनको क्रममा, सामाजिक आर्थिक वातावरण अन्तर्गत जनसांख्यिक विशेषताहरु, जाति/जातिय समूह, आर्थिक विशेषताहरु, शिक्षा तथा सीप, सामुदायिक पूर्वाधारहरु इत्यादि सम्बन्धि विवरणहरु साधारण प्रश्नावली प्रक्रिया हुँदै घरधुरी सर्वेक्षण र स्थानिय सँगको अर्न्तक्रिया मार्फत संकलन गरियो । यसै सन्दर्भमा पानीको मासिक महसुल तिर्ने सम्बन्धि इच्छुकता, अग्रिम नगद योगदानका लागि इच्छुकता र तिर्ने सक्ने क्षमता बारे पनि मुल्यांकन गरियो । नमुना घरधुरी सर्वेक्षण अनुसार ४३ घरधुरी मध्य १००% ले नै पानीको मासिक महसुल तिर्ने सम्बन्धि र अग्रिम नगद योगदान सम्बन्धि इच्छुकता व्यक्त गरेका छन् । यसले अवस्थित गंभीर पानीको समस्याबाट छुटकारा पाउनका लागि प्रस्तावित आयोजनाको मागलाई संकेत गर्दछ । त्यस्तैगरी, सर्वेक्षणले ९३० घरधुरी मध्य ४% गरिब वर्ग अन्तर्गत रहेको देखाएको छ भने १२.३६% घरधुरीले प्रति महिना रु.७५००.०० भन्दा कम खर्चिने गरेको देखाएको छ । तसर्थ, यसले मासिक आय र व्यय स्तरको आधारमा समुदायको तिर्न सक्ने क्षमताको संकेत गर्दछ ।

वैकल्पिक विश्लेषण

१३. प्रस्तावित आयोजनाको वैकल्पिक विश्लेषण, यस प्रारम्भिक वातावरणीय परीक्षणको अर्को मुख्य प्रक्रिया हो जसले प्राविधिक, वातावरणीय तथा सामाजिक पक्षहरुको सन्दर्भमा यस आयोजनाको सम्भाव्यताको परीक्षण गर्न मद्दत पुर्याउँछ । मुख्यतय, यस प्रक्रिया अन्तर्गत “आयोजना विना” विकल्प र “आयोजना सहित” विकल्प जस्ता दुई विकल्पहरु समावेश गरिएका छन् । निरन्तर खानेपानी प्रणाली, प्रशोधन प्रणाली तथा पानीजन्य रोगप्रतिको संवेदनशीलताको सन्दर्भमा “आयोजना विना” विकल्पको सीमितताले “आयोजना सहित” विकल्पको छनौट तर्फ उन्मुख गराएको छ । प्रस्तावित आयोजनाको डिजाइनका लागि दुई विकल्पहरु प्रस्ताव गरिएको यस “आयोजना सहित” विकल्पको विश्लेषणले देखाएको छ । वैकल्पिक विश्लेषण अनुसार पहिलो विकल्प पूर्ण रुपमा ग्रेभिटी प्रणालीमा आधारित रहेको छ भने दोस्रो विकल्प आंशिक रुपमा ग्रेभिटी प्रणाली तथा पम्पिङ प्रणालीमा आधारित छ । वैकल्पिक विश्लेषणले दुवै विकल्पहरु प्राविधिक र वातावरणीय हिसाबले सम्भाव्य देखाएको छ । यद्यपि, वित्तीय अध्ययनले दोस्रो विकल्पको मासिक महसुल प्रत्येक आम्दानी वर्गको सन्दर्भमा किफायती नभएको देखाएको छ । तसर्थ, दोस्रो विकल्प आर्थिक हिसाबले सम्भाव्य नभएको र यस प्रस्तावित आयोजनाको सर्वोत्कृष्ट विकल्पको रुपमा विकल्प १ लाई छनौट गरिएको छ ।

अनुमानित वातावरणीय प्रभावहरु

१४. स्थलगत अध्ययनको अवधिमा एकत्रित गरिएको जानकारीहरुको गरिएको विश्लेषणले प्रस्तावित आयोजनाको परिणामस्वरूप देखिने प्रत्याशित वातावरणीय प्रभावहरुको पहिचान तथा पूर्वानुमान गर्न मद्दत पुर्याउँछ । राष्ट्रिय वातावरणीय प्रभाव मुल्यांकन दिशानिर्देश, ई. सं. १९९३ अनुसार तय गरिएको स्कोरिङ म्याट्रिक्स प्रयोग गरी यी अनुमानित प्रभावहरुको प्रकृति, सीमा र परिमाण निर्धारण गर्न यी प्रभावहरुको मुल्यांकन गरियो । यो मुल्यांकनले प्रत्येक प्रभावका लागि उपर्युक्त न्यूनिकरण विधि प्रस्ताव गर्न थप मद्दत गर्नेछ ।

Engineer

Government of Nepal
Ministry of Water Supply
Singhadurbar, Kathmandu

१५. यी प्रत्याशित वातावरणीय प्रभावहरूलाई मुख्यतय यिनका नकरात्मक र सकारात्मक महत्वको आधारमा दुई भागमा वर्गीकृत गरिएको छ : क) लाभदायी प्रभाव र ख) प्रतिकूल प्रभाव । यी वर्गीकृत गरिएको प्रभावहरूलाई वर्तमान वातावरणमा पर्ने असरहरूको आधारमा थप चार प्रभावहरूमा वर्गीकृत गरिएको छ: क)भौतिक वातावरणीय प्रभाव ख) जैविक वातावरणीय प्रभाव ग) रासायनिक वातावरणीय प्रभाव र घ)सामाजिक आर्थिक वातावरणीय प्रभाव । यी चार प्रभावहरूलाई आयोजनाको चरण अनुसार पुन तीन भागमा विभाजन गरिएको छ जस अर्न्तगत क) डिजाइन चरण, ख) निर्माण चरण र ग) सञ्चालन चरण समावेश छन् ।
१६. यहाँ लाभदायिक प्रभावहरू अर्न्तगत रोजगार श्रृजना, कौशल वृद्धि, स्थानीय व्यापार तथा व्यापारिक अवसरहरू, सुधिएको स्वास्थ्य तथा सरसफाई, आर्थिक अवसरहरूमा वृद्धि, महिला सशक्तिकरण जस्ता प्रभावहरू समावेश छन् । त्यस्तैगरी, भूक्षय, ध्वनि प्रदुषण, वायुमा पर्ने प्रभाव, सतही पानीको गुणस्तरमा पर्ने प्रभाव, निर्माण क्षेत्र एवं श्रमिक शिविर बाट फोहोर मैला एवं फोहोर पानीको उत्पन्न, भण्डारण गरिएको ईन्धन/रसायनको आकस्मिक चुहावट, जमिन प्रयोगको ढाँचामा पर्ने प्रभाव, प्राकृतिक ढल निकासमा अवरोध, भत्काइएका अवशेष बाट निस्किएका फोहोरको अनुचित ढंगबाट गरिएको विघटनको प्रभाव, खोला नालामा पर्ने प्रभाव, वनस्पति तथा वन्यजन्तुमा पर्ने प्रभाव, जलीय जीवनमा पर्ने प्रभाव, श्रमिक तथा सामुदायिक स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरू, हाल प्रदान भइरहेको सुविधाहरूमा हुनसक्ने क्षति, ट्राफिक जाम, स्थानिय विक्रेताको व्यवसायमा अवरोध, पेशागत स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरू, असुरक्षित खानेपानीको वितरण, आयोजनाका कार्यहरूको दिगोपनमा पर्ने प्रभाव इत्यादि जस्ता प्रभावहरू प्रतिकूल प्रभाव अर्न्तगत समावेश छन् ।

न्यूनिकरण तथा वृद्धि-विकासका उपायहरू

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

सूचना प्रकाश, परामर्श तथा सहभागिता

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

गुनासो सुनवाई संयन्त्र

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

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

➤ ती व्यक्तिहरुको समस्यालाई समयमै प्रभावकारी ढङ्गले सम्बोधन गर्ने

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

क) उपभोक्ता समितिको सचिव

ख) क्षेत्रिय आयोजना व्यवस्थापन कार्यालयको इन्जिनियर

ग) क्षेत्रिय आयोजना व्यवस्थापन कार्यालयको सामाजिक/वातावरण अधिकारी

घ) पीडित पक्षका तर्फबाट एक प्रतिनिधि

ङ) क्षेत्रिय डिजाइन, निरीक्षण र व्यवस्थापन परामर्शदाताकोबाट सुरक्षा विद (सामाजिक/वातावरणीय प्रासांगिक रूपमा)

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

छ) ठेकेदारको प्रतिनिधि

वातावरणीय व्यवस्थापन योजना

२०. वातावरणीय व्यवस्थापन योजनाको तयारी तथा यसको कार्यान्वयन, प्रारम्भिक वातावरणीय परीक्षणको अर्को अत्यावश्यक प्रक्रिया हो । यस योजनाको मूल उद्देश्य भन्नु नै आयोजनाका गतिविधिहरु विना क्षति जिम्मेवार ढंगले भइरहेको सुनिश्चित गर्नु हो । त्यस्तैगरी, यस योजनाका अरु उद्देश्यहरु निम्न उल्लिखित छन् :
- क) स्थलगत वातावरणीय गतिविधिको निगरानीको लागि सक्षम बनाउन एक सक्रिय , सम्भाव्य र व्यावहारिक उपकरण प्रदान गर्नु;
 - ख) यस आयोजनाका लागि गरिएको वातावरणीय गतिविधिहरुका खोज तथा सिफारिशहरुको कार्यान्वयनलाई मार्गदर्शन र नियन्त्रण गर्ने ;
 - ग) यस आयोजनाको वातावरणीय प्रभावहरुको निर्मूलिकरण गर्न सहयोगका लागि आवश्यक देखिएका विशेष कार्यहरु विस्तार गर्ने, र
 - घ) सुरक्षा सम्बन्धि दिइएका सिफारिशहरुको अनुपालना गरिएको सुनिश्चित गर्ने ।
२१. यस आयोजनाका लागि तयार पारिएको स्थानिय स्तर निगरानी तथा प्रत्यासित प्रभावको निर्मूलिकरणको कूल अनुमानित लागत रु.१,०००,०००.०० रहेको छ ।

अनुगमन तथा रिपोर्टिङ

२२. यस आयोजनाको वातावरणीय गतिविधिको निगरानी र रिपोर्टिङका लागि आयोजना व्यवस्थापन कार्यालय (PMO) र क्षेत्रिय आयोजना व्यवस्थापन कार्यालय (RPMO) जिम्मेवार रहनेछ । RPMO ले PMO समक्ष मासिक निगरानी र कार्यान्वयनको प्रतिवेदन पेश गर्नेछ, भने तदनुसार PMO ले आवश्यक भएमा उचित कदम चाल्नेछ । यस पश्चात् PMO ले एसियाली विकास बैंक समक्ष अर्द्ध वार्षिक निगरानीको प्रतिवेदन पेश गर्नेछ । कानूनी कागजातमा सम्झौता भएअनुसार खानेपानी मन्त्रालयले गरेको प्रतिवद्धताको लेखाजोखा गर्न एसियाली विकास बैंकले आयोजनाको गतिविधिहरुको समीक्षा गरिनेछ । आयोजना सम्पन्न प्रतिवेदन जारी नभएसम्म एसियाली विकास बैंकले आयोजनाको निगरानी गर्नेछ । नेपाल सरकार अर्न्तगत खानेपानी मन्त्रालयले आयोजना प्रदर्शनको समीक्षा गर्न प्रसागिक स्थलगत भ्रमणका माध्यमबाट अनुगमन कार्य पनि गर्नेछ ।

निष्कर्ष

२३. निष्कर्षमा, प्रारम्भिक वातावरणीय परीक्षण अध्ययनले यस प्रस्तावित आयोजना वातावरणीय हिसाबले गम्भीर प्रकृतिको नभएको देखाएको छ । प्रस्तावित आयोजना र यसका संरचनाहरु वातावरणीय हिसाबले संवेदनशील क्षेत्रभित्र वा वरपर अवस्थित छैनन् । साथै, निर्माणको क्रममा सामना गर्नुपर्ने केही प्रतिकूल प्रभावहरु (सम्भावत अधिकतम निर्माण अवधिमा देखापर्ने) अस्थायी र छोटो अवधिका छन् । प्रस्तावित आयोजनाले निम्न उल्लिखित फाइदाहरु दिनेछन् :

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

- ख) उचित सरसफाई र स्वच्छताको अभ्यासमा उन्नति र स्वास्थ्य एवं सुरक्षा जोखिममा कमी,
- ग) वर्षादेखि निरन्तर खानेपानी आपूर्तिकालागि भोग्नुपरेको कठिनाई बाट मुक्ति र
- घ) परिणामको स्वरूप परिस्कृत सामुदायिक स्वास्थ्य , सुधारिएको जीवन स्तर र सुरक्षित समुदाय
२४. निष्कर्षमा, यस आयोजनाले कुनै उल्लेखनीय नकरात्मक प्रभावहरु ननिम्त्याएको र एसियाली विकास बैंकद्वारा गरिएको वर्गीकरण अनुसार प्रस्तावित आयोजना **Category 'B'** अर्न्तगत पर्ने र वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको अनुसूचि-१ लाई अनुपालन गरेको देखिएको छ । २००९ मा लागू गरिएको सुरक्षा नीति विवरण (SPS) तथा वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको अनुपालन गर्न कुनै विशेष अध्ययन वा वातावरणीय प्रभाव मूल्यांकन (EIA)को आवश्यकता नभएको यस प्रारम्भिक वातावरणीय परीक्षण अध्ययनले निष्कर्ष निकालेको छ ।



[Signature]
Engineer



1. INTRODUCTION

1.1. Background

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

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

1.2.1. Name of the Proposal

4. The Name of the Proposal is Diktel Water Supply and Sanitation Project

1.2.2. Name and Address of the Proponent

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

Name of Proponent

Project Management Office

Urban Water Supply and Sanitation (Sector) Project

Department of Water Supply and Sewerage Management (Implementing Agency)

Ministry of Water Supply (Executive Agency)

Government of Nepal

Address of the Proponent:

Panipokari, Kathmandu

Tel: 977 1 442388, 977 1 4412348

Fax: 977 1 4413280

E-mail: info@stwspp.gov.np

Website: www.sstwspp.gov.np

1.2.3. Consultant Preparing the Report

6. TAEC Consultant P. Ltd. Joint Venture with Integrated Consultants Nepal Pvt. Ltd. is responsible for preparing this IEE report.

1.3. Purpose of IEE

7. The main purpose of the IEE study is to ensure the environmental sustainability of the Project, to integrate environmental considerations into the Project preparation process, and to facilitate the environmental management during Project implementation. ADB and GoN require all projects to undergo environmental assessments. All projects funded by ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. The rapid environmental assessment using ADB's REA Checklist has indicated that the Project is a "Category B" undertaking, requiring IEE. On the GoN side, the statutory requirement that has to be adhered to is the Environment Protection Act

(1997), and Environment Protection Rules (1997) and as amended in 1999, 2007 & 2017 AD. Based on EPR Schedule 1, the Project is within the threshold of activities requiring IEE under the Water Supply Sector. This IEE fulfills the policy requirements of both ADB and GoN.

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

1.4. Need for the Project

10. The existing water supply system is not able to meet the current demand of Rupakot Majhuwagadhi municipality. The supply system is just about 4-6 hours a day for the public and 24 hours for major offices. The existing transmission mains are about 40 years old. As per field study, leakage problems at certain parts have been observed and requirement of replacement has been felt. Most of the existing distribution mains are found laid exposed to the ground and most of them are not properly laid. Most of these pipelines are very old. The existing stone masonry tank located at Diktel Bazaar is observed to be very old and need of rehabilitation or replacement has been felt. The tapped discharges of the existing system are not sufficient to meet the water demand of the Diktel Bazaar area. There is no provision of water treatment system in the existing system. The existing system has a design, construction, and operation & maintenance deficiencies and requires upgrading and rehabilitation to meet the growing demand.
11. The Diktel Bazaar area of this Rupakot Majhuwagadhi municipality is densely populated and is facing acute water shortage problem. Similarly, various governmental & non governmental offices that includes schools, health institutions, temples, commercial shops etc. exist in this area. This has awakened the need to

facilitate the reliable water supply system in Diktel Bazaar Area. Regarding this, as per the detailed design of the proposed project, domestic consumption at ultimate demand i.e., 75 lpcd has been considered as the proposed project aims to provide safe & reliable water to each HH. This nodal demand also includes the institutional demand, commercial demand and wastage & leakage. Here, the institutional demand consists of water demand pertaining to institutions like schools & colleges. Similarly, the commercial demand consists of water demand pertaining to army barracks, police posts, hotels, lodges, factories, government and non-government offices. Hence, all the parts that includes Residential, Commercial, Institutional along with anticipated wastage & leakage issues within the service area has been covered under the scope of the proposed project.

12. Considering the water demand and condition of existing system, there is a need for a project to upgrade the existing water supply situation in the service area to meet growing demand for private connections and to make drinking water available to each household of the service area throughout the year. This continuous service will not be limited to the government offices only but also to the public throughout the year.

1.5 Rationale of the Project

13. The proposed project requires to be studied from the environmental point of view as per EPA 1997 AD and EPR 1997 AD, 2054 BS (Amendments 1999 AD, 2007 AD & 2017 AD). The Proposed Water Supply and Sanitation Project is intended to serve drinking water in partial area of wards 1, 2 & 3. The project is expected to benefit a base year population of about 8,063 populations (2018) & the design population of 10,934 (2038) by providing a reliable and adequate supply of safe & potable water along with the promotion of good hygiene and sanitation practices.
14. The proposed project shall use surface water sources. The Project does not involve any tunnels' construction; 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, 2007 & 2017 AD) Schedule 1 (H) for drinking water projects; only an IEE should be done. The regulation stated in Schedule 1 (H) shall only be applicable if the proposal does not fall under the categories "A" through (H) of Schedule 2.

Engineer

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

Table 1: Criteria for Requirement of IEE for Drinking Water Supply Projects as per Schedule 1 (H) of Environment Protection Regulation 1997 with Amendment 2007 & 2017 AD

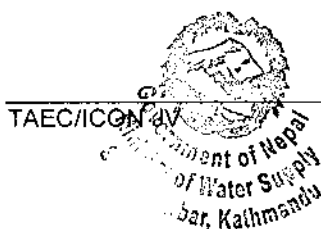
S.N.	Condition described in the Act and Regulations	IEE Required as per the Regulation Schedule 1 (H)	Conditions in the Project
1	Supply of water in dry season from surface water with a safe yield of	Up to 1 cusec and utilizing up to 50% of the available quantity	Within the Limit (The proposed existing sources Rambha Khola & Majh Khola has safe yield of 8 lps while new source Kaule Khola have safe yield 5 lps which is within 1 cusec i.e., 28.32 lps)
2	Processing of Water Treatment	More than 25 liters per sec	Within the limit
3	Supply water to existing water supply system for a population of	5,000 – 50,000	About 8,063 populations (2018) & design populations of 10,934 populations (2038).

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

2 DESCRIPTION OF THE PROJECT

2.1 Location & Accessibility

16. The Project area of Diktel Water Supply and Sanitation Subproject lies in Rupakot Majhuwagadhi Municipality, Khotang District, a hilly district in the Province 1 of Eastern Nepal. The proposed project covers partial area of ward no.1, 2 & 3 of Rupakot Majhuwagadhi Municipality.
17. Geographically, the project area lies in the hilly region at 27°08'N to 27°20'N latitude and 86°41'E to 86°55'E longitude with altitudes ranging between 500(Phedi) to 2600m (Rupakot) above mean sea level (amsl) with an average altitude of 1623 meters.
18. This figure 1 given below shows that the project area belongs to Rupakot Majhuwagadhi Municipality of Khotang District of Province 1 of Nepal. Rupakot Majhuwagadhi Municipality is bounded by Kepilasagadhi Rural Municipality in the north, Sakela Rural Municipality & Bhojpur District (Tyamke Mayung Rural Municipality) in the east, Halesi Tuwachung Municipality & Dibrung Rural Municipality in the south and Halesi Tuwachung Municipality & Lamidanda Municipality in the west.



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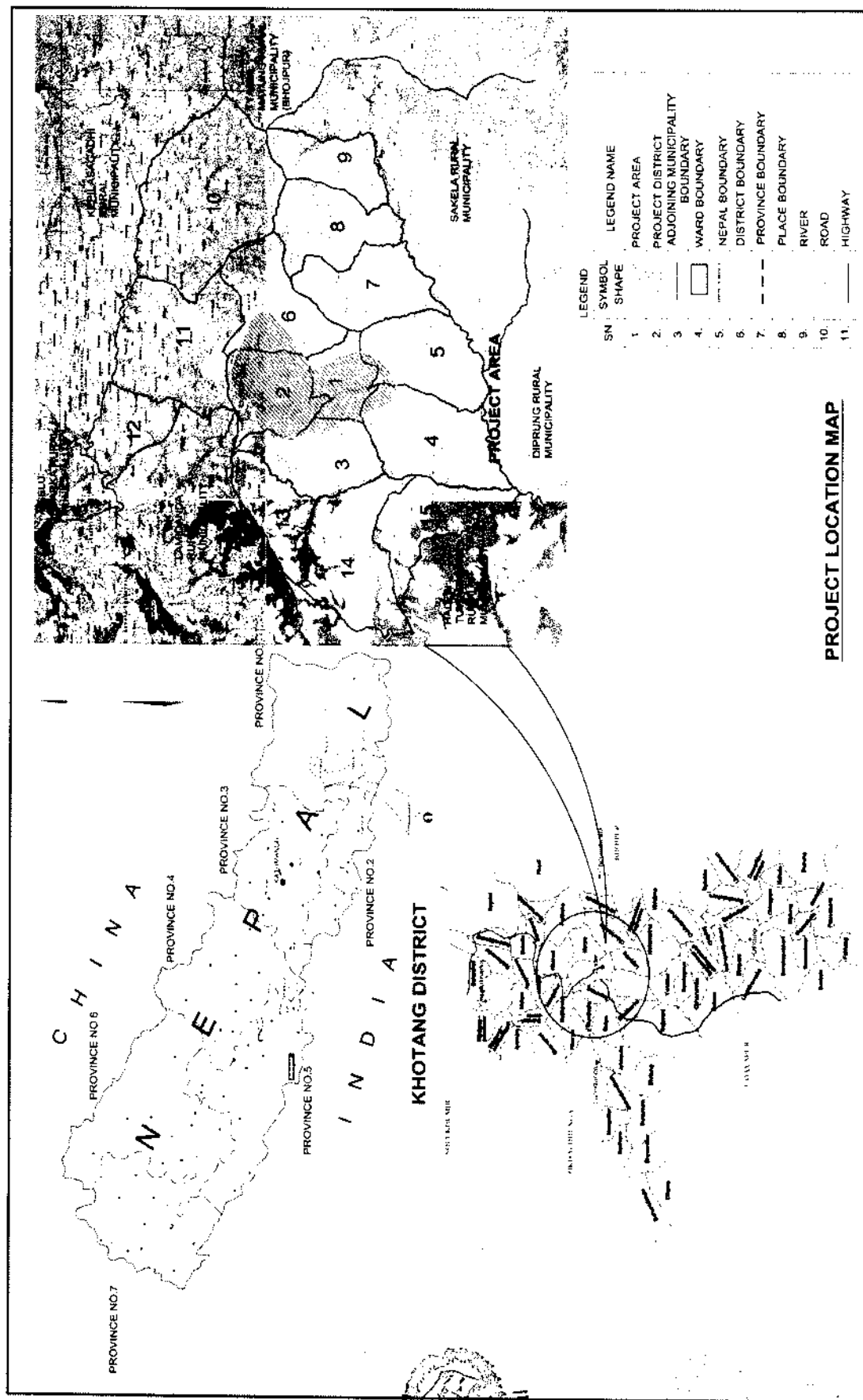


Figure 1: Projection Location Map

19. This Rupakot Majhuwagadh municipality was formally known as Diktel Municipality which was established on May, 2014 merging some existing VDCs namely Bamrang, Laphyang and Kahalle. On 10 March, 2017, with the new constitution of Nepal, new Rupakot Majhuwagadhi municipality was reformed by merging more VDCs i.e., Kharmi, Chiuridanda, Jalpa, Nirmalidanda, Bijayakharka, Buipa, Nunthala, Nerpa and Patheka VDCs.

Table 2: Rupakot Majhuwagadhi Municipality Ward Profile

Present Ward Municipality	Former VDC/Municipality	Former Ward No.
1	Diktel Municipality	WN 1 to 3
2	Diktel Municipality	WN 4 to 6
3	Diktel Municipality	WN 7 to 9
4	Diktel Municipality	WN 13 to 15
5	Diktel Municipality	WN 10 to 12
6	Nerpa VDC	WN 1 to 9
7	Chiuridanda VDC	WN 1,2,5,7 & 9
8	Chiuridanda VDC	WN 3,4,6 & 8
9	Nirmalidanda VDC	WN 1 to 9
10	Patheka VDC	WN 1 to 9
11	Kharmi VDC	WN 1 to 9
12	Jalpa VDC	WN 1 to 9
13	Nunthala VDC	WN 1 to 9
14	Buipa VDC	WN 1 to 9
15	Bijayakharka VDC	WN 1 to 9

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

20. The Table 2 shows that the reformed Rupakot Majhuwagadhi municipality has been divided into 15 wards. The current wards 1 to 5 of the municipality belongs to wards 1 to 3, 4 to 6, 7 to 9, 13 to 15 and 10 to 12 of the former Diktel Municipality. Similarly, the current ward 6 belongs to wards 1 to 9 of former Nerpa VDC. The wards 7 & 8 belongs to wards 1, 2, 5, 7 & 9 and wards 3, 4, 6 & 8 respectively of former Chiuridanda VDC. The current wards 9 to 15 belongs to wards 1 to 9 of former Nirmalidanda VDC, wards 1 to 9 of former Patheka VDC, wards 1 to 9 of former Kharmi VDC, wards 1 to 9 of former Jalpa VDC, wards 1 to 9 of former Nunthala VDC, wards 1 to 9 of former Buipa VDC and wards 1 to 9 of former Bijayakharka VDC respectively.
21. Diktel Bazaar can be reached from two major cities, Kathmandu and Biratnagar, using different routes. The route along Kathmandu-Khurkot-Ghurmi-Diktel is about 255km. Regular local jeep and bus services are available from Kathmandu. Another route is from Biratnagar-Dhankuta-Hile-Leguwasghat-Bhojpur-Diktel. This

route is about approximately 285 km. No regular bus services are directly available in this route. The stretch of the Middle Hill Highway (Ghurmi-Diktel-Bhojpur) passes through the Diktel Municipality.

22. There is also provision of airport for domestic air flights in the project area. The nearest airport from Diktel Bazaar is Khanidanda Airport. This airport was in operation since 1999, and is about 6 km from the Diktel Bazaar. Another closer airport is Lamidanda Airport which is located around 11km west from the bazaar. Nepal Airlines and Tara Airlines Pvt. Ltd. operate their services from Kathmandu & Biratnagar to these airports.
23. The project town has warm and cold temperate types of climate. A warm temperate type of climate is observed between 1,000-2,000 meter elevations, while a cold temperate type of climate exists in between 2,000-3,000 meters, particularly, in the mid hills of Nepal. The proposed service area elongates from 1501 to 1815 m elevation.

2.2 The Proposed Project

24. The proposed project is the extension of the existing water supply system. This Project has been conceptualized as a totally gravity surface water system. The system is a combination of rehabilitation of old system and amalgamation of proposed water supply components required for upgrading the system.
25. The overall concept has been developed with distribution system comprising of Bulk Distribution System (BDS) and Household Distribution System (DS). In this concept, the whole service area will be divided in number of service area with dedicated storage reservoir, also referred as sub-system, for that particular service area. Therefore, the main system comprises of number of sub-system. The service area will be divided on the basis of elevation difference and proximity. Altogether, the proposed project comprises of three sub systems. The service area has been divided based on elevation difference and proximity of households in a distribution system. At the same time, it will reduce pipe cost considerably, provides flexibility to operate the system, avoid excessive large number of break pressure tanks and follow principles of DMA.
26. The proposed project will use almost all structures of the existing system to the extent possible. However, small storage reservoirs having less than 40cum

capacity and the entire distribution mains are not incorporated in the proposed system.

27. The service reservoir of any sub-system shall be dedicated reservoir for that particular sub-system. This has been carried out to minimize large pressure differences in distribution networks and use maximum number of existing reservoirs. The entire distribution network is to be supplied from three reservoir system. The total demand of 2018 and 2038 of every sub-system has been calculated and shown below.

Table 3: Proposed Sub-system and demand

Sub-System	Water Demand (LPD)			Storage Volume (cum)
	2016	2018	2038	
Existing Tank Area-A	261,950	269,463	357,834	50(N)
Near Police Office Area-B	91,649	94,605	129,954	150(N)
Near Army Base Camp Area-C	388,513	400,951	549,529	175(N)
TOTAL	742,112	765,020	1,037,317	375

Source: Detailed Engineering Design Report, 2018

28. The schematic diagram of the proposed project is presented in the figure given below:

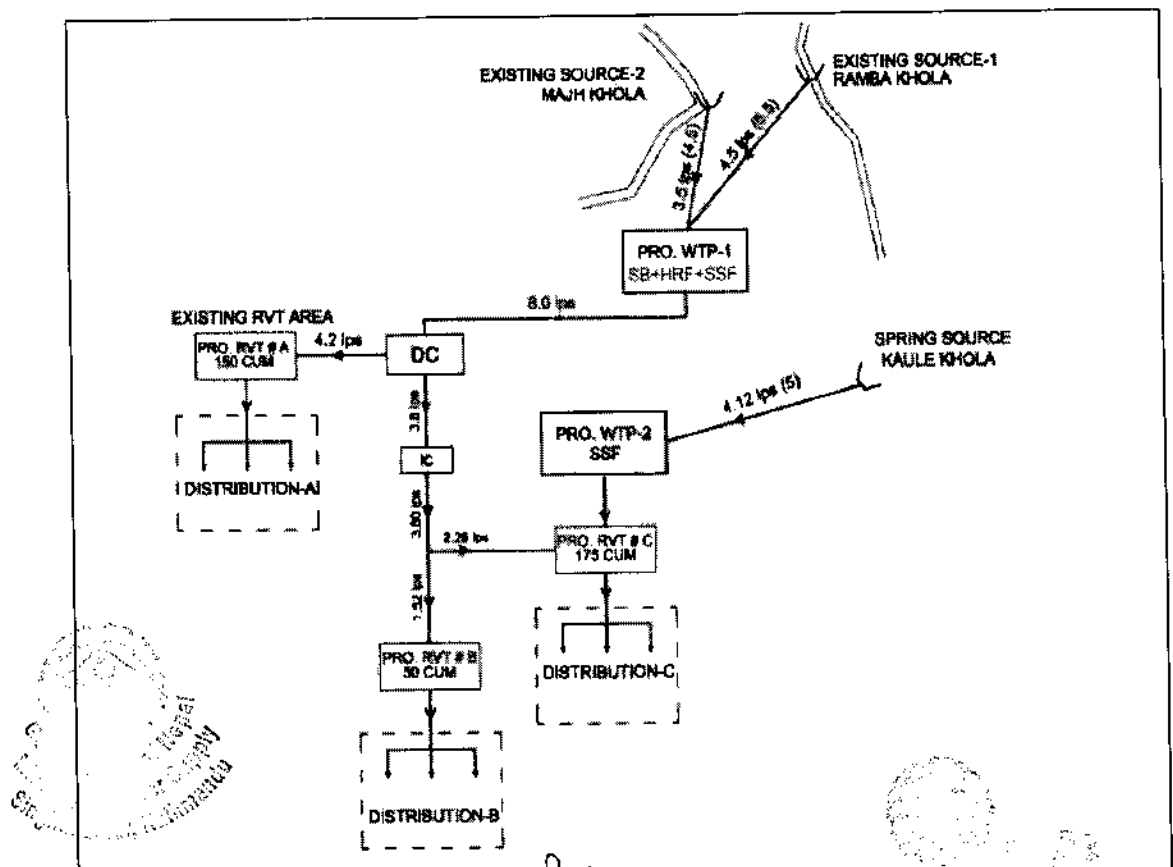


Figure 2: The Schematic Layout of the Project

2.3 Salient Features of the Project

29. The salient features of the project is given in Table 4.

Table 4:Salient features of the project

SN.	Items	Description
1	Name of Project	Diktel Water Supply and Sanitation Project
2	Type	Gravity
3	Study Level	Detailed Engineering Design
4	Location Area	
	Province	1
	District	Khotang
	Rural Municipality/Municipality	Rupakot Majhuwagadhi Municipality
	Ward	Partial Area of Ward 1,2 & 3 of the Municipality
5	Available Facilities	
	Road	Middle Hill Highway (Ghurmi-Diktel-Bhojpur)
	Water Supply 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 sources: Ramba and Majh Khola Proposed Source: Kaule Khola
	Source Type	Rambha & Majh Khola : Stream Kaule Khola : Spring
	Source Location	Rambha & Majh Khola (WN-2) & Kaule Khola(WN-6)
	Safe Yield	Rambha Khola: 4.5 lps Majh Khola : 3.5 lps Kaule Khola :4 to 5 lps
8	Type of Structures	
	Proposed intakes	2 Nos Existing Stream Intake with rehabilitation +1No of Proposed Spring Intake
	Water treatment plant	2 Nos. (WTP-1 & WTP-2)

SN.	Items	Description
	Storage Reservoir(No. and Capacity in CUM)	3 nos. (1no.-50cum (Circular)+1no.-150cum (Circular)+1 no.-175cum (Rectangular). (All proposed)
	Valve Chamber(Bricks/RCC/RRM)	10/10/10
	Office Cum GH at Bazaar	1 no.
	Guard House at WTP	1 nos.
	Dosing Pump House	1 nos.
	Household Connections	1,049 no.
	Fire Hydrant	8 no.
	Boundary Wall with Gate	9 locations (3 Intakes, 2 WTPs, 3 RVTs and Office Building
	Protection Works	Included under Miscellaneous Works viz; Retaining Walls, Gabion Walls and Rip Rap Protection
	Approach Roads (4m width)	500m
	Reinstatement of PCC/RCC pavements	3000 m ²
	Re-sealing of Blacktopped Roads	500 m ²
	Re-sealing of Gravel Roads	1000 m ²
	Total Length of pipe in transmission and Bulk Distribution	Cumulative of 18.462 km
	Total Length of pipe in Distribution	24,710m
9	Total Cost of WS Component (Inclusive of all) NRs.	313,541,519.60
10	Cost Sharing Arrangement in WS Component	
	GON Component (75%)	219,479,063.72
	TDF Loan (25%)	78,385,379.90
	WUSC's Contribution for upfront (Cash5%)	15,677,075.98
11	Tariff	
	Up to 6cum/monthly(NRs)	210
	7 to10cum/monthly(NRs)	53
	11 to 20cum/monthly(NRs)	79
12	Per Capita Cost for W/S component	
	Per Capita Cost (for base year pop.)	38,884.00
	Per Capita Cost (for design year pop.)	20,073.00
13	Economic and Financial Indicators	
	Financial Rate of Return(FIRR)	9.14%
14	Environment	
	ADB Category	B, Only IEE necessary
	IEE finding	No significant adverse impact.

Source: Detailed Engineering Design Report, 2018

2.4 Water Supply Project Components/Features

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

2.4.1 Sources/Intakes

31. Two existing sources namely Rambha Khola and Majh Khola will also be used for this proposed project. These two sources are perennial stream sources and are

located in ward 2 of the project town. Both are located in the north of the service area, which originates from the Mahabharat Hills within the project town and flows south-east. The safe yield of these sources is 8 lps. These sources do not cater the water demand of the town. Water from other sources has been proposed to supplement these existing sources for water supply service to the project town.

32. The new proposed source, Kaule Khola has been identified as a spring source which lies at an elevation of 1708 m near Solma. It is located in ward 6 of the project town. Water abstracted from this river can be conveyed by gravity method to the project town at lower elevation to cater the households located at lower elevation. The safe yield of this source is about 4 to 5 lps.
33. The existing intakes at the existing sources will be used for this project after some rehabilitation works to increase discharge in the respective transmission line. An additional spring intake has been proposed at the bank of the new proposed source i.e., Kaule Khola. Hence, there will be three intakes used for the proposed project.

2.4.2 Transmission Mains

34. The total length of transmission main from Rambha Khola and Majh Khola intakes to the proposed WTP is about 4km and 0.9km respectively. As the pipe used in the existing transmission lines of from both the Kholas to Diktel Bazaar are substandard in pressure ratings (4 kgf to 6 kgf pressure ratings), it is recommended to replace pipes of the both transmission systems. 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.
35. In addition to the upgrading of the existing transmission line, an additional 5.76 km length of transmission line is necessary to transport the water of the spring source from Kaule Khola to Diktel Bazaar. The cumulative length of pipe used in transmission system and bulk water system is about 18.462 km.
36. The transmission discharge capacity has been taken slightly more than the driest available discharge (shown in the schematic diagram) in the all sources. This has been carried out to draw more discharge during other seasons as the driest period will last only for few months. Therefore, the discharge capacity of transmission pipes have been designed at 4.5 lps, 5.5 lps and 5 lps in Majh Khola, Ramba Khola and Kaule Khola, respectively.

2.4.3 Thrust Blocks, Saddle Blocks and Thrust Beam

37. Thrust blocks has been proposed for DI pipes (both transmission and distribution mains) from being moved by forces exerted within the pipe arising from the internal pressure of the pipeline or the flow of water hitting bends, tapers and closed or partially closed valves. Typical Thrust Blocks for horizontal bend, vertical bend and end blocks have been design for pressure of 24 kg/sq cm for transmission and distribution line.
38. 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 centre 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.

2.4.4 Water Treatment Plant

39. The study shows that the existing water supply system does not have any kind of treatment facilities. The on site bacteriological test carried out during field study shows that the proposed water source is contaminated with bacteria. The water quality test reports (**Refer Annex 7**) of the proposed sources for physical & chemical parameters show that the sample from Rambha Khola has 1.3 NTU turbidity value and iron content is < 0.05 which falls below the prescribed NDWQS (Turbidity: 5-10 NTU and Iron: 0.30-3 mg/L . However, the test result also shows that the water sample taken from Majh Khola has high turbidity value which is 42 NTU and slightly higher iron content i.e., 3.42 mg/L. Hence, this indicates the necessity of provision of water treatment plant for the treatment of high turbid water with slightly higher iron content.
40. The water treatment plant (WTP-1) has been proposed to treat water from the two existing sources viz., Rambha Khola & Majh Khola. It has been proposed near Thapagaon Nigale after combining two existing stream sources Rambha and Majh Khola. A conventional type treatment plant comprising of Sedimentation Tank (ST), Horizontal Roughening Filter (HRF) and Slow Sand Filter (SSF) have been proposed.
41. Plain sedimentation has been provided as a Pre-treatment unit in this WTP-1 to treat this high turbid water. This will allow coarse and heavy suspended particles to settle down through the force of gravity. This settling process will reduce the turbidity of water because lesser the presence of suspended solids, lesser will be

the turbidity. This sedimentation tank is a rectangular settling basin with a longitudinal flow. The setting basin with two identical chambers of size of 2.6 m x 9 m have been adopted for 10.0 lps with design load of 0.8 cum/sq. m /hour.

42. Similarly, the Horizontal Roughening Filter (HRF) has been proposed as it provides superior treatment to basic sedimentation methods for suspension with particulates. Moreover, it is primarily used to separate water from fine solids that are only partly retained, or not at all, by sedimentation tanks. In addition to this, it partly improve bacteriological water quality and to minor extent, it improves some water quality parameters like Color and Dissolved Organic Matters. The proposed 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 x 1.7 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.
43. A Slow Sand Filter (SSF) has been proposed after the HRF of WTP-1 as using SSF after HRF will enhance the removal of turbidity. The filtration rate of 0.2 cum/sq.m/hr has been adopted for its design. It will have a depth of 2.8 m including a free board of 50 cm. Three chambers (each 5 m x 12 m) have been proposed. This SSF improves water quality by removing water borne parasites, bacteria and suspended solids. This is also effective in removing oxidated precipitate of dissolved solids like iron. However, higher amount of iron content will not be totally removed by this filter. As the water quality test report shows that the sample from Majh Khola has higher iron content i.e., 3.42 mg/L which is slightly higher than the NDWQS which is 0.3 (3) mg/L. Chlorination or disinfection unit is required for the removal of complex iron content and complete removal of bacteriological content. Hence, there is provision of dosing system or chlorination/disinfection unit before distributing water to the RVTs.
44. In order to treat water from the new spring source (Kaule Khola), WTP-2 has been proposed near Diktelgaon. The water quality test report shows that the physical & chemical parameters of the sample taken from Kaule Khola are within the limit prescribed under NDWQS. Hence, there is no requirement of primary treatment process and there is provision of Slow Sand Filter only under this WTP-2. This SSF will be enough to treat the water from Kaule Khola. This SSF will remove the bacteriological content in the water of Kaule Khola. The filtration rate of 0.15 cum/sq.m/hr has been adopted for design in a Slow Sand Filter (SSF) proposed

at WTP-2. It will have a depth of 2.8 m including a free board of 50 cm. Two chambers (each 5 m x 12 m) have been proposed.

45. The cumulative capacity of water treatment plant is about 1.382 MLD or 1382.4 cum per day (57.6 cum/hour).
46. The dosing system has also been proposed under WTP-2 before distributing water to the RVTs.
47. The dosing system at each WTP comprises of electronic dosing pump with FRP tank and stirring device. As the pump is automatic dosing pump of the electronic type, close housing has been recommended. This will effectively remove bacteriological content that are only partly removed by SSF.

2.4.5 Service Reservoir

48. Altogether, there are three service reservoirs proposed for this project. The total capacity of the service reservoir provided in the Diktel Water Supply & Sanitation Project is about 375 cubic meters. As all the existing reservoirs are made of masonry and are quite old with leaks, three RCC reservoirs have been proposed with different shapes as per the appropriate site conditions. The capacity of each reservoir is given in the table given below:

Table 5:Details of Service Reservoirs

SN	Location	TYPE	Capacity(CUM)	CODE
1	Existing Tank Area(Northof Service Area)	RCC Circular	150	A
2	NearPoliceOfficeArea(Southof Service Area)	RCC Circular	50	B
3	NearArmyBaseCamp(MainBazaar)	RCC Rectangular	175	C

Source: Detailed Engineering Design Report,2018

2.4.6 Distribution Mains

49. The distribution system comprises of a pipe network, which is looped in certain cases and branched in other. The network has been analyzed using EPAnet, a design analytical software tool. The entire system has been designed using Polyethylene (PE), Ductile Iron (DI) and Galvanized Iron (GI) pipes.
50. The minimum diameter of distribution pipe has been adopted as 50mm for the proper saddle arrangement at the household connection in distribution pipe.
51. Two types of pipes have been used in the distribution network; Galvanized Iron (GI) pipes and PE pipes. However, uses of GI pipes have been limited in some small crossings. The total pipe lengths of various diameters are given in the table

above. The total pipe length of the proposed distribution system works out to 24.710 km. The details are briefly given in the table given below:

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

PEPIPES	Pressure Rating		
	16Kg /sqcm	10Kg /sqcm	6Kg /sqcm
PEpipe 50 OD	3,804	14,892	
PEpipe 63 OD		3,267	
PEpipe 75 OD		456	945
PEpipe 90 OD		18	732
PEpipe 110 OD			390
Sub-Total	3,804	18,633	2,067
GI pipe of ND of 150		206	
Sub-Total		206	
Total		24,710	

Source: Detailed Engineering Design Report, 2018

52. The pipelines will be laid along both sides of the wider roads and paved roads to avoid the pavement demolition and long house connection. Therefore, double pipelines are essential to avoid long household connection. 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.

53. The three subsystems are also inter linked at possible extent and water from one subsystem can be supplied to another subsystem in case of maintenance and other unforeseen events. Appropriate valve chambers have been proposed to regulate this..

2.4.7 House Connections

54. 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 A.D. with the adopted population growth rate. Most of the all connection will be private.

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

56. Distribution from DI pipes shall be discouraged, if possible, by providing reticulation lines. However, provisions of saddle for distribution from DI pipes have also been considered. Dry dial volumetric rotary piston type water revenue meters for all house connections are proposed. These recommended household water meters have 15mm ND.

2.4.8 Appurtenances

a) Line or Sectional Valves

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

b) Air (Release) Valves

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

c) Wash Out Valves

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

should be taken to position the discharge points of washout pipes to avoid water in stream course seeping through the washout pipes into the water mains.

d) Flow Meters

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

e) Fire Hydrant

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

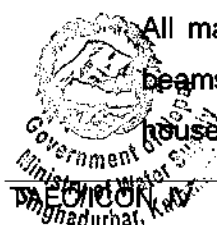
f) Chambers

63. Two type of Chambers has been proposed in the project. A Chamber constructed by brick masonry wall has been provided in non-vehicular areas and rural area. In other vehicular carriageway and city area chambers constructed with RCC has been provided.
64. The concrete chambers shall serve as housing, protection and convenient access to these pipe appurtenances. Inside the concrete chambers, necessary concrete supports shall be provided for pipes and valves at appropriate locations.
65. Access to the concrete chamber will be given via lockable cast iron covers with frames. Manhole covers of the heavy-duty type have been recommended in these RCC chambers. Covers for manholes in paths has been proposed of medium duty type.

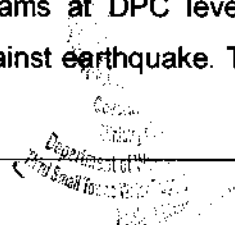
g) Office Building, Guard House, Dosing House and Boundary Wall

66. A double storey earthquake resistant RCC frame structure building for office is proposed at the main Bazaar. The RCC building comprises of administrative rooms (office room), meeting hall and cash counters. All small buildings for chemical store and dosing house have been proposed to build in masonry system.

All masonry structures are duly secured by tie beams at DPC level and roof beams just below the ceilings to provide safety against earthquake. This dosing house has been proposed at each RVT site.



Engineer



67. In addition to this, a small guard house with kitchen and bathroom facilities have been proposed at each WTP premises and Intermediate reservoir location. These buildings are made of RRM masonry. A framed structure generator house has been proposed for generator housing. Corrugated Galvanized Iron Sheet (CGI) CGI roofing has been proposed in Mild Steel Roof Truss.
68. In order to safeguard storage tanks (extended RVT premises and other structure from vandalism as well as contamination boundary wall has been proposed. A galvanized chain link fencing over 450 mm high parapet wall has been proposed from aesthetic and economic consideration. Separate vehicular and pedestrian Iron Gates are proposed in RVT and Sump Well sites. Barbed wire fencing has been proposed at non urban area. The location and type of boundary wall, fencing, guard house and other building facilities have been provided as per the system need during operation.
69. The table given below summarizes the details of the above mentioned components :

Table 7: Proposed Buildings and Boundary Type

Components	Location
Main Office (O1)	At Bazaar
Small Guard House of RRM (GH1)	At two WTP Premises
Dosing House (RRM+CGI)	At two WTP Premises
Barbed Wire Fencing	At all Intakes (Existing+Proposed)
Chain Fencing	Office (O1)+WTPs and RVTs

Source: Detailed Engineering Design Report, 2018

2.4.9 Miscellaneous Works

70. There is also provision of miscellaneous works for this proposed project that includes Construction of Approach Road, Construction of RRM, Gabion Wall, Surface Drain (RRM, BW), Footpaths, Hume Pipe, Manhole, Landscaping etc. for the protection of Intake, Treatment Sites, Office Buildings and RCC Pier Supports, Thrust Blocks and Dismantling Works for the distribution system.

2.4.10 DMA Establishment

71. One increasingly common principle of managing a large water network is to sub-divide it into a number of areas, typically of between 500 and 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 on 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.

72. An important factor in lowering and subsequently maintaining a low level of leakage in a water network is pressure control. The division of the network into DMAs facilitates the creation of a permanent pressure control system, thus enabling pressure reduction in DMAs which reduces the level of background leakage, the rate of flow of individual bursts and the rate of the annual burst frequency.
73. In order 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 bazaar and termed as DMA-B. Similarly, the third service reservoir RVT-C that serves HHs situated at lower elevation and termed as DMA-C.
74. The figure given below gives brief details on the DMAs of the proposed project:



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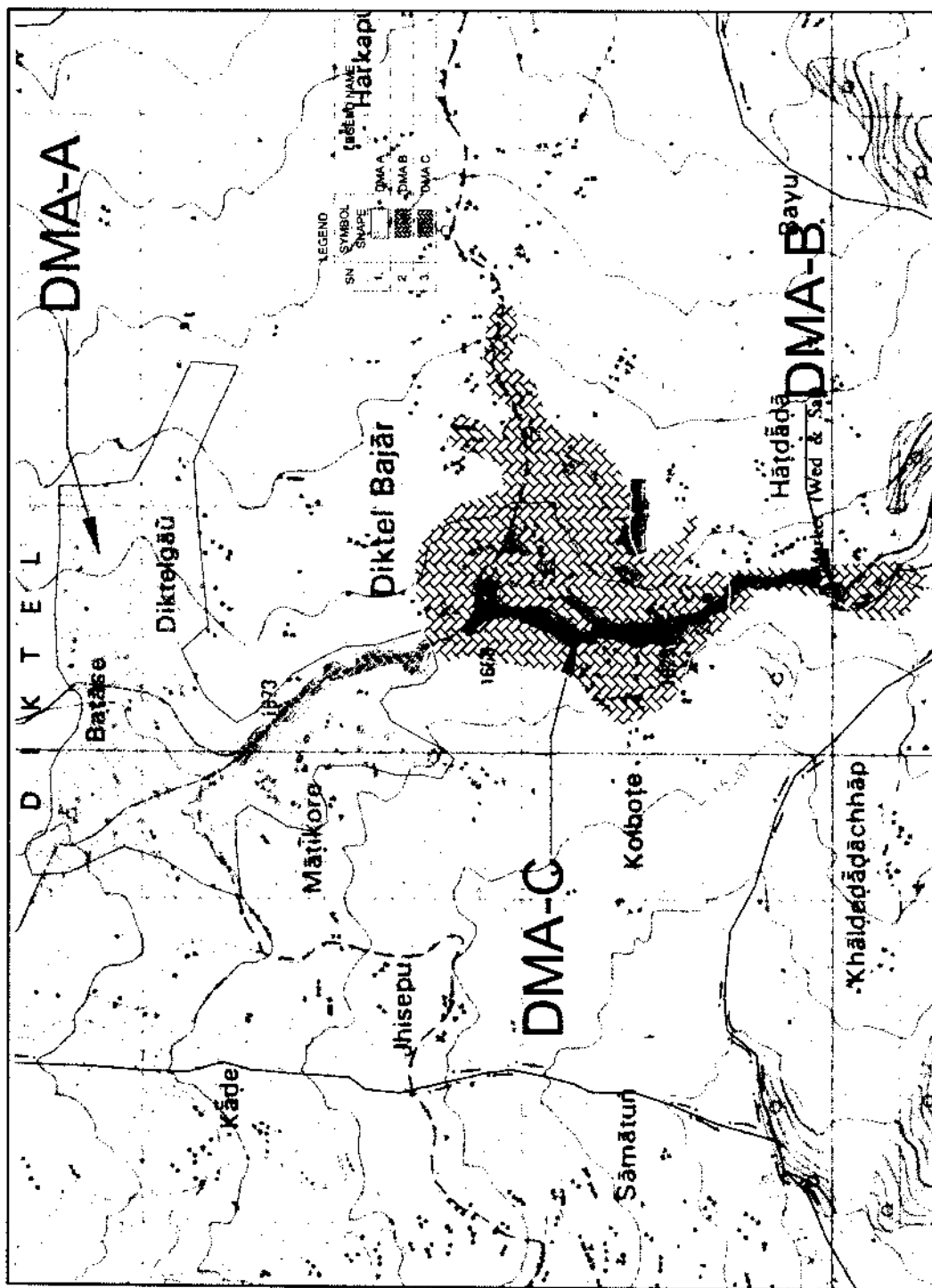


Figure 3: District Metering Area (DMA) of the Proposed System

2.4.11 Construction Planning

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

a) Land Requirement for the project area

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

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

S. No.	Project Components	Land Requirement (ft ²)	Land Availability (ft ²)	Land Type	Requirement	Ownership
1.	Kaule Khola Intake	500.00	16,212.50	Barren Land with normal slope	Permanent	WUSC
2.	WTP-1 (ST, HRF & SSF)	17,200.00	18,524.30	Barren Land	Permanent	WUSC
3.	WTP-2 (SSF)	11978.75	11,978.75	Barren Land	Permanent	WUSC
4.	RVT-A	1345.25	1369	Vacant & Barren Land	Permanent	Private Land of area 1369 ft ² received in voluntary donation
5.	RVT-B	1290.00	11,957.00	Vacant & Barren Land along river bank	Permanent	WUSC
6.	RVT-C	1800.00	17,112.50	Barren Land	Permanent	WUSC

Source: Due Diligence Report, 2018

77. The above given table shows that the land required for all the major project components belong to the existing WUSC. As mentioned above in Table 8, the land with area of 1369 sq ft for the proposed RVT-A has been provided by the land owners Mr. Khadga Bahadur Basnet and Mrs. Krishna Maya Basnet, out of 7187 sq. ft. area of their land, as a voluntary donation for the proposed project as per their own consent. The written consent letter has been included in **Annex 3**. Hence, there will be no issue of resettlement for the land acquisition.

78. The distribution pipes will be laid within the existing Right of Way (RoW) of road network. Provision of 1049 house connections, about 24.71km long distribution network and 18.462 km transmission pipelines will be laid along the public road within rights of way.

b) Energy Requirement

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

c) Human Resource Requirement

80. Human Resources are the main functional units of the construction projects. The contractor should ensure that the project has sufficient human resources. The human resources include Skilled Labours and Unskilled labours. For ensuring punctuality and sincerity in work schedule, hiring local human resources especially labours would be preferable. As per design estimate, the total number of Skilled Labors and Unskilled Labours are 34,728 and 155,292 respectively. Similarly, during operation phase, human resources for operation & maintenance should be mobilized by the concerned WUSC.

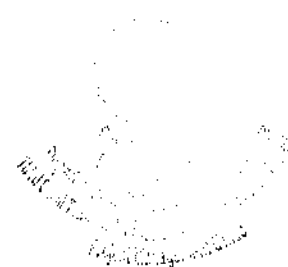
d) Construction Materials

81. For ensuring availability, the local construction materials would be more preferable. The construction materials like stone, sand & aggregates can be locally brought from the authorized local vendor. There is no requirement of quarrying hence, there will be no need of crusher plant for the proposed project.
82. The major construction materials other than Stone, Aggregate and Sand have been envisaged to import from Lahan which included Bricks, Cement and Reinforcement Bars. It is about 183 km far from Diktel Bazaar, Khotang.
83. As per the detailed design estimate, the total quantity of these major construction materials required for the overall project construction activities will be around as follows:

Stone: 1726 m³

Sand: 1657 m³

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L. III
Government of Nepal
Ministry of Water Supply
Singhadurbar, Kathmandu



Aggregate: 2000 m³

Cement: 960 tonnes

Bricks: 18066 nos.

Reinforcement Bars: 175 tonnes

84. Other miscellaneous construction materials like pipe materials, fittings, sanitary items etc. will be purchased from the available and nearest market areas. As per the detailed design, the total estimated quantity of pipe materials for pipe laying works, house connection works and for other project components is; a) DI Pipes is 958m, b) PE pipes is 43.899m and c) GI pipes is 645m.

e) Camp Site

85. The proposed project has provision of worker's camp site to ensure worker's safety & rights during construction phase. The contractor will temporarily facilitate the construction workers with well equipped worker's camp. The camp site will be located nearby the construction sites at six locations that includes (i) At Solma, near Rambha Khola Intake; (ii) WTP-1 site near Thapagaun Nigale; (iii) WTP-2 site at Batase; (iv) RVT A site near Diktelgaon; (v) RVT C site near Kolbote and (vi) RVT B site. This is depicted in the figure 4 given below. There will be provision of proper drainage, sanitation and basic utilities at camp site to ensure good health & sanitation behaviour of each workers.

f) Stockpiling Site

86. There is also provision of the stockpiling site which will be located nearby the construction site so that the stockpiled construction materials would be readily available. Six locations for this stockpiling site have been proposed that includes (i) At Solma, near Rambha Khola Intake; (ii) WTP-1 site near Thapagaun Nigale; (iii) WTP-2 site at Batase; (iv) RVT A site near Diktelgaon; (v) RVT C site near Kolbote and (vi) RVT B site. This is depicted clearly in the figure 4 given below. This location ensures that the proposed stockpiling sites do not interfere any natural drainage courses, drain inlets or concentrated flows of storm water. This ensures the control of blockage problems to these features that may be caused by some materials like soil, cement, rubbles etc. These locations are adjacent to worker's camp site so that the stockpiled materials will be under proper supervision of the workers. To control wind erosion, water or dust palliative will be

applied to stockpiles and the bagged materials will be placed on ballets under cover.

g) Cut and Fill Volume of Muck

87. Cut & Fill Volume of muck after earthworks has been estimated during detailed design of this proposed project. After using the excess of cut in filling works, the resulting muck will be disposed off properly to Spoil Disposal Site. As per detailed design, the total quantity of cut volume of muck is 35,868.01m³ and of fill volume of muck is 30,512.95m³. Hence, the remaining volume of muck after backfilling will be 5355.06 m³ which will remain as excess spoil. This will be managed by disposing into the proposed spoil disposal site as described in the following section.

h) Spoil Disposal Site

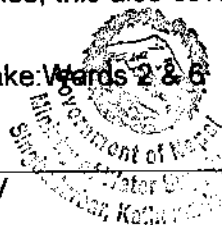
88. There will be also provision of Spoil Disposal Site at three locations viz; i) In between Rambha Khola & Kaule Khola Intakes near Solma, ii) Near RVT-A location and iii) Near RVT-B location. The location of each Spoil Disposal Site is depicted in the figure 4 given below. Each location of this Spoil Disposal Site ensure environmental safety. Each of this location is nearby the existing roads so that it will be easy to transport the excess spoil which could not be reused for the construction and to dispose off to the approved landfill sites.

2.4.12 Project Area Delineation

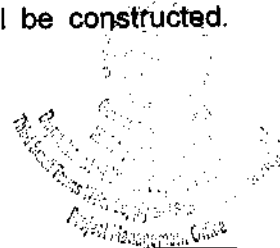
89. To carry out IEE study, the possible areas where the anticipated impacts have either significant or insignificant effects, need to be delineated. The impact areas have been delineated on the basis of proximity of the construction site to the nearby surrounding areas. The impact areas has been delineated as "Core Project Area", and "Surrounding Project Area" on the basis of proximity and magnitude of the impacts due to the proposed project activities.

90. Here, the Core Project Area indicates the area required permanently as well as temporarily for the proposed project. It includes the service area of the proposed project which comprises partial areas of ward 1, 2 & 3. This also includes the construction area where the proposed project components will be constructed. Hence, this also covers the following areas:

Intake: Wards 2 & 3



Engineer



WTP-1: Ward 2 (Tinbote Near Thapagaon Nigale)

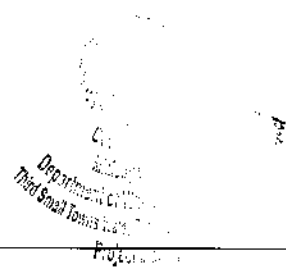
WTP-2: Ward 2 (Alchhebote)

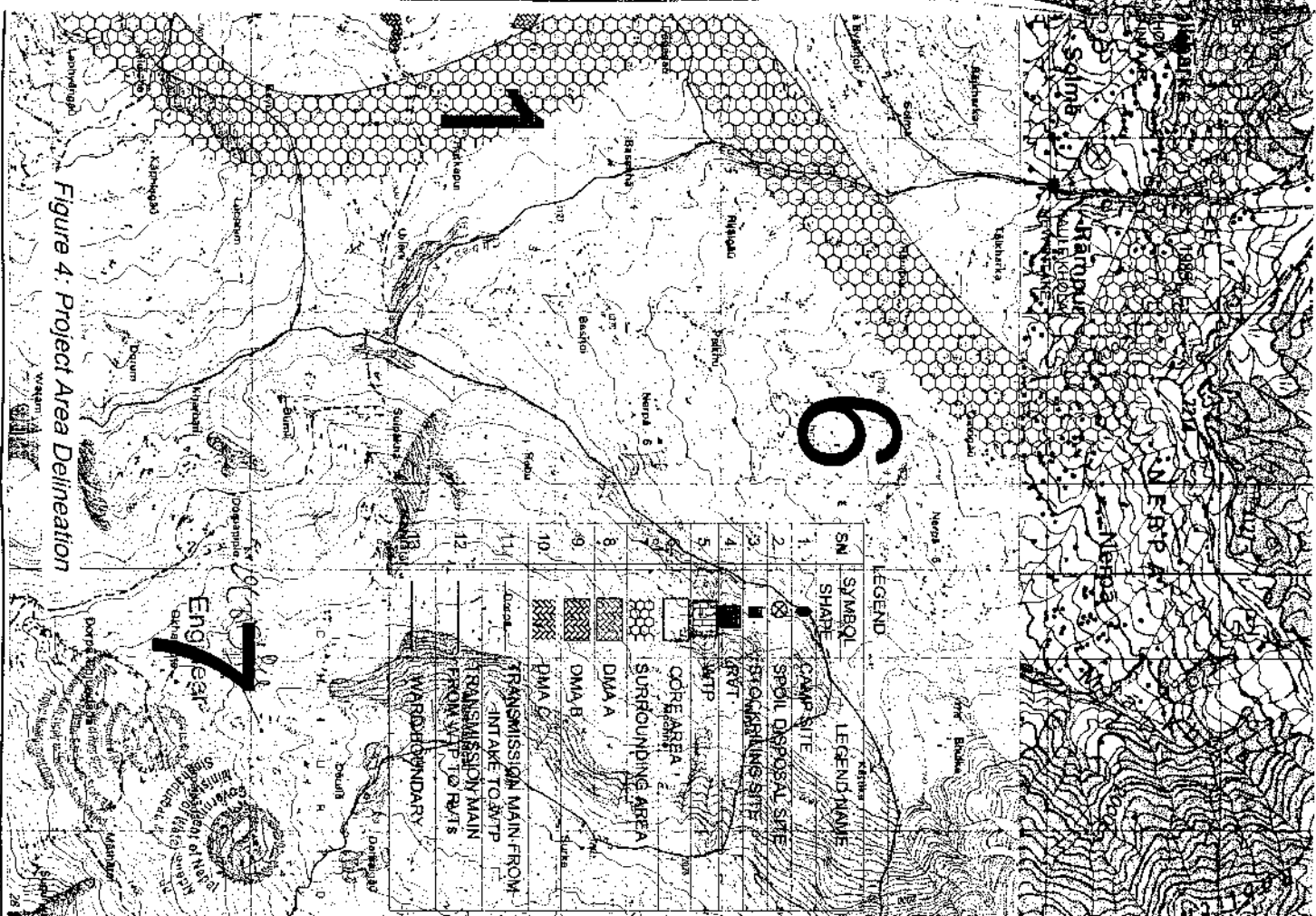
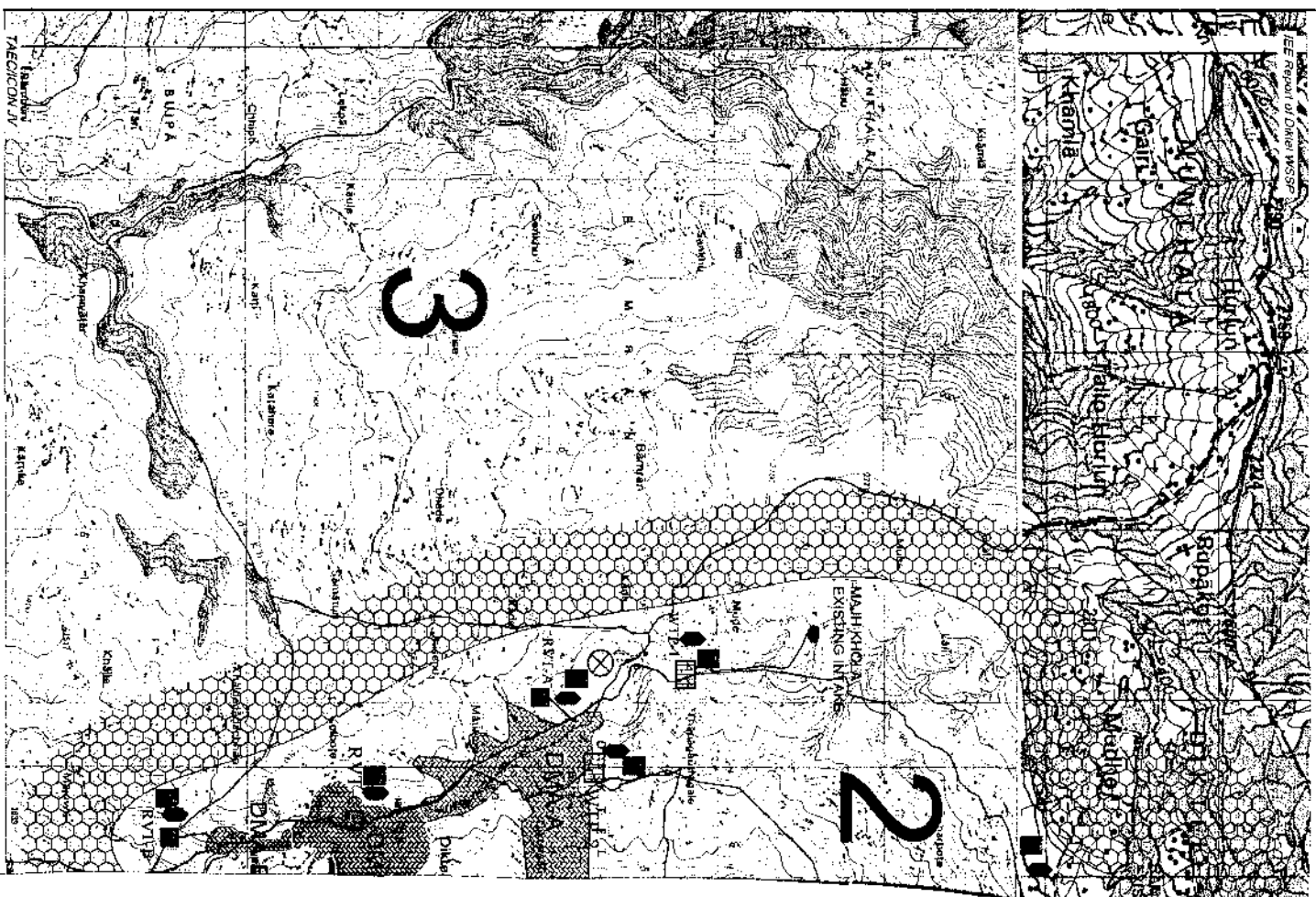
Transmission Mains: Ward 2

91. The Surrounding Project Area indicates the area within the immediate surroundings of the proposed project. It includes the area of the project town which is closely associated with the core area of the project. It involves partial areas of ward 1, 2, 3, 4, 5 & 6.
92. The Core Area & Surrounding Area of the proposed project is depicted in Figure given below:



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Engineer





2.5 Project Activities

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

2.5.1 Construction Activities

94. The list of construction activities of the proposed project are given below:

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

2.5.2 Operation Activities

95. The list of operation activities of the proposed project are given below:

- a) Water Quality Monitoring
- b) Proper Implementation of Water Safety Plan (WSP)
- c) Regular Monitoring by WUSC to ensure effective operation of water treatment plants
- d) Regular Cleaning of Sedimentation Tank

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



Signature
Engineer

Signature
Project Engineer

3. METHODOLOGY

96. To meet the objectives of the IEE study a systematic and integrated methodology was followed by the legal requirements of GoN. The Ministry of Water Supply has already approved the Terms of Reference (ToR) for the IEE study of Diktel Water Supply and Sanitation Project. The IEE study has followed basically the procedures outlined in the approved ToR.

97. The IEE study has been conducted as per provisions of the Environmental Protection Rules (1997, 2007 & 2017) following the provision of Rules 5, 7, 10 & 11 in compliance with the schedule 1, 3 & 5.

98. The IEE study has followed the procedures outlined in the approved ToR and has covered the issues delineated therein. The principal steps undertaken in the IEE methodology to accomplish the assignment are briefly discussed below:

3.1 Literature review

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

3.2 Field Study

100. The field study was carried out in the project service areas in an extensive manner by a multidisciplinary team, comprising an environmentalist, biologist, socio-economist, and a civil engineer. During the visits, baseline information on physical and cultural, chemical, biological, and social conditions of the project direct and indirect impact areas were collected using simple checklist and questionnaire

method. The sub-sections below present briefly the various approaches and methodological tools used during the field exploration.

3.2.1 Physico-Chemical Environment

101. An extensive physico-chemical environment survey was carried out by delineating the project impact area to collect the baseline information through simple checklist method. Topographic and geomorphological features were observed and documented. Physical features such as topography, air quality, erosion and land stability & land use pattern were also observed and recorded. These data on physico-chemical environment were collected through literature review, field survey & investigation by the team of experts, expert's judgement and stakeholder consultations.
102. The data regarding Climate & Rainfall of the project town was collected from Department of Hydrology & Meteorology, Kathmandu. Similarly, the baseline information regarding water quality was collected by sampling process that involved water sample collection from the proposed source followed by laboratory analysis. Also, information on air quality and noise quality condition has been collected through field observation and expert's judgement. For convenience, simple checklist for Physical environment has been prepared and this checklist as included in **Annex 7** is duly followed and filled up during field study. The consultations with the local communities and interviews with a few government officials, schools and representatives of the local bodies also provided aid to assess the physico-chemical aspects.

3.2.2 Biological Environment

103. The baseline information regarding biological environment was collected through walkthrough survey throughout the core & surrounding areas of the project area by adopting simple checklist method (**Refer Annex 7**), through professional judgement and local interaction. Types of vegetation and forests were identified based on the species composition. Information on rivers of the project area were also collected through interaction with the locals and through field observation. The protected vegetation (rare, endangered, indigenous, etc.) of the project area as per IUCN Red Book, CITES Appendices, IBAT Report generated by ADB and GoN list species were enumerated based on consultation with the local people and the expert judgement. Similarly, information on the aquatic species were also collected through the expert judgement and discussions with the locals.

3.2.3 Socio-economic and Cultural Environment

104. Household surveys were conducted through interviews by simple questionnaire method to obtain information on the socio-economic & cultural environment that includes demography, ethnicity, education, health & sanitation, drinking water condition of the project area, irrigation facility, local traditions, religions, land use patterns, incomes & expenditures and to acquire their perception towards the proposed project, etc. Information on Migratory patterns of the local people and the Impact of river on settlements & agriculture were also collected. The survey covered 100% of the total HHs whereas only 10% of the total HHs was surveyed in detail for this study. The sample of Household Questionnaire that has been filled up during field study has been included in **Annex 4**.
105. Focussed Group discussions (FGD) were also conducted to obtain suggestions and comments from all the potential stakeholders. The checklist followed for FGD and its findings have been included in **Annex 7**. Direct observation (Transect Walk Method) was also conducted to ascertain the existence of the cultural sites, and public institutions such as temples, cremation grounds, historical and archaeological sites, schools, and health posts within the direct project impact areas. Consultation with village elites and through group discussions were done to assess the current situation of the project area community.

3.3 Public Notice

106. A public notice of 15 days was published in Arthik Abhiyan Dainik, a national daily newspaper on 2075/09/11. The main aim of the notice is to seek written opinions from the concerned people and institutions regarding the possible impacts that may result from the implementation of the proposal. Copies of the Public Notice has been pasted at the municipality office, WSSDO (Khotang), District Coordination Office and District Administration Office. This has been included in **Annex 3**.

3.4 Public Consultation

107. The public consultation program was conducted in the Rupakot Majhuwagadhi Municipality Office. There is no dissatisfaction regarding the proposed project.

3.5 Collection of Muchulkas (Recommendation Letters)

108. Recommendation letters from the concerned local stakeholders has been collected within the 15 days from the date of public notice publication. Each of the recommendation letters collected have been included in **Annex 3**.

3.6 Impact Identification, Prediction & Evaluation Methods

109. The information regarding Physico-chemical, Biological and Socio-economic & Cultural aspects as mentioned above has been collected to identify the susceptibility of these aspects to be affected by the proposed project activities. This helped to identify the anticipated environmental impacts of the proposed project. For this, Simple Checklist method has been adopted for the impact identification and prediction method. This has been carried out by using Rapid Environmental Assessment (REA) Checklist prepared by ADB (**Refer Annex 2A**) and by using simple socioeconomic survey questionnaire (**Refer Annex 4**) prepared during the desk study.
110. The environmental impacts both beneficial and adverse were elaborately identified, predicted and evaluated to the extent possible, for both construction and operational stages. This involves study of baseline data, interaction with the people of the project area and professional judgement.
111. After the impact identification and prediction method, these impacts need evaluation to assess their adversity on the project core & surrounding areas. The impacts were evaluated regarding their nature, magnitude, extent, and duration. The National EIA Guidelines 1993 has been used for the reference for the impact identification, prediction, and evaluation. The magnitude of the impact has been classified into High (H), Medium (M) and Low (L). The extent has been classified into Site-Specific (SS), Local (L), and Regional (R). Similarly, the duration of impact has been further classified into Short Term, Medium term, and Long term.

Scoring of Impacts

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 rated if total score: More than 75: Very Significant, 50-75: Significant, Less than 50: Insignificant

112. This evaluation has been carried out as per the professional judgement done by the key expert team involved in the IEE study.

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 Government of Nepal
 Ministry of Water Supply
 Engineering, Kathmandu

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Nepal's Environmental Policy and Legal Framework

Constitution of Nepal

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

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

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

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

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

- (i) sets out the review and approval process of IEE and EIA Reports, that involve informing and consulting stakeholders;
- (ii) stipulates that no one is to create pollution that would cause significant adverse impacts on the environment or harm to public life and health, or to generate pollution beyond the prescribed standards;
- (iii) specifies for the Ministry in charge of environment (currently the MoFE) to conduct inspection of approved projects to ensure that pollution prevention, control or mitigation is carried out according to the approved IEE or EIA Report;
- (iv) provides for the protection of objects and places of national heritage and places with rare plants, wildlife and biological diversity; and



- (v) states that any person/party affected by pollution or adverse environmental impact caused by anybody may apply to the prescribed authority for compensation to be recovered from the polluter/pollution generator.

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

115. Environmental Protection Rules (EPR), 1997, and its amendments in 1999, 2007 & 2017 defines the implementing rule and regulations of the IEE/EIA process, elaborating the provisions in the EPA. The preparation, review and approval of IEE and EIA Reports are dealt with in Rules 3 to 7 and 10 to 14. Schedules 1 and 2 list down the projects of activities that are required IEE and EIA, respectively, as amended in 2017.
116. Other environmental policies, laws, rules, conventions & standards that provide general context in the environmental assessment of water supply & sanitation works are presented in Table 9.

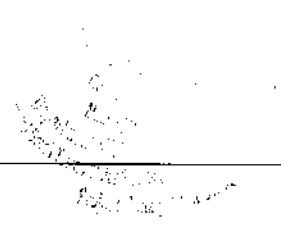
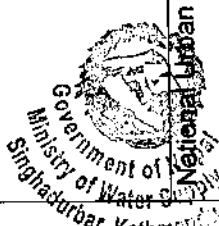


Table 9 : Other Relevant Environmental Act, Rules, Plan, Policies, and Guidelines of Nepal

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
1.Plans, Policies & Strategies			
National Environmental Policy & Action Plan (NEPAP)	2050 B.S. (1993 A.D.)	Of its five objectives, most relevant to the Project are to (i) mitigate adverse environmental impacts; and (ii) safeguard national & cultural heritage & preserve biodiversity, within & outside protected areas.	- The subproject will not encroach any physical & cultural heritage areas and will not affect biodiversity. - EMP provides measures to mitigate anticipated adverse impacts.
Water Resources Strategy	2059 B.S. (2002 A.D.)	Among the ten strategic outputs of this strategy, third output focusses on Adequate Supply of and access to potable water and sanitation & hygiene awareness provided.	This provision will strengthen implementation capacity for the proposed project.
Rural Water Supply and Sanitation National Policy and Rural Water Supply and Sanitation National Strategy	2060 B.S. (2004 A.D.)	Recognizes that all people have a right to access to basic water supply and sanitation services and that these services are necessary for socio economic development and to combat waterborne diseases.	The proposed project ensures easy access to safe, reliable & potable water.
Rural Water Supply and Sanitation Sectoral Strategic Action Plan (Unofficial Translation)	2060 B.S. (2004 A.D.)	- This action plan has proposed "Environmental Aspects" as one of its major components. - This underscores the environmental aspects of all levels of plans and their implementation and consolidates them according to rules & policies to ensure the execution of development works.	Though this action plan has main focus on rural areas and the proposed project is for urban area, the IEE study has duly followed this strategic action plan as a reference.
National Water Plan-Nepal	2062 B.S. (2005 A.D.)	- This includes subsector-wise action programmes in water induced disasters, environmental action plan on management of watershed and aquatic ecosystem, water supply, sanitation and hygiene, irrigation for agriculture, hydropower development, industries, tourism, fisheries, and navigational uses, water-related information systems (Decision Support System for River Basin Planning and Management), legal frameworks, and institutional mechanisms - This also includes Environment Management Plan, a strategic document for the implementation of environmental protection measures (including	This has been considered in IEE study.

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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
 National Urban Policy	2063 B.S. (2007 A.D.)	downstream water pollution and groundwater quality, erosion/landslide and sedimentation, water pollution and sanitation, effect on aquatic life and wetland ecosystem), monitoring (baseline, impacts, and compliance), environmental auditing and institutional and procedural arrangements. The policy gives importance to environment conservation while carrying out urban development works and natural resource use; thus, supporting the required environmental conservation and protection in donor-assisted development projects.	The IEE study will meet the provisions of this policy.
National Urban Water Supply & Sanitation Sector Policy (Final Draft)	2065 B.S. (2009 A.D.)	The Policy requires the IEE or EIA of proposed WSS projects by the EPA/EPR to (i) incorporate consultations with key stakeholders, including endpoint users; & (ii) specify measures to mitigate environmental impacts before, during construction & operation, as well as corrective measures.	The IEE study will meet the provisions of this policy.
Updated 15-yr Development Plan for Small Towns Water Supply and Sanitation Sector	2066 B.S. (2009 A.D. Amendments in 2015A.D.)	The Plan emphasizes monitoring and evaluation as an important component of a project to determine the overall impact of a project.	EMP prescribes performance monitoring & evaluation to minimize the anticipated environmental impacts.
National Water Supply & Sanitation Policy (Draft)	2071 B.S. (2014 A.D.)	The goal of this Policy is to reduce urban and rural poverty by ensuring equitable socio-economic development, improving health and the quality of life of the people and protection of environment through the provision of sustainable water supply and sanitation services.	- The proposed project is solely for provision of sustainable water supply service to Diktel Bazaar residents. - The IEE study ensures the protection of the environment from the construction activities of the proposed project.
Forest Policy	2071 B.S. (2015 A.D.)	It guides sub sectoral programmes relating to forests, plant resources, wildlife, biodiversity, medicinal plants, and soil and watershed conservation. It also covers periodic assessment and updating of information on forest resources of the country.	The proposed project does not have to deal with forest related adverse issues.

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Land Use Policy	2072 B.S. (2015 A.D.)	- The strategy 3 of Policy 2 has taken into account to maintain a balance between physical infrastructure development and environment. - The strategy 3 of Policy 10 focusses on adoption of principle of sustainable development in view of the impact of climate change during any construction and/or development works in order to keep balance between land, environment and development.	- The proposed project will maintain balance between construction activities and environmental aspects of the project town. - The IEE study ensures this issue.
 National Urban Development Strategy	2017 A.D.	- This strategy assesses the existing conditions of infrastructures, environment, economy and governance, establishes benchmarks and desirable standards. - It identifies prioritized strategic initiatives for investment in infrastructure and environment to realize the comparative advantages of urban areas.	The IEE study has duly followed this.
2.Laws & Acts			
Essential Goods Protection Act	2012 B.S. (1955 A.D.)	- Deems drinking water an essential commodity and strictly protects drinking water. - Prohibits any unauthorized use or misuse, stealing, damaging etc. of drinking water.	The proposed project ensures safe, reliable & potable water along with the provision of protection works and metering system to prevent any misuses, stealing and damage problems.
Aquatic Animal Protection Act	2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.))	This act renders punishment to any party introducing poisonous, noxious or explosive materials into a water source or destroying any dam, bridge or water system with the intent of catching or killing aquatic life. It also emphasizes that GoN empowers to prohibit catching, killing and harming of certain kinds of aquatic animals by notification in Nepal Gazette.	- Information of this act will be delivered to the construction workers, as they may get involved in fishing during construction period. - This issue has been covered by this IEE study.
Town Development Act	2045 B.S. (1988 A.D.)	This act has provision of necessary services and facilities to the residents of the town by reconstructing, expanding and to develop existing towns and by constructing new towns and to maintain health, convenience and economic interest of general public.	The proposed project is solely for provision of continuous water supply facilities as per the increasing demand of water of the increasing population of Rupakot Majhuwagadhi town.

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Water Resource Act	2049 B.S. (1992 A.D.)	- The umbrella Act governing water resource management. - Provides for the formation of water user associations and establishes a system of licensing. - Prohibits water pollution.	WUSC has been formed for this proposed project as per this act and There is provision of control of water pollution through protection works and strict supervision.
Forest Act	2049 B.S. (1993 A.D.) with Amendments - 2055 B.S. (1999 A.D.)	The Act prohibits the extraction of boulders, rocks, pebbles, sand or soil from national forests, defined as all forests, excluding private forests, whether marked or unmarked with forest boundary, to include waste or uncultivated lands, or unregistered lands surrounded by the forest or situated near adjacent forests as well as paths, streams rivers, lakes, riverine lands within the forest.	No trees will be cut. EMP stipulates no quarrying of natural aggregate materials.
Land Acquisition Act	2049 B.S. (1993 A.D.)	It guides the compulsory acquisition of land. It also describes that GoN can acquire land at any place and in any quantity by giving compensation pursuant to the act for the land acquired for any public purposes or for operation of any development project initiated by GoN.	There is no requirement of land acquisition of private land. All the land required are under the ownership of GoN.
Child Labor Prohibition and Regulation Act	2056 B.S. (2001 A.D.)	The section 3 of the Act prohibits a child from engaging in work, sub-clause 1 of the clause 3 states "Nobody shall engage in work a child who has not completed fourteen years of age as a labor and subclause 2 states "Nobody shall engage a child in a risk full occupation or work set forth in the Schedule". The section 4 states "Child not to be engaged in work against his will by temptation or fear or pressure or by any other means.	This provision has been stated in EMP.
Water Supply Management Board Act	2063 B.S. (2006 A.D.)	It guides to prevent the misuse of potable water and prevent pollution of potable water	The proposed project has followed this as it has provision of protection works at the intake site, WTP & RVT sites that will prevent pollution of water.
Solid Waste Management Act	2068 B.S. (2011 A.D.)	Article 4 provides that the management of hazardous, medical, chemical or industrial waste rests upon the generators of such wastes. Management should be as prescribed in the Act. Article 5 provides that individuals and entities must reduce the amount of solid waste	EMP prescribes eco-friendly management of solid and hazardous wastes.

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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Labour Act	2074 B.S. (2017 A.D.)	generated while carrying out work or business. - The Act has provisions for the rights, interest, facilities and safety of workers and employees working in enterprises of various sectors. - The Act emphasizes on occupational health and safety of workers and stipulates provision of necessary safety gears and adopting appropriate precautionary measures against potentially hazardous machine/equipment in the workplace. - It also specifies to arrange such as removal of waste accumulated during production process and prevention of dust, fume, vapor and other waste materials, which adversely affect the health of workers. - It specifies the provision of controlling the communicable diseases at the construction site. It also prohibits mobilization of child as a labor. It emphasizes on the provision of temporary camp, safe drinking water and necessary food supplies to the workers.	These provisions are stated in EMP.
Local Government Operation Act	2074 B.S. (2017 A.D.)	The Act gives Province Government the functions, duties & powers to: (i) entrust municipalities with responsibility of WSS services, (ii) conserve & protect their local environment & natural resources; (iii) plan, implement &/or operate & maintain WS projects at local level; (iv) implement or arrange for implementation local sanitation/sewerage & drainage projects; (v) protect cultural heritage & religious sites; &/or (vi) monitor project activities within their respective jurisdictions.	Provides a basis for Local Government to monitor the environmental performance of the projects. EMP provides the responsibilities of LGs in EMP implementation.
3. Rules & Regulations Solid Waste (Management & Resource Mobilization), Rules	2044 B.S. (1987 A.D.) & Amendments 2049 B.S. (1992A.D.)	- This act focusses on the management of solid waste and mobilization of resources related. - These also ensure the health convenience of the common people by controlling the adverse impact on pollution from solid waste.	- This act needs to be reviewed during construction phase. - EMP covers the requirement of this rule for the proposed project.
Water Resource Regulations	2050 B.S. (1993 A.D.)	This is the umbrella Regulation governing water resource management.	The proposed project has followed these provisions.

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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Drinking Water Regulations	2055 B.S. (1998 A.D.)	- Sets out the procedure to register a Water User Association and to obtain a license. - Sets out the rights and obligations of Water User Associations and license holders. - Regulates the use of drinking water. - Provides for the formation of Drinking Water User Associations and sets out the procedure for registration. - Deals with licensing of use drinking water. - Deals with the control of water pollution and maintenance of quality standards for drinking water. - Sets out the conditions of service utilization by consumers.	The proposed project has followed all these provisions.
Solid Waste Management Rules	2070 B.S. (2013 A.D.)	- GoN has issued these rules by exercising the power conferred by the section 50 of the Solid Waste Management Act, 2068. - Section 3 of this rule focuses on Segregation & management of solid wastes.	EMP for this proposed project covers this matter focused by this rule.
Labor Rules	2075 B.S. (2018 A.D.)	- GoN has issued these rules by exercising the power conferred to it under the section 184 of the Labor Act, 2074. - Section 7 of these rules deals with Occupational Safety & Health Policy.	EMP for this proposed project covers this matter focused by this rule.
4.Guidelines & Manuals National EIA Guideline	2049 B.S. (1993 A.D.)	This guidelines aims to assess the environmental impacts likely to be caused by a project, and promote its positive impacts and mitigate or eliminate adverse impacts by undertaking preventive and other effective measures after integrating the environmental impacts in the planning cycle of all the projects to be initiated in Nepal, prior to their initiation, so as to make the economic benefits from development projects sustainable.	This has been followed for evaluation of the anticipated environmental impacts.
WHO Air Quality Guidelines, Global Update	2061 B.S. (2005 A.D.)	It provides basis for global standards in air quality that are designed to offer guidance in reducing the health impacts of air pollution.	During air quality monitoring, this guidelines will be followed.
WHO Guidelines for Drinking-water	2073 B.S. (2017 A.D.)	It provides the recommendation of WHO for managing the	During water quality



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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Quality, Fourth Edition	A.D.	risk from hazards that may compromise the safety of drinking water.	monitoring, this guidelines will be considered and followed.
National Noise Standard Guidelines	2068 B.S. (2012 A.D.)	It provides basis for national standards in noise quality that are designed to offer guidance in reducing the health impacts of noise pollution.	During noise quality monitoring, this guidelines will be followed.
Guidelines for Community Noise by WHO	2055 B.S. (1999 A.D.)	It provides basis for global standards in noise quality at community level that are designed to offer guidance in reducing the health impacts of noise pollution.	During noise quality monitoring, this guidelines will be followed.

Source: IEE Study, 2018/019

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4.2 Environmental Agreements

4.2.1 International Environmental Agreements (Conventions & Treaties)

117. Nepal is a signatory to many international agreements and conventions related to environmental conservation. However, all of those conventions are not interrelated to the proposed project. The conventions related to the proposed project are as follows:
- a) The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973
 - b) International Covenant on Economic, Social and Cultural Rights (ICESCR), 1976
 - c) Worst Forms of Child Labour Convention, 1999
118. 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.
119. The Diktel Water Supply & Sanitation Project does not and will not break or go against Nepal's commitment to these international agreements.

4.3 Environmental Standards

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

- The key environmental quality standards applied in the GoN IEE (as well as in the ADB IEE) are listed in Table 10 and their details on the acceptable level criteria of these standards are featured in **Annex 2B**.

Table 10: Relevant Environmental Quality Standards

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

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

Source: IEE Study, 2018/019

121. As shown in the above Table 10, *National Ambient Air Quality Standards, for Nepal, 2003* is enforced by GoN that has set quality standards for seven parameters TSP, PM₁₀, Sulphur Dioxide(SO₂), Nitrogen Oxide(NO₂), Carbon Mono-oxide (CO), Lead (Pb) and Benzene at national level. Similarly, *WHO Air Quality Guidelines, Global Update, 2005* enforced by WHO has set quality standards for four parameters PM₁₀, PM_{2.5}, SO₂ and NO₂ at international level. Both standards provide guidelines to follow and comply the set standards for the ambient air quality during construction period. The acceptable level criteria for ambient air quality as per both standards are given below:



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Table 11: Standards for Ambient Air Quality

Parameter	Averaging Period	Nepal's Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) *	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$) **	
			Global Update 2005	Second Edition [^] 2000
TSP	Annual	-	-	-
	24-hour	230	-	-
PM ₁₀	Annual	-	20	-
	24-hour	120	50	-
PM _{2.5}	1-year	-	10	-
	24-hour	-	25	-
SO ₂	Annual	50	-	-
	24-hour	70	20	-
	10-minute	-	500	-
NO ₂	1-year	40	40	-
	24-hour	80	-	-
	1-hour	-	200	-
CO	8-hour	10,000	-	10,000
	15-minute	100,000	-	100,000
Pb	1-year	0.5	-	0.5
Benzene	1-year	20	-	-

Source:

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

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

[^] Air Quality Guidelines for Europe, Second Edition, 2000. WHO Regional Office for Europe, Copenhagen.

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

122. Similarly, *National Noise Standard Guidelines, 2012* has set the standard noise levels measured in dBA for Industrial area, Commercial Area, Rural Residential Area, Urban Residential Area, Mixed Residential Area and Quiet Area. This also has provision of standard values for the noise level generated by Water Pumps and Diesel Generator also. This is limited within the country only. For international level, *WHO Noise Level Guidelines* has set the standard noise levels measured in dBA for two areas that includes residential and commercial areas. The standard values for ambient noise quality are given in the table given below:

Table 12: Standards for Ambient Noise Quality

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

* Guidelines for Community Noise, WHO, 1999.

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

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



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Table 13: Standards for Drinking Water Quality

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	0.005
	Aluminum	mg/l	0.2	none established
	Residual Chlorine	mg/l	0.1 - 0.2	5 ^^
	E-coli	MPN/100ml	0	must not be detectable in any 100 ml sample
Micro Germs	Total Coliform	MPN/100ml	0 in 95% of samples taken	

* Health-based guideline values

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

^ These standards indicate the maximum and minimum limits.

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

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

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

Source: National Drinking Water Quality Standards, 2005 and Implementation Directives for NDWQS, 2005

124. National Diesel Generator Emission Standard, 2012 has been introduced by the Government of Nepal in 2012 for new and in use diesel generators with a capacity of 8 kW-560kW (under the 1997 Environment Protection Act). The emissions standards set for new diesel generator imports is equivalent to Bharat Stage III standards and, for in-use diesel generators, is equivalent to Bharat Stage II. The Diesel Power Generation: Inventories and Black Carbon Emissions in Kathmandu

Table 14: National Diesel Generators Emission Standards, 2012

1. Emissions Limits (g/kWh) for Imports of New Diesel Generators

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

Note: This standard is equivalent to Bharat III standards.

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

Category (kW)	CO	HC	NO _x	PM
kW < 8	8.00	1.30	9.20	1.00
8 = kW < 19	6.60	1.30	9.20	0.85
19 = kW < 37	6.50	1.30	9.20	0.85
37 = kW < 75	6.50	1.30	9.20	0.85
75 = kW < 130	5.00	1.30	9.20	0.70
130 = kW < 560	5.00	1.30	9.20	0.54

Note: This standard is equivalent to Bharat II standards.

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

Source: Diesel Power Generation, 2014 by The World Bank

4.4 Environmental Assessment Requirements

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

4.4.1 Environmental Assessment Requirements of the ADB

126. All projects funded by the ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects funded under ADB loan are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. Concerning the environment, the SPS 2009 is underpinned by the ADB Operations Manual, Bank Policy (OM Section F1/OP, 2010). The policy promotes international good practice as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines¹.

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/EnvironmentalGuidelines>

127. ADB's Environmental Safeguards policy principles are defined in SPS (2009), Safeguard Requirements as per Table 15 and the IEE is intended to meet these requirements.

Table 15: SPS 2009 Safeguard Requirements

SPS 2009 - Safeguard Requirements	Remarks
Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment (EA) so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.	REA has been undertaken, indicating that the Project is 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, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical, cultural resources in the context of the project's area of influence. Assess potential transboundary global impacts, including climate change.	IEE has been undertaken to meet this requirement. (Chapter 6 & 7). No transboundary & global impacts, including climate change.
Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also, consider the no project alternative.	Analysis of alternatives is presented in Chapter 6
Avoid, and where avoidance is not possible, minimize, mitigate, &/or offset adverse impacts and enhance positive impacts using environmental planning & management. Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.	An EMP has been prepared to address this requirement.
Carry out meaningful consultation with affected people & facilitate their informed participation. Ensure women's participation. Involve stakeholders, including affected people & concerned NGOs, early in the project preparation process & ensure that their	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

SPS 2009 - Safeguard Requirements	Remarks
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.	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. Copies of both SPS-compliant IEE and GoN-approved IEE will be made available at the offices of the PMO, ICG and WUSC for public consultation.
Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.	EMP implementation, reporting and disclosure of monitoring reports are in this IEE.
Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.	The project does not encroach on areas of critical habitats. No trees will be cut. However, ground cover and low shrubs in the project footprint and some work easement will have to be removed from the transmission main. Although in due time, ground cover is expected to grow over the backfilled affected area naturally, EMP recommends seeding of the re-surfaced area to accelerated re-growth.
Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans	This requirement is only minimally applicable to the Project in the aspect of waste generation, e.g., effluent from septic tanks and generated sludge and sludge disposal from water supply and sanitation structures. The Project will not involve hazardous materials subject to international bans/phase-outs.

SPS 2009 - Safeguard Requirements	Remarks
or phase-outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.	
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 Project will not affect any physical, cultural resource. The EMP recommends the measure/s mitigate the adverse impact on PCRs in case of the chance find.

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

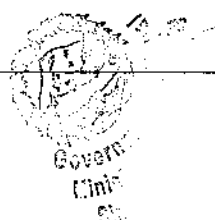
4.4.2 Environmental Impact Assessment Requirements of Government of Nepal

128. The Environmental Protection Rules (EPR) defines the environmental impact assessment process that should be followed in the preparation, review, and approval of environmental assessment reports. The process applicable to the Project is summarized in Table 16 given below.

Table 16: The GoN IEE Report Preparation, Review, Approval and Implementation Process

Steps in the Process	Remarks
Proponent refers to EPR Schedules 1 & 2 for the required environmental assessment (IEE or EIA) to carry out.	The project requires an IEE.
If proposed project requires an IEE, Proponent prepares an IEE schedule of work/ToR using the format prescribed in Schedule 3 of the EPR and submit this to the CSA for approval.	The project has secured an approved ToR.
Proponent carries out IEE according to the approved work schedule/ToR and prepares an IEE Report following the format prescribed in EPR Schedule 5 and incorporating stakeholders' feedback applying the consultation procedure specified in the EPR.	The project carried out IEE and prepared the IEE Report accordingly.
Proponent submits 15 copies of the IEE Report along with the project proposal and recommendation of the Municipality to the CSA.	Project submitted documents accordingly for review and approval.
CSA conducts review and grants approval of IEE Report.	
➤ If the review reveals project implementation to have no substantial adverse impact on the environment, CSA approves within 21 days from receipt of the report.	

Signature
Engineer



Steps in the Process	Remarks
> If thereview reveals the necessity to carry out an EIA, Proponent conducts an EIA following the prescribed EIA process.	
Proponent implements approved IEE Report and any terms and conditions given with the approval.	Project has not started and being implemented
CSA monitors and evaluates the impact of project implementation. When necessary, issue directives to the Proponent to institute environmental protection measures.	Project has not started and being implemented
MoWS conducts the environmental audit after two years of project commissioning/operation.	Project has not started and being implemented

Source: EPR, 1997 with amendments in 1999, 2007 and 2017 and IEE Study, 2018/019

CSA Concerned Sector Agency

EPR Environment Protection Rules, 2054 (1997), with amendments in 1999, 2007 and 2017

MoWS Ministry of Water Supply

VDC Village Development Committee

5 EXISTING ENVIRONMENT

5.1 Existing Physical Environment

5.1.1 Landforms and Topography

129. The project area lies in mid hilly region. The altitude of the project area ranges from an elevation 500 (Phedi) to 2600 m (Rupakot) above mean sea level (amsl) with an average altitude of 1623 meters.
130. The altitude of Rupakot Majhuwagadhi municipality varies from 2,250m to 700m. The topography is characterized by ridges and hill slopes. Mountain terrains in Khotang are of gentle to steep slopes. The mid hill is suitable for potato, ginger, citrus and other cereal crops.

5.1.2 Geology & Soil

131. The project town is dominated by green, dark green, purple, and grey phyllite and schist. There are also few alternating bands of amphibolite, marble and calcareous quartzite.
132. The project town is covered either by residual soils or colluviums. The colluvial deposits are widespread in the project area and distributed along the hill slopes. The colluvium soils in the hill slope are pre-dominantly silty-sandy gravel. The residual soils occur along the flat ridges, spurs and upper hill slopes. The most common residual soils that occur in the project area are silty clayey sand.

5.1.3 Land use pattern

133. No data regarding land use pattern could be obtained during the IEE study. Hence, field study judgement has been adopted to study the existing land use pattern of the project area. During field study, it has been observed that generally, the agricultural land dominates the land use pattern of the project area. This is followed by forests and residential areas. Likewise, the remaining area has been used by rivers & rivulets and commercial areas. The land use pattern is determined by topography, climate and soils. Generally, lands with gentle slopes are used for settlements.

5.1.4 Water Resources

134. The project district, Khotang is rich in water resources, as there are various sources of water. The project area has potentiality of surface water only. There are

two perennial stream sources i.e., Rambha Khola & Majh Khola which are being used by the existing water supply system. These two rivers will also be used in the proposed project. Apart of these two rivers, the available nearby water resources are Chhebe Khola and Kaule Khola (tributary of Chhebe Khola). Both of these rivers are spring sources. For the proposed project, Kaule Khola has been used.

5.1.5 Climate

135. The climate of the project area is essentially warm and cold temperate type. A warm temperate type of climate is observed between 1,000- 2,000 meter elevation while a cold temperate type of climate exist in between 2,000-3,000 meters elevation, particularly in the mid hills of Nepal. June, July & August are the hottest and December & January are the coldest months. The annual rainfall in the area is about 1,191 mm. 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.

5.1.6 Water Quality

136. During the survey, the respondents were asked about the existing water quality in the project area. The survey revealed that about 0.4 % (4) of respondents feel as good quality where as large numbers 99.4% (924) feel satisfactory or moderate in terms of water quality. Their response is categorized as good or satisfactory in terms of their sensitivity to the taste, colour , visibility (turbidity) and incidence of water borne diseases.
137. During field survey, water samples collected from the proposed sources were tested for various physical and chemical parameters. The test reports show that all parameters of water quality of the sample collected from Kaule Khola (Chhebe Khola) & Rambha Khola are within the permitted value of NDWQS. However, the test report of the sample collected from Majh Khola shows that the turbidity value is 42 NTU and the observed value for iron content is 0.3 which are actually higher than the permitted value of NDWQS. These water quality test reports are included in Annex 7.
138. Similarly, during field study, simple bacteriological tests (Coliform P/A Test Vial) which has been developed by ENPHO to determine the presence of Coliform bacteria at the water source was carried out. This on-site bacteriological test is

based on the principle developed by Manja et. al in 1982. The test is based on the readily observable formation of black precipitate iron sulfide in the test bottle, as a result of the reaction of H_2S with iron. The results of the Coliform P/A Test Vial shows that the samples collected are contaminated with bacteria.

5.1.7 Air Quality

139. Air pollution is generally caused by fugitive dust from vehicle movements e.g. old and over smoky buses, tractor, heavy and overloaded trucks, old jeeps particularly over unpaved roads, construction activities, and wind action on unpaved exposed surfaces. Air emissions come from household cooking, open burning, and moving vehicles. Emissions from these sources are scattered regarding both locations and timing. However, the magnitude of air quality problems in the project town is not that severe.

5.1.8 Acoustic Environment

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

5.1.9 Landslide Susceptibility

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

5.2 Existing Biological Environment

5.2.1 Flora

142. Khotang District is blessed with natural beauty of floral diversity. The site specific vegetation types are described below. The major plant life forms available in the project area are given in Table 17.

Table 17: Major Plant Life Forms of the Project Area

S.No.	Scientific Name	Local Name	Species
1	<i>Viburnum erubescens</i>	Asaare	Shrubs
2	<i>Adhotoda vasica</i>	Asuro	Shrubs
3	<i>Rubus ellipticus</i>	Ainselu	Shrubs
4	<i>Quercus lanata</i>	Banjh (Oak)	Trees
5	<i>Bambusa nutans</i>	Bans	Trees
6	<i>Citrus grandis</i>	Bhogate	Trees

S.No.	Scientific Name	Local Name	Species
7	<i>Lagerstroemia Parviflora</i>	Bot Dhayaro	Trees
8	<i>Michelia Champaca</i>	Chanp	Trees
9	<i>Schima wallichii</i>	Chilaune	Trees
10	<i>Castanopsis indica</i>	Dhale Katus	Trees
11	<i>Colebrookea oppositifolia</i>	Dhasure	Shrubs
12	<i>Ficus neriifolia</i>	Dudhilo	Trees
13	<i>Centella asiatica</i>	Ghodtapre	Shrubs
14	<i>Pinus wallichiana</i>	Gobre Salla	Trees
15	<i>Rhododendran arboreum</i>	Gurans	Trees
16	<i>Myrica esculenta</i>	Kafal	Trees
17	<i>Machilus odoratissima</i>	Kaulo	Trees
18	<i>Sapium insigne</i>	Khirro	Trees
19	<i>Pinus roxburghii</i>	Khote Sallo	Trees
20	<i>Syzigium cerasoides</i>	Kyamun	Trees
21	<i>Duabanga grandiflora</i>	Laampate	Trees
22	<i>Mimosa pudica</i>	Lajavati	Shrubs
23	<i>Pyrus pashia</i>	Mayal	Trees
24	<i>Engelhardtia spicata</i>	Mahuwa	Trees
25	<i>Castanopsis tribuloides</i>	Musure Katus	Trees
26	<i>Ficus auriculata</i>	Nibaro	Trees
27	<i>Prunus cerafoids</i>	Paiyun	Trees
28	<i>Erythrina stricta</i>	Phaledo	Trees
29	<i>Ficus religiosa</i>	Pipal	Trees
30	<i>Shorea robusta</i>	Sal	Trees
31	<i>Origanum vulgare</i>	Sanjivani/Kadam	Shrubs
32	<i>Vitex negundo</i>	Simali	Shrubs
33	<i>Dalbergia sisoo</i>	Sisau	Trees
34	<i>Bauhinia vareigata</i>	Tanki	Trees
35	<i>Alnus nepalensis</i>	Uttis	Trees
36	<i>Ageratina adenophorum</i>	Vanmaara	Shrubs

Source: IEE Field Visit Survey, 2015

5.2.2 Fauna

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

Table 18 : Mammals of the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Felis Chaus/Prionailurus Bengalensis</i>	Jungle cat	Ban Dhade	LC
2	<i>Macaca Assamensis</i>	Assam Macaque	Bandar	NT*
3	<i>Prionailurus Bengalensis</i>	Leopard cat	Chari Bagh	LC
4	<i>Panthera Pardus</i>	Common Leopard	Chituwa	VU*
5	<i>Semnopithecus entellus</i>	Northern Plains Gray Langur	Dhedu	LC
6	<i>Hystrix Hodgsoni (Brachyura)</i>	Malayan Porcupine	Dumsi	LC
7	<i>Vulpes Bengalensis</i>	Bengal Fox	Fyauro	LC
8	<i>Naemorhedus Goral</i>	Himalayan Goral	Ghoral	NT*
9	<i>Lepus Nigricollis</i>	Indian hare	Kharayo	LC
10	<i>Funambulus Pennantii</i>	Five Stripped Palm Squirrel	Paanch Dharke Lokharke	LC

S. No.	Scientific Name	English Name	Local Name	Status
11	<i>Martes Flavigula</i>	Yellow Throated Marten	Malsapro	LC
12	<i>Gangetica Canis Aureus</i>	Golden Jackal	Syaal	LC

Source: IEE Field Visit Survey, 2015

144. Some of the birds reported in the forest areas are listed in Table 19. The status of these birds are as per IUCN & IBAT reports.

Table 19: List of Birds in the project area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Passer domesticus</i>	Sparrow	Bhangera	LC
2	<i>Streptopelia Tranquebarica</i>	Red Turtle Dove	Sano Tame Dhukur	LC
3	<i>Tyto Alba</i>	Common Barn Owl	Gothe Latokosero	LC
4	<i>Corvus Macrorhynchos</i>	Large Billed Crow	Kaalo Kaag	LC
5	<i>Lophura Leucomelanos</i>	Kalij Pheasant	Kalij	LC
6	<i>Eudynamys Scolopaceus</i>	Western (Asian)Koel	Koili	LC
7	<i>Gallus Gallus</i>	Red Jungle Fowl	Luiche	LC
8	<i>Pavo cristatus</i>	Indian Peafowl	Mayuri/Mujur	LC
9	<i>Arborophila Torqueola</i>	Hill Partridge	Piura	LC
10	<i>Gracula Religiosa</i>	Common Hill Myna	Sarung	LC

Source: IEE Field Visit Survey, 2015

145. The commonly found reptiles and amphibians observed in the project area are presented in Table 20. The status of these reptiles & amphibians are as per IUCN & IBAT reports.

Table 20: List of Reptiles and Amphibians Found in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Calotes versicular</i>	Garden lizard	Chheparo	LC
2	<i>T. albolabris</i>	Green Pit Viper	Haryau	LC
3	<i>Hemidactylus brookii</i>	Common lizard	Mausuli	LC
4	<i>Bufo melanostictus/Duttaphrynus Himalayanus</i>	Common toad	Bhyaguto	LC
5	<i>Rana cyanophylectis</i>	Stream Frog	Bhyaguto	LC*

Source: IEE Field Visit Survey, 2015

146. Similarly, the commonly found fishes in the project area are given in Table 21. These species are found in the nearby water bodies of the project area that includes Rambha Khola, Majh Khola, Chhebe Khola, Chhyap Khola and Kaule Khola. . The status of these fishes are as per IUCN & IBAT reports.

Table 21: List of Fishes Found in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Schizothoracichthys sp</i>	Trout	Asala	LC
2	<i>Barilius Vagra</i>	Vagra Baril	Faketa	LC
3	<i>Garra Annandalei</i>	Annandale Garra	Chuche Buduna	LC
4	<i>Glyptothorax Indicus</i>	Catfish	Mungri	LC
5	<i>Heteropneustes fossilis</i>	Stinging Catfish	Singhi	LC
6	<i>Nemacheilidae (Schistura Multifasciata)</i>	Stone Loach	Gadela	LC
7	<i>Psilorhynchus Pseudecheneis</i>	Stone Carp	Tite	LC
8	<i>Channa Gachua</i>	Dwarf Sankehead	Hile	LC

Source: IEE Field Visit Survey, 2015

5.2.3 Protected Area

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

5.2.4 Forest Area

148. There is no interference of the project area on the existing forest resources.

5.3 Socio-economic and Cultural Environment

5.3.1 Demographic Features

5.3.1.1 Settlement pattern

149. The settlement pattern of the project area is mixed type. The core bazaar area which is located in ward 1, 2 & 3 of former municipality is dense and populated. Most of the government & non government offices are located in this area. Hence, this area has the densest population of the service area. The settlement pattern of the bazaar area is dense with row of houses on the ridge. However, the settlement pattern of the other areas are scattered due to semi urban and rural in character. The settlement pattern is gradually changing and rural clusters are developing as market.

5.3.1.2 Population Distribution

150. As the area of the project town consists of the ward areas of all the thirteen former VDCs, the total population of historic 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 22: 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 & 2011

151. 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 rate in 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 from the insurgency.
152. 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.
153. As the social surveys have been carried out 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 Diktel Water Supply and Sanitation Subproject comprises partial ward area of 1, 2 & 3

of Rupakot Majhuwagadhi Municipality which belong to ward 1 to 5 & 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. The wardwise household number and population of the service area is given in the table given below:

Table 23: Households & Population of Beneficiaries

FormerWard (Diktel Municipality)	Present Ward Number Rupakot Majuwagadhi	HHS	Total Population
1	Partial Area of WN 1	258	197
2		466	329
3		180	133
4	Partial area of WN 2	77	54
5		63	61
9	Partial area of WN 3	5	5
Total		1049	782

Source: Socio-economic Survey 2015/016

5.3.2 Caste/Ethnic Groups

5.3.2.1 Ethnicity and caste

154. The composition of the community by caste/ethnic is heterogeneous. Therefore, the diversity of cultures, customs, traditions, norms, and values exists in the project area. The household survey of the subproject area also reflects the cross-section of major ethnic groups of the country.
155. The survey revealed that Brahmin/Chhetri are the major groups comprising of 56%(520) households in the service area. Similarly, Janajati/ethnic (Limbu, Magar, Rai, Sherpa, Tamang, Gurung, Newar,etc.) are the second largest group. It comprises 36% (334) of total household whereas, Dalits comprises 8% (76) of total households.

5.3.3 Economic Features

5.3.3.1 Economic Activities

156. The economy of the municipality is extensively agrarian although most of the households in the project area depend on more than one occupation. During the household survey of the project area, the detailed data has been collected regarding the major occupation and economic activities of each household of the project town. The survey shows that highest number of population, i.e., 51% are engaged in Agriculture, whereas 26.88% population depend on the business and

16 percent of the population are engaged in service. Similarly, about 4% and 1.51% of household head are dependent upon remittance and labour respectively. The survey also shows that the lowest (0.11%) of the households are engaged in industrial work.

157. The project area is popular for bamboo products (doko, nanglo, bhakari, mandra, dala). The main agricultural crops of the project town are Potato, Ginger, Citrus and Other Cereal Crops.
158. The existing financial institutions are Bank of Kathmandu, Agriculture Development Bank, Baijya Bank etc. and various cooperatives.

5.3.3.2 Monthly Income Details

159. The survey revealed that main sources of household income of the service area are agriculture, service, remittance and wage labour, respectively. Among the total household, 6.3 % have a monthly income of more than Rs. 7,501-10,876 and about 40 % of household have a monthly income of Rs. 10,876-20,000. Likewise, 45% of households are earning Rs. 20,001-50,000. Likewise, 3.7% households are earning more than Rs.50,000 per month. The study shows that only 4.8% of 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 are given in the following table.

Table 24: Monthly 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
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 2015/16

5.3.3.3 Monthly Expenditure Details

160. The survey revealed that main sources of household income of the service area are agriculture, service, remittance and wage labour, respectively. Among the total household, 6.3 percent have monthly income of more than Rs. 7,501- 10,876, about 40 % of household have monthly income 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 falls under poor category as they are only earning less than Rs 7,500 per month. The monthly income of HHs in the service area is given in the table below.

Table 25: Monthly Expenditure Level of Households by Ward

S.N.	Monthly Expenditure	Ward No. of Former Municipality						Total	%
		1	2	3	4	5	9		
1	< Rs.7,500	28	49	9	14	14	1	115	12.36
2	Rs.7,501-10,875	116	170	112	46	17	2	463	49.78
3	Rs.10,876-20,000	56	118	35	5	17	2	233	25.05
4	Rs.20,001-50,000	36	58	13	2	8	0	117	12.58
5	>Rs.50,000	0	1	1	0	0	0	2	0.21
	Grand Total	236	396	170	67	56	5	930	100

Source: Socio-economic survey 2015/16

5.3.3.4 Willingness to Pay

a) Monthly Water Tariff

161. The sampled survey was carried out to observe the response of the community revealed that community towards the willingness to pay for monthly water tariff. As per the findings, more than 25.6% of total 43 sampled households prefer to pay monthly water tariff in the range from Rs. 151 to 200 whereas about 11.6% of 43 households prefer to pay in the tariff range from Rs. 201-250. Similarly, 2% of household are willing to pay between Rs. 251-300 per month. Likewise, about 60.5% of household are willing to pay more than Rs.500. This indicates positive response towards the willingness to pay for monthly water tariff.

b) Up-front Cash Contribution

162. As per the survey, all household(100%) have shown willingness to pay 5% up-front cash contribution for proposed town water supply and Sanitation project. It shows that all the HHs are ready to contribute required upfront cash so far.

5.3.3.5 Affordability

163. The study has also assessed affordability of community in terms of monthly income level for expense on water supply & sanitation service. Hence, assessing the income level of households, more than 95 % of household can afford monthly water tariff and contribute for up front cash. Hence, affordability of the community has been observed as encouraging and positive towards the program.

5.3.4 Education & Skills

164. The institutional data shows that there are 9 educational institutions including one diploma level college as well as 8 schools with primary to secondary level in the service area with 6,112 people including students, staffs and teachers. The study also shows that most of the educational institutions are depending on both tap and springs water source.
165. The survey also revealed that about 3.2% (30) of households head are illiterate. Whereas, just literate ratio is 73% (679) and those having qualification from primary to Masters are 23.8% (221).

5.3.5 Health and sanitation

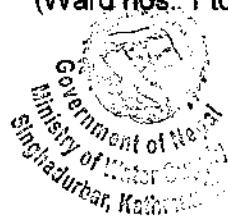
166. Medical facilities for diagnosis and treatments are available in the service area. There is one district hospital with 15 bed capacities & 32 staffs. Similarly, some polyclinics, pharmaceutical stores and medical shops are also available in Diktel Bazaar area.
167. The survey revealed that cases of waterborne diseases such as diarrhea, dysentery, stomach aches and skin disease etc. are found to be very few. Similarly, cases of mortality by water related diseases are nil. Visits to hospital and health posts within the service area crosschecked the information related to water borne and communicable diseases. According to the survey, about 8.50% suffered from diarrhea where as 5.60% were suffered from dysentery. Similarly, about 5.19% suffered from other diseases such as skin diseases, stomach pains, fever etc.

5.3.6 Community Infrastructure

5.3.6.4 Existing Drinking Water Condition

a) Existing Water Supply

168. 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 part of ward no. 1 to 3 of the Rupakot Majuwagadhi Municipality (Ward nos. 1 to 5 of the former Diktel Municipality).



[Signature]
Engineer

b) Source Description

169. Rambha Khola and Majh Khola are two water sources supplying the existing system. All these sources are registered at the District Water Resources Committee as per Water Resource Act, 2049. The details of the existing sources are illustrated in the following table.

Table 26 : Existing Source Details

Particulars	Source 1	Source 2
Name of the Source	Rambha 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

Source: Detailed Engineering Design Report, 2018

170. There is no dispute regarding the use of the existing water sources as these sources Rambha Khola and Majh Khola are on public land. These sources were protected by barbed wire fencing and most of the catchment areas of these sources are covered with vegetated forests.

c) Transmission Lines, Distribution Lines and Storage Capacity

171. The transmission lines of the existing water supply system 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 Rambha and Majh Khola are about 5.4 and 4.6 km, respectively.
172. 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.
173. 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. The table given below gives details on existing storage reservoir details:

Table 27: Existing Storage Reservoir Details

Location	Type of structure	Capacity	Remarks
Diktel	Stone Masonry (3Nos.)	300 Cu.m.	Very old
Diktel	Ferro cement (4 Nos.)	@20 Cu.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: Detailed Engineering Design Report, 2018

174. The different types of reservoirs are situated in safe locations on public land. The ownership of the lands have acquired by WUSC. The stone masonry reservoir, situated in Diktel bazaar, is very old and needs rehabilitation or replacement. Other ferro-cement tanks are in good condition.
175. 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.

d) Coverage

176. About 700 private and 50 community taps have been connected to the existing distribution system to serve the population of more than 5000 in the Diktel Bazaar town area. More than 500 households have already applied for tap connections but due to insufficient discharges available for tapping the available local sources, the tapped discharge is not sufficient to meet the water demand of the Diktel Bazaar area.

e) Service Level and Consumption

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

f) Water Quality

178. During the survey, the respondents were asked in term of existing water quality in the project area. The survey revealed that about 0.4% of respondent feel as good quality where as almost of household head 99% feel satisfactory or moderate in term of water quality. The existing system carry out occasional disinfection (use of 3-5 kg bleaching powder once in a month during the rainy season). Water samples

collected from the sampled sources were tested for various physical, chemical and bacteriological parameters.

g) Operation Costs & Tariff

179. 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. Diktel Bazaar WUSC, Khotang, has adopted the tariff system as mentioned in the following given table:

Table 28: Existing Tariff Structure

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

Source: Detailed Engineering Design Report, 2018

h) Problems of the existing system

180. The existing system is not able to meet the water demand, supply is intermittent, and the supplied water is of poor quality. The major problems of the existing system are presented below:
- The existing system is 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 more acute 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 supplied 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 in terms of its design and construction.

5.3.6.2 Existing Sanitation Situation

a) Sanitation Facilities

181. The survey shows that most of the household have household latrine facilities within the project area. About 99.6 % (926) of households have latrine facilities, and only 0.4% (4) does not have latrines in their house.
182. The survey shows that about 44.6% (415) of 930 households have pour flush latrine whereas 45.6% (423) of 930 households have ventilated pit latrine. About 9.5% (88) have pit latrines whereas no households have cisterns flush type of pit latrine as shown in the table given below.

Table 29: Type of Toilets in use in Project Area

Type of Toilet	Ward						Grand Total	%
	1	2	3	4	5	9		
No Toilet	1			3			4	0.4
Pit Latrine	35	36	4	9	3	1	88	9.5
Ventilated Pit Latrine	145	256	7	2	13		423	45.6
Water Seal/Pour Flush	55	103	159	54	40	4	415	44.6
Cestern Flus								0.0
Grand Total	236	396	170	67	56	5	930	100

Source: Socio-economic Survey, 2015/016

b) Drainage Facilities

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

c) Wastewater Management Practices

184. There is no sewerage system in the project area. Wastewater from individual is managed inside the houses/premises. The socio economic survey conducted in 2016 shows that 97.1% of 930 HHs have their own toilet. 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 to pay for it.

d) Solid Waste

185. The major sources of waste generation in the project town are households, hotels, hospital, market areas, meat stores, groceries, clothing/ fancy stores/tailors etc.

The survey revealed that 95% of households are disposing domestic solid waste in pits near to the house 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 public health and the surrounding environment. The details on the practice of disposal of solid waste is given in the following table. These details will help to decide the methods of solid waste disposal during construction phase.

Table 30: Solid Waste Management Practice

S.N.	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, 2015/016

e) ODF Situation in Service Area

186. Rupakot Majhuwagadhi Municipality has already been declared as Open Defecation Free (ODF) area. This indicates that people of the project town are quite aware about safe sanitation activities.

5.3.6.3 Local Institutions

a) Existing Institutional Situation

187. The main institutions involved in water supply and sanitation sector in the project area is Diktel Bazaar Water Supply & Sanitation Committee (Previously registered as Rambha Khola Majh Khola Small Town Water Supply & Sanitation User's Committee), Khotang and Water Supply Sanitation Division Office (WSSDO), Khotang. WSSDO, Khotang has been actively supporting the WUSC to operate the existing water supply system and carry out different 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.

b) Water Supply and Sanitation User's Association

188. The WUSC has been registered in Water Resource Committee, Khotang in 2054 B.S. as per the Water Resource Act-2049 and Water Resource Rules, 2050.

The certificate of the registration is included in **Annex 3**. The WUSC is involved in management and improvement of the water supply system in Diktel Bazaar. Similarly, the renewal of WUSC and annual general meeting has been carrying out regularly.

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

Table 31: Members of Diktel Bazaar Water Supply and Sanitation Users Committee

S.N.	Name	Position
1	Mr. Gajurman Rai	Chairperson
2	Mr. Dhan Kumar Joshi	Vice Chairperson
3	Ms. Prabha Rai	Secretary
4	Mr. Navaraj Joshi	Treasurer
5	Mr. Chatra Kumar Bajimay	Member
6	Mr. Rajendra Kumar Shrestha	Member
7	Mr. Krishna Prasad Acharya	Member
8	Ms. Binita Shrestha	Member
9	Ms. Nirmala Acharya	Member

Source: Socio-economic survey, 2015/016

6. ANALYSIS OF ALTERNATIVES

6.1 With- and Without-Project Alternatives

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

6.1.1 Without-project' or 'do-nothing' alternative

191. "Without Project" or "Do-nothing" Alternative carried out study on the existing water supply system to analyze the condition of the project town in the absence of the proposed project.
192. The study shows that the residents of the project area are consuming either untreated or partially treated water from the existing water supply system. Though there are not any evidence of impacts of untreated water on the lives of local people at present situation, there is possibility of incidence of water-borne diseases in the future due to continuous consumption of unsafe and untreated water. This will result in the health hazards in the project area that will in turn expose the surroundings to environmental problems.
193. The existing water supply system in the project area is intermittent and is not able to meet the increasing demands of the increasing population of the project area. Insufficient water supply will compel them to control the use of water for various purposes even for sanitation practices. Lack of water in the sanitation practices like flushing of water after use of latrine, bathing, washing clothes etc. will demote the domestic hygiene of the project area. This may pose outbreak of diseases like Typhoid, Cholera, Dysentery etc. This may in turn result in various environmental problems.
194. 'Without Subproject' or 'Do-Nothing' alternative will toughen the chance of the occurrence of the abovementioned threats to the environment of the project area. Without subproject, people of the project area will continue to consume the partially treated or untreated water from the existing water supply system. This may increase the risk of bacterial infection resulting health issues that will obviously have impact on public health, animal health and the health of the

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ecosystems. Similarly, 'Do-Nothing' alternative will constrain the locals to be content with the intermittent water supply service.

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

6.1.2 With Project Alternative

197. With Project Alternative was also analyzed by envisaging the likely benefits of the proposed project. The analysis shows that the proposed project is designed to provide convenient access to reliable, adequate, safe and potable water supply to 8,063 populations as per base year 2018 A.D. There is provision of water treatment system in this project which will ensure the balanced health condition of the people of the project area through consumption of well-treated drinking water. Similarly, the adequate supply of water will encourage people to use water generously for sanitation practice ensuring good hygiene of the people. The study also shows that there is provision of intermittent water supply system to the public while for government offices, it is continuous system. This partiality makes the existing system unreliable. This unreliability will be overcome by the proposed project through 24 hours water supply to each household as well as other

institutional bodies. Hence, in overall, the 'with subproject alternative' will result in the improved public health and living environment that will contribute to improved quality of life in the project municipality.

198. Hence, the 'with project' alternative will contribute to the realization of the Updated 15-Yr Development Plan for Small Towns Water Supply & Sanitation Sector, compliance with the fundamental right related to health as guaranteed in Constitution of Nepal (Article 35), fulfillment of Goal of National Urban Water Supply & Sanitation Sector Policy, 2009 (Final Draft) and the delivery of Nepal's commitment to SDG 6.
199. Along with this, the limitation of "Without Project" Alternatives regarding continuous water supply system, treatment system and susceptibility to water borne diseases leads to opt for "With Project" Alternative. The proposed sub project will be the best alternative to overcome the aforementioned threats that is likely to occur in the absence of this subproject. This "With Project" Alternative also involves analysis of alternatives to assess the most cost-effective, reliable and efficient system that can serve the design population. The alternatives regarding "With Project" Alternative is described in detail in the following section.

6.1.2.1 Alternatives Relative to Planning and Design

200. As per Feasibility Study Report by PPTA team, the system design for the town has been done under two scenarios. The optimization of a proposed water supply system can be done regarding system layout, alternative technology, alternative materials and alternative source. In case of Diktel WSSP, the development of system alternatives has been done using alternate system layouts keeping other parameters constant.

i) Alternative Sources

201. The environmental factors of the water source will also help to choose the best alternative source to be adopted for any proposed project. These factors include Possibility of Source Depletion, Location of source, Susceptibility of source to the erosion etc. Regarding this proposed project, there are various alternative sources available in the nearby vicinity to meet the overall demand for this project. As per feasibility report, use of existing sources has been proposed to integrate the existing system to the proposed system. The detailed design report shows that the

cumulative discharge of the existing sources is about 8 lps only which is not sufficient for the proposed project and requires additional discharge from new sources. As per alternative analysis, two alternatives have been used.

202. The first alternative considers the use of existing sources (3.5 lps from Majh Khola and 4.5 lps from Rambha Khola) and tapping new sources (5 lps from Kaule Khola). The system has been designed as a gravity system in which water from all these sources is conveyed to the WTP under gravity.
203. The second alternative considers the use of existing sources as in the first alternative (3.5 lps from Majh Khola and 4.5 lps from Rambha Khola) and tapping new sources (6 lps from Chhebe Khola near Triveni Ghat) by pumping system.
204. All the sources proposed in both alternatives are environmentally safe.

ii) Alternative Design

205. The environmental issues can be a deciding factor to choose the best alternative design among the list of alternatives. The design of both proposed alternatives is environmentally sound. There is no such difference among the proposed alternatives. The main difference is in use of different sources with different intakes, water treatment facilities, transmission pipelines and allied structures for the transmission system.

iii) Selected Alternative Scheme

206. The first alternative (Alternative I) is a gravity system while the second alternative (Alternative II) comprises of pumping system from intake to Diktel Bazaar as the proposed source Chhebe Khola is located at lower elevation (1201m). Technically both alternatives are feasible. Environmentally, they are not much different and both of the alternatives have no such environmental issues too. Socially, both alternatives are on equal footing.
207. The financial analysis of these two alternatives have been carried out. The analysis shows that the proposed water tariffs are affordable and fall below 5% of the monthly income for all income categories in Alternative I. But, in Alternative II, the monthly tariffs are not affordable in all income categories. This indicates that the Alternative II is unfeasible option for the project town as per financial assessment. Hence, Alternative I has been selected as the best feasible alternative

as this alternative is technically, environmentally and financially feasible. The comparison of these two alternatives have been presented in the table given below which provides the basis of selection of best alternative:

Table 32: Cost Comparisons of Various Alternatives Based on Feasibility Report

S.N.	Particulars	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	Remarks	Feasible Alternative	

Source: Detailed Engineering Design Report, 2018

7. ANTICIPATED ENVIRONMENTAL IMPACTS

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

7.1 Beneficial Impacts

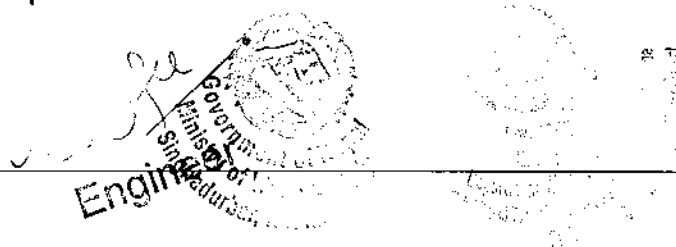
209. The development of water and sanitation facilities will have numerous beneficial impacts on individuals as well as to the entire community. Availability of clean and adequate drinking water and sanitary facility are basic human needs. Also, any development efforts aimed at improving water and sanitation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

7.1.1 Impact on Socio-economic Environment

7.1.1.1 Construction Phase

a) Employment Generation

210. The project will generate direct employment opportunities to the local people of the project area. The construction activities of the proposed project will offer the locals a grand opportunity to be engaged in the proposed project activities as either v skilled or non-skilled workers in terms of their proficiency. The main target group for this benefit is People relying on daily wages. The socioeconomic survey shows that 1.51% of total households have to rely on daily wages. Hence, this project will be beneficial to this 1.51% of total households. The amount of money earned by the local people will somehow increase the local economy thereby reducing the chances of seasonal migration of the local people depending upon daily wages works to survive. To augment such benefits, priority will be given to employing local laborers as far as possible.



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

b) Skill Enhancement

211. The construction of the project will not only provide direct employment opportunities but also ensure the transfer of skills and technical proficiency to the local workforce. The project activities such as construction of treatment plant, valve chambers, buildings etc. will provide transferable skills. In future, these skills will be a plus point for the locals in any relevant work as such. Such benefit will be augmented by making a proper work plan and code of conduct during the construction period. Hence, this benefit is targetted to the local people relying on daily wages and those to be involved in labor works of this proposed project.

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

c) Local trade and business opportunity

212. The proposed project will directly add in building business opportunity within the area. As construction work involves a lot of human resources, some shops about food items and, agriculture and livestock product will gain a momentum in the vicinity of the construction site. This will boost the local trade and business sector. The main target group for this beneficial impact is local people involved in local business sector. The socioeconomic survey shows that about 26.88% of total households are involved in business. Hence, the enhancement of local trade & business opportunity will be fruitful to these people.

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

7.1.1.2 Operation Phase

a) Improved health and hygiene

213. Deteriorating water quality and unsanitary conditions are often the causes of waterborne communicable diseases. The socioeconomic survey revealed that the cases of waterborne diseases such as diarrhoea, dysentery, stomach ache and skin disease etc. are found very few in numbers. Similarly, cases of mortality by water related diseases are nil. However, it is not certain that this condition will be well maintained in the future too. The provision of water treatment plant under the proposed project components will provide solution to this uncertainty. After the

implementation of the project, easy access to safe & potable water will maintain the health & hygiene of the local people. This will also help to reduce the chance of occurrence of water-borne communicable diseases within the project area in the future. This will also help them in bringing a decrease in medical expenses that may require to be incurred if any incidence of water borne diseases is observed. To enhance such benefits, the regular maintenance of the water supply and sanitation components should be done so that the project operates smoothly and the benefits are intact. As this proposed project aims to provide safe, reliable & potable drinking water to the proposed service area of the project town, the main target group of this beneficial impact will be beneficiaries or people residing in the service area of this proposed project.

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

b) Increased economic opportunity

214. After the completion of the project there is a possibility of migration of people from rural areas towards the town due to reliable water supply facilities and transcend opportunities. The increased economic level will add great value to the land thereby uplifting their economic status. These benefits can be maximized by ensuring regular maintenance of the water supply and sanitation components and by promoting land development activities in the area. The main target group for this beneficial impact will be people of the service area involved in business & industry.

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

c) Social Empowerment

215. Social Empowerment refers to the process of self empowerment enabling to overcome the sense of powerlessness in the society. This covers Gender Equity, Women's Participation and Social Inclusion. The proposed project will be able to enhance this social empowerment through easy access to safe & potable water and through various capacity building programs. Gender Inequality that is still prevailing within the project town is expected to be eliminated through the implementation of the proposed project.

216. As per the sampled household survey carried out in 2015/016, 91.1% of female are observed to be involved in water fetching & storage while only 56.33% of male are said to be involved in this activity. This indicates that women are highly responsible for fetching water in comparison to the men. As the proposed project aims to provide water supply service to each household, easy access to safe & potable water through the implementation of this proposed project will contribute towards their betterment. It is because the time that may be spent for fetching water will be saved and could be utilized in various other activities. The improved water supply system will contribute towards their better health and hygiene through the provision of safe & potable water. This will in turn ensure the maintenance of health & hygiene of other family members as the sampled survey also shows that 80.4% of female are involved in taking care of family members especially children and senior citizens.
217. The proposed project also encourages women participation in the project related activities by enforcing at least two women in water user's committee. As per the Table 20 given above, two female members are appointed as general member of Diktel Bazaar Users and Sanitation Committee. This will allow them to involve in decision making process.
218. The proposed project also expects to enhance the condition of underprivileged people (Dalits & Poor People). There is no provision of water supply service to each household in the existing water supply system. Hence, Dalits & poor people are deprived of water supply service. But, the proposed project has considered each and every household of the proposed service area. Hence, this proposed project has also prioritized Social Inclusion.

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

219. Overall, the Project will lead to enhanced public health and urban environment, significantly contributing to the improvement in the quality of life of Rupakot Majhuwagadhi Municipality residents.
220. To sustain the positive outcomes, effective operation, and maintenance guided by an O&M manual that contains Water Safety Guide, among others, is essential. Continuing hands-on training of WUSC in EMP implementation particularly water

quality monitoring is necessary. The summary of impact matrix of beneficial issues of the project is given in Table 33.

Table 33: Summary of Impact Matrix of Beneficial Issues of the project

Beneficial Impacts	Impact Rating				
	Nature	Magnitude	Extent	Duration	Rating
Construction Phase					
Employment Generation	D	H (60)	L (20)	ST (5)	Very Significant (85)
Skill Enhancement	ID	M (20)	L (20)	LT (20)	Very Significant (80)
Local Trade and Business	D	M (20)	L (20)	LT (20)	Very Significant (80)
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)	Very Significant (80)
Women empowerment	ID	L (10)	L (20)	LT (20)	Significant (50)

Source: IEE Field Study, 2015

Note: Scoring is done based on following;

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

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

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

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

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

Significance of Impact

Total Score: More than 75 : Very Significant

50-75 : Significant

Less than 50 : Insignificant

7.2 Adverse Impacts

7.2.1 Impact on Physical Environment

7.2.1.1 Design Phase

a) Soil Erosion & Slope Instability

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

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

7.2.1.2 Construction Phase

a) Erosion & land surface disturbance

222. Excavation and digging of trenches during construction has the potential to cause erosion and cave in thereby causing soil erosion, silt runoff and unsettling of street surfaces. as the bazaar area lies on the top of the hills. Unorganized disposal of the excavated earth can disturb the street surface and decrease the value of the area where it is disposed. The activity as such will be a discomfort to the road users and inhabitants.
223. Similarly, the construction of Internal Access Road will result in Slope Instability and Landslides due to site clearance and earthwork excavation works. However, its impact will not be significant as minimal length i.e., 500m for this approach road has been proposed

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

b) Spoil Disposal

224. Inappropriate disposal of spoils from the construction activities may result in gully and erosion of spoil tips especially when it is combined with unmanaged surface water runoff. This leads to destruction of vegetations, damage to agricultural lands and destruction to property at downhill through direct deposition.

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

c) Air Pollution

225. There will be greater impact on air quality from the inadequately managed or haphazard project activities that includes: (i) earthworks such as clearing, grubbing, excavations, and drilling especially during dry seasons; (ii) demolition works; (iii) stockpiling of natural aggregates, excavated materials and spoils; (iii) transport, loading and unloading of natural aggregates; (iv) movement of construction-associated vehicles; (v) on-site rock crushing and concrete mixing; (vi) burning of firewoods for cooking & heating in work and labour camps and (vii) open burning of solid waste by workers.
226. These activities may increase dust, carbon, monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons in the air.

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

d) Noise

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

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

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

228. During construction phase, generation of solid waste & waste water from the construction sites and workers camp are likely to create nuisance in the surroundings. Soil runoff from the construction site may lead to off-site contamination (particularly during rainy season). Similarly, Improper disposal of construction debris may lead to off-site contamination of water resources. Unmanaged solid waste & effluent from workers camp may contaminate the surroundings. It is not possible to avoid this impact, however, it is not impossible too if provisions are envisioned with regular & proper monitoring activities.

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

f) Accidental Leakage or Spillage of Stored Fuel/Chemicals

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

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

g) Impact on Land Use Pattern

230. The construction of the proposed project components will occupy significant area of the land within the core area. This will affect the current land use pattern as the land to be used for the construction of these components could be used for other purposes like agricultural, residential etc. This effect will be direct in nature.
231. As the construction works of the proposed water supply project start, there will be possibility of influx of people from the nearby areas of the project town to this project town. This will in turn increase the population of the project area which may lead towards change in land use pattern but in haphazard manner. Arable land may be converted to settlement areas. Unstable land may also be used for planned areas. Hapazard cutting of sloped areas may be done to increase settlement areas. The unmanageable land is the main reason behind the destruction of the environment. The effect will be indirect in nature.

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

h) Disruption to Natural Drainage

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

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

i) Haphazard Disposal of Dismantled Debris

233. The proposed project also involves dismantling activities for rehabilitation of existing intakes, for pipe laying works and other miscellaneous works. This will result in the generation of dismantled debris.
234. Similarly, after the completion of construction works, the temporary facilities like labour camps, stockpiling sites, temporary toilets etc. needs to be dismantled immediately. The dismantled properties in the form of debris if not properly and instantly disposed off, may create nuisance in the surroundings. This may degrade the environmental quality.

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

7.2.2 Impact on Biological Environment

7.2.2.1 Construction Phase

a) Impacts on Flora and Fauna

235. The construction activities may affect the nearby flora & fauna, however, the effect may be insignificant. Similarly, there is no requirement of cutting trees except clearing of some bushes and shrubs. Similarly, during pipe laying works, some of the top soil may be lost.
236. The construction of Internal Access Road will also have impact on flora through certain loss of vegetation due to clearing activities.
237. Haphazard site clearing, parking, movement of construction vehicles, use of various equipments, stockpiling, illegal harvesting of forest resources as fuel (NTFP) for cooking by workers and hunting of animals by workers will result in unnecessary loss of vegetation & fauna beyond Project footprints.

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

b) Impacts on Aquatic Life

238. During construction phase, nearby water bodies may be used by the workers for their daily activities like waste disposal, sanitation activities which may pollute the river quality which in turn lead the habitat of aquatic life towards risk.
239. Similarly, the construction works for the proposed Intake on the bank of Kaule Khola and for WTP near Thapagaon Nigale and the rehabilitation works of the existing intakes at Rambha Khola & Majh Khola may also contaminate the river quality affecting aquatic habitat.

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

7.2.2.1 Operation Phase

a) Impacts on Aquatic Life

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

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

7.2.3 Impact on Chemical Environment

7.2.3.1 Construction Phase

a) Impacts on Water Quality of the nearby rivers

241. During construction phase, there is high possibility of nearby rivers like Chhyap Khola, Rambha Khola, Majh Khola, Kaule Khola, Chhebe Khola and various other rivulets to be polluted due to the chance of disposal of solid wastes by the workers and poor sanitation behavior of the workers. This will lower the water quality of those water bodies. Polluted water bodies will be detrimental to aquatic life as well as to the health of people relying mainly on the river and streams as sources of water for drinking and other domestic uses.

242. Similarly, some sections of the distribution pipeline will cross small water bodies, exposing these resources to risks of pollution caused by poorly managed construction sediments, wastes and hazardous substances.

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

7.2.3.2 Operation Phase

a) Impacts on Quality of Water Stored in Reservoir

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

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

b) Impacts on Water Bodies

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

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

7.2.4 Impact on Socio-economic Environment

7.2.4.1 Design Phase

a) Structural Instability

245. Cracking of structure leads to facility failure and public discomfort due to construction of water supply components in high earthquake zones. Though this impact will be experienced during operation phase, this should be considered

during design phase so that such possibility of structural failure can be reduced to greater extent.

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

b) Poor Disposal of Sludge from Reservoirs & Treatment Plants

246. During design phase, if proper place for disposal site for the sludge from the reservoirs & treatment plants is not considered then, there is possibility of generation of nuisances to the surroundings.

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

c) Health & Safety of Community & Workers

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

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

d) Damage to the existing utilities

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

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

7.2.4.2 Construction Phase

a) Community health and safety hazards

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

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

b) Workers' Health and Safety Hazards

250. Workers will also be exposed to the cross-cutting threats of the impacts above during construction. Inadequate supply of safe/potable water and inadequate sanitation facilities; poor sanitation practices on site; poor housing conditions; the handling and operation of construction equipment; handling of hazardous substances; exposure to extreme weather and non-observance of health and safety measures, pose additional threats to the health and safety of construction workers. Construction workers may also be potentially exposed to communicable and transmittable diseases in the community and the workforce.

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

c) Traffic Congestion

251. The core Diktel bazaar area may be susceptible to traffic congestion during pipeline laying works that may provide discomfort to the passer-by & shopkeepers and may obstruct the daily activities of the people living in that area .

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

d) Disruption to Local Vendor's Business

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

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

e) Mobilization of Child Labor

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

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

f) Impacts on the Sustainability of Works

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

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

g) Damage to the existing utilities

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

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

7.2.4.3 OperationPhase

a) Occupational Health and Safety Hazards

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

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

b) Delivery of Unsafe Water

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

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

c) Impacts on Consumer's Health

258. Irregularity in the supervision of the operation of distribution system may lead to excessive algae growth in service reservoir which may produce toxins causing

serious illness in humans consuming water. The algal growth may also impart earthy taste & odor which may create dismay to the consumers and this may result in customer complaints.

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

d) Non-sustainability of Services or Completed Works

259. This issue will arise with the Operator's disregard of the impacts of the following during operation: (i) climate change-induced drought; and (ii) seismic events.

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

The summary of impact matrix of adverse issues of the project is given in Table 34.

Table 34: Summary of Impact Matrix of Adverse Issues of the Proposed Project

Adverse Issues	Impact Rating				
	Nature	Magnitude	Extent	Duration	Rating
A) Impacts on Physical Environment					
i) Design Phase					
Soil Erosion & Slope Instability	D	M (20)	L (20)	ST (5)	Insignificant (45)
ii) Construction Phase					
Soil Erosion & Land Surface Disturbance	D	M (20)	L (20)	ST (5)	Insignificant (45)
Spoil Disposal	D	M (20)	L (20)	ST (5)	Insignificant (45)
Air Pollution	ID	M (20)	R (60)	ST (5)	Very Significant (85)
Noise	D	H (60)	L (20)	ST (5)	Very Significant (85)
Generation of Solid Waste & Wastewater from the construction site & worker's camp	D	M (20)	L (20)	LT (20)	Significant (60)
Accidental Leakage or Spillage of Stored Fuel/Chemicals	D	M (20)	L (20)	LT (20)	Significant (60)
Impact on Land Use Pattern	D & ID	M (20)	L (20)	LT (20)	Significant (60)
Disruption to Natural Drainage	D	M (20)	L (20)	LT (20)	Significant (60)
Haphazard Disposal of Dismantled Debris	D	M (20)	L (20)	LT (20)	Significant (60)
B) Impacts on Biological Environment					

Engineer

Adverse Issues	Impact Rating				
	Nature	Magnitude	Extent	Duration	Rating
I) Construction Phase					
Impacts on Flora and Fauna	D	M (20)	L (20)	ST (5)	Insignificant (45)
Impacts on Aquatic Life	D	M (20)	L (20)	ST (5)	Insignificant (45)
ii) Operation Phase					
Impacts on Aquatic Life	D	M (20)	L (20)	LT (20)	Significant (60)
C) Impacts on Chemical Environment					
i) Construction Phase					
Impacts on Water Quality of the nearby rivers	D	M (20)	R (60)	ST (5)	Very Significant (85)
ii) Operation Phase					
Impacts on Quality of Water Stored in the reservoir	D	M (20)	L (20)	ST (5)	Insignificant (45)
Impact on Water Bodies	D	M (20)	L (20)	LT (20)	Significant (60)
D) Impacts on Socio-economic Environment					
i) Design Phase					
Structural Instability	ID	M (20)	L (20)	LT (20)	Significant (60)
Poor Disposal of Sludge from Reservoirs & Treatment Plants	ID	M (20)	L (20)	LT (20)	Significant (60)
Health & Safety of Community & Workers	ID	M (20)	L (20)	LT (20)	Significant (60)
Damage to the existing facilities & False Claims by the people	D	M (20)	L (20)	ST (5)	Insignificant (45)
ii) Construction Phase					
Community Health and Safety Hazards	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Workers' Health and Safety Hazards	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Traffic Congestion	D	M (20)	L (20)	ST (5)	Insignificant (45)
Disruption to local vendor's business	D	M (20)	L (20)	ST (5)	Insignificant (45)
Mobilization of Child Labor	ID	M (20)	L (20)	LT (20)	Significant (60)
Impacts on the sustainability of works	D	H (60)	L (20)	ST (5)	Very significant (85)
Damage to the existing facilities	D	M (20)	L (20)	ST (5)	Insignificant (45)
iii) Operation Phase					
Occupation Health and Safety Hazards	ID	M (20)	L (20)	LT (20)	Significant (60)
Delivery of Unsafe Water	D	M (20)	L (20)	LT (20)	Significant (60)
Impacts on Consumer's Health	D	M (20)	L (20)	ST (5)	Insignificant (45)
Non Sustainability of Services or Completed Works	ID	M (20)	L (20)	LT (20)	Significant (60)

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Source: IEE Field Study, 2015

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

260. The above given table shows that *Air Pollution, Noise Pollution, Impacts on Water Quality of nearby rivers and Impact on Sustainability of Works* are evaluated as "Very Significant". However, if the mitigation measures for these impacts are properly adopted, these impacts would not be problematic for the project implementation. Apart of this, the Table 34 also shows that some impacts are insignificant & some are significant. The best way to avoid these impacts is to follow the appropriate mitigation measures and to implement them effectively. The proposed mitigation measures of each of the above mentioned adverse impacts are discussed in detail in the Chapter 8.

8. MITIGATION & AUGMENTATION MEASURES

8.1 Impact on Physical Environment

8.1.1 Design Phase

a) Soil Erosion & Slope Instability

261. The mitigation measures can be as follows;

- Incorporate measures and sites for handling excessive spoil materials
- Incorporate drainage plan in final design

PMO, RMO & DSMC are the main responsible bodies to carry out the above mentioned mitigation measures

8.1.2 Construction Phase

a) Erosion & land surface disturbance

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

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

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

b) Spoil Disposal

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

- Follow Spoil Management Plan as included in **Annex 2E**.
- Use of excess Spoil or Soil for filling depressed areas or borrow pits wherever possible.
- Appropriate disposal of Spoil at the designated places.

- Spoils should not be disposed on natural drainage paths, canals and other infrastructures.
- Provision of toe walls and retaining walls to protect the erosion of disposed spoils.
- Provision of proper drainage, vegetation and adequate protection against erosion at the Spoil Disposal Site.

c) Air Pollution

265. The measures to mitigate the impacts on air quality include: (i) confining earthworks according to an Excavation Segmentation Plan that should be part of EMP; (ii) watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, as necessary; (iii) if re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces; (iv) during demolition, watering of exterior surfaces, unpaved ground in the immediate vicinity and demolition debris; (v) signage at active work sites in populated areas; (vi) requiring trucks delivering aggregates and cement to have tarpaulin cover; (vii) limiting speed of construction vehicles in access roads and work sites to a maximum of 30 kph; (viii) Strict Prohibition of open burning of solid waste by the workers; (ix) Use of Vehicles complying with NVMES,2069, (x) Use of equipments/machinery that comply with applicable emission standards of GoN i.e.,NAAQS,2012, (xi) Use of Diesel Generators complying with National Diesel Generator Emission Standard,2012 and (x) Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking by the concerned contractor.

d) Noise Pollution

266. The measures to mitigate the noise pollution include: (i) using equipment that emits the least noise, well-maintained and with efficient mufflers; (ii) restricting noisy activities to daytime and overtime work to avoid using noisy equipment; (iii) limit engine idling to a maximum of 5 minutes; (iv) spread out the schedule of material, spoil and waste transport; (v) minimizing drop heights when loading and unloading coarse aggregates; (vi) Use of Vehicles complying with NVMES,2069 B.S.; (vii) Use of equipments/machinery that comply with applicable emission standards of GoN i.e., National Noise Standard Guidelines, 2012; and (viii) Use of

Diesel Generators complying with National Diesel Generator Emission Standard,2012

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

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

Construction Wastes:

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

Solid Wastes & Effluent from Worker's Camp:

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

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

f) Accidental Leakage or Spillage of Stored Fuel/Chemicals

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

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

g) Impact on Land Use Pattern

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

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

h) Disruption to Natural Drainage

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

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

i) Haphazard Disposal of Dismantled Debris

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

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

8.2 Impact on Biological Environment

8.2.1 Construction Phase

a) Impacts on Flora & Fauna

272. The mitigation measures for this impact include:

- (i) Replace the excavated top soil to its original position after the completion of pipe laying works
- (ii) Re-vegetating disturbed slopes and grounds, as applicable
- (iii) Awareness programs regarding conservation of existing flora & fauna, to the workers and the community;
- (iv) Regular Monitoring by DSMC & PMO

b) Impacts on Aquatic Life

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

8.2.2 Operation Phase

a) Impacts on Aquatic Life

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

- Direct discharge of the raw sludge to the water bodies will be discouraged through strict monitoring to the operators involved.
- Proper Implementation of Water Safety Plan (WSP).

8.3 Impact on Chemical Environment

8.3.1 Construction Phase

a) Impacts on Water Quality of the nearby rivers

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

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

276. In addition to this, other mitigation measures include

- disposing of spoils or excess soils as free filling materials as soon as possible;
- locating temporary storage areas on flat grounds and away from main surface drainage routes;
- shielding temporary storage areas with sandbags
- adopt measures mentioned above in the section 8.1.2 (e) for the solid waste management

- implementing eco-friendly solid and hazardous waste management, disposing them promptly;
- providing adequate water supply and sanitation facilities at work sites.
- Strict supervision on the behaviour of workers for the waste management as well as sanitation behaviour and monitoring the workers to manage the wastes properly.

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

8.3.2 Operation Phase

a) Impacts on Quality of Water Stored in Reservoir

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

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

b) Impacts on Water Bodies

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

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

8.4 Impact on Socio-economic Environment

8.4.1 Design Phase

a) Structural Instability

280. This impact can be mitigated through proper design of each & every component as per standard and code of practice.

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

b) Health & Safety of Community & Workers

282. The mitigation measure for this impact involves;

- Preparation of training manuals in Nepali with sketches on community health and safety and potential occupational health and safety.

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

c) Damage to the existing facilities

283. The mitigation measures for this impact includes;

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

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

8.3.2 Construction Phase

a) Community Health & Safety Hazards

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

b) Worker's Health & Safety Hazards

286. The mitigation measures for this impact include:

287. (i) Comply Labor Act (2017) of GoN; (ii) Train all site personnel on environmental health and safety; (iii) Provide Personal Protective Equipment (PPEs) to workers that includes protective clothing, helmets, goggles and other equipments designed

to protect the wearer's body from injury or infection and ensure their effective usage; (iv) Require workers to wear high visibility clothes; (v) Exclude public from worksites; (vi) Maintain accident reports and records; (vii) Make first aid kits readily available; (viii) Maintain hygienic accommodation in work camps; (ix) Ensure uncontaminated water for drinking, cooking, and washing; (x) Assure clean eating areas; (xi) Make sure sanitation facilities are readily available, Provide medical insurance coverage for workers; (xii) Provide adequate space and light to the camp site; (xiii) Adequate supply of potable water to the camps and good sanitation within camps; (xiv) Provide medical insurance coverage for workers; (xv) Provide orientation for guest visitors; (xvi) Ensure that visitors do not enter hazard areas unescorted; (xvii) Ensure moving equipment is outfitted with audible backup alarms; (xviii) Hearing protection equipment enforced in noisy environment and (xix) Chemical and material storage areas need to be marked clearly.

c) Traffic Congestion

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

- The trench for pipeline should not be abandoned and the contractor should be recommended to backfill the trench immediately after completion of pipe laying works.
- The contractor will be accountable to provide signage at appropriate locations indicating available alternate access routes to minimize traffic disruptions.
- The contractor will have to ensure access to shops and residences using simple wooden walkways.
- The contractor shall follow the Traffic Management Plan, the sample of which has been attached in **Annex 2D**.

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

d) Disruption to Local Vendor's Business

290. The mitigation measures for this impact includes;

- Avoid delay in construction works and Prompt Backfilling right after completion of pipe laying works.

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- Provision of temporary access to the shops through provision of planks.
- Pre-notify the vendors regarding the construction works that may hinder their daily activities and Coordinate with them properly.

e) Mobilization of Child Labor

291. The mitigation measures for this impact includes;

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

f) Impacts on Sustainability of Works

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

g) Damage to the existing facilities

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

8.3.3 Operation Phase

a) Occupational Health and Safety Hazards

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

b) Delivery of Unsafe Water

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

c) Impacts on Consumer's Health

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

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

d) Non-sustainability of Services or Completed Works

297. As a mitigation measure, WUSC should monitor yield closely especially in the dry season and during a climate-change-induced drought. After every seismic event, WUSC should conduct engineering investigations of completed works and implement the necessary corrective actions without delay. The mitigation measure also involve Preparation of Emergency Response Plan and Immediate Implementation of this plan after any seismic event.

9. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

9.1 Stakeholder Consultation & Participation

298. Stakeholder consultation and participation is an essential process in project preparation. It is also a part of information disclosure. It will disseminate as well as collect information regarding the proposed project by involving various stakeholders that includes Key Informant Interviews, Stakeholders Meetings, Focus Group Discussions (FGD), On-site discussions with WUSC and Random Field Interviews. The checklists & findings of FGD has been included in **Annex 7** and the minutes of various meetings undertaken during field visits are also included in **Annex 3**.
299. This stakeholder consultation requires the analysis of stakeholders through the identification of the potential participants and the methods of their involvement. The table given below illustrates the concerned stakeholders of the proposed project that will have either primary or secondary.

Table 35: Stakeholder Analysis & Mapping

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

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

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

S.N.	Stakeholders	Primary ¹	Secondary ³	Stakeholders' Role or Interest	Level of Influence
5.	UWSSP, PMO, RPMO & DRTAC		✓	It is responsible in successfully implementing the proposed project activities, establishing coordination with ADB & GoN and managing day to day activities at municipality levels.	High
6.	Town Development Fund (TDF)		✓	TDF will assist the project municipality conducting financial appraisal of the proposed project and advice DWSSM on its outcomes prior to the start of detailed design process.	High
7.	Local Bodies (DCC, Municipality & Ward Offices)		✓	It is responsible for establishing coordination with the implementing	High
8.	DSMC		✓	It will assist PMO & RPMO in the overall planning, implementation and monitoring of the project activities regarding environmental & social safeguards requirements.	High
9.	WJSC		✓	It is responsible for O & M of the proposed water supply system. It will also facilitate the concerned authorities during planning as well as	High
10.	Households (Families & Individuals)	✓		They are the main beneficiaries and are benefitted by the provision of enhanced & improved continuous	Low
11.	Contractors, Petty Contractors		✓	It is responsible for bidding for works and involved in the construction of the proposed project.	Low
12.	Local Technicians/Plumbers	✓		This group will be benefitted through the increased work opportunities related to construction works of the proposed project.	Low
13.	Unemployed Locals	✓		This group will be benefitted through the increased work opportunities related to construction	Low
14.	Local Vendors	✓		This group will be affected by the pipe laying works for the distribution network of the proposed project at the core bazaar area.	Low
15.	Schools & Hospitals	✓		This group will be benefitted by the provision of enhanced and improved continuous water supply service.	Low
16.	Commercial Establishments (Private Enterprises)	✓		This group is benefitted by enhancing their business by supplying items to the construction employees regarding their basic needs.	Low

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S.N.	Stakeholders	Primary ²	Secondary ³	Stakeholders' Role or Interest	Level of Influence
17.	Scrap Vendors	✓		This group will be benefitted by purchasing the recyclable wastes generated from the construction activities as well as from workers camp.	Low
18.	Local Leaders		✓	This group will facilitate to establish strong coordination between the local people and the project authority.	High

Source: IEE Field Study 2015 and DEDR & DDR, 2018

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

9.2 Major issues raised by the stakeholders

301. The major issues raised by the key stakeholders during stakeholder consultation are as follows:
- The project town is in need of safe, reliable and potable water.
 - Water shortage problem is acute in Diktel Bazaar area especially during dry season.
 - People of the project town are relying on untreated but occasionally disinfected water.
 - The operating system of the existing water supply system is good but the supply system is intermittent for public only while for government offices, the supply system is continuous. This partiality should be disregarded by this project.
 - The project should give priority to local people while hiring for the construction activities.
 - The project must consider solid waste management issues during construction period.

- vii. The proposed project must address the socioeconomic problems that may be observed during the construction period at Diktel Bazaar area like Traffic Congestion, Disruption to Local Vendors, Discomfort to the passerby, Noise Pollution, Air Pollution, Damage to the existing facilities etc.
302. All the stakeholders present during consultation programs expressed their sincere committment towards the proposed project, committed to collect 5% upfront cash contribution from the beneficiaries and agreed to provide aid during project construction whenever required.
303. The assurance made by the study team regarding the issues raised by the stakeholders are as follows:
- i. The proposed project is focused on Diktel Bazaar area. Hence, it will address the water shortage problem faced by Diktel bazaar residents.
 - ii. The proposed project has provision of water treatment system. This will resolve the problems of consumption of untreated water.
 - iii. The proposed project has provision of continuous water supply system. This will end the partiality felt by the beneficiaries regarding the existing water supply system.
 - iv. The proposed project with water treatment facility and continuous water supply provision if effectively implemented will address the needs of Diktel residents regarding safe, reliable and potable water.
 - v. The socioeconomic problems raised by the stakeholders has been considered in IEE study and this IEE study has proposed mitigation measures for these issues. Accordingly, for ensuring the effective implementation of the proposed mitigation measures, EMP will be prepared and the contractor will be enforced to consider, follow and implement the EMP during construction.
 - vi. The solid waste management plan will be prepared, followed and implemented during the construction phase of the project that includes Spoil Management & Disposal, Disposal of Dismantled Debris and Management of Construction Wastes & Solid Wastes.
 - vii. Local workers of Rupakot Majhuwagadhi municipality will be given priority for employment to the extent possible however, it requires strong coordination with the concerned contractor.

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304. The project envisages that stakeholder consultations will continue during the project period and concerned stakeholders will be invited and encouraged to participate. The PMO and ICG will maintain rapport with WUSC and the municipality. PMO, ICG, Contractors, and WUSC will be open to the public to discuss concerning the progress of the subprojects, adverse impacts, mitigation measures and environmental monitoring and grievances. The stakeholder consultations in future will be as follows.
- i. During construction, if change in design, alignment, and location, the PMO and ICG will hold at least one public consultation to solicit perceived impacts, issues, concerns and recommendations from affected communities;
 - ii. Before construction, the PMO and ICG will conduct an information, education and communication (IEC) campaign among the affected communities about the upcoming construction, its anticipated impacts, the grievance redress mechanism, contact details and location of the PMO and ICG, and status of compliance with the Government's environmental safeguard requirements. Billboards about the subproject, implementation schedule and contact details of the executing agency, PMO-ES, ICG-ESA and Contractors will be set up at strategic locations. The grievance redresses procedure and details will be posted at the offices of the ICG, WUSC, and VDC;
 - iii. During construction, regular random interviews will be conducted by the ICG-ESA every month to monitor environmental concerns of subproject communities;
 - iv. During operation, periodic random interviews will be conducted by the ICG and WUSC to monitor the environmental concerns of subproject communities;
 - v. The public consultations and information disclosure will be continuous throughout the project cycle. PMO and ICG will be responsible for designing and implementing such aspects on the ground.
305. Several public consultations held at various locations on different dates with key stakeholders as mentioned above are tabulated below:

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Table 36: Summary of Major Public Consultations carried out by Study Team

S.N.	Meeting Date	Facilitator	Venue & Participation	Topic of Dissemination/Discussion
1.	24 August 2015	GESI Specialist/Engineer	Three Brother Hotel, Diktel Bazaar -WUSC executive body, advisors & stakeholders	Dissemination of TSTWSSSP approach, modality, role & responsibility of various stakeholders
2.	21 Dec 2015	GESI Specialist/Water Supply and Sanitation Engineer/Survey Group	Three Brother Hotel, Diktel Bazaar -WUSC executive body, advisors & stakeholders	Dissemination of TSTWSSSP approach, modality, role & responsibility of various stakeholders Preparation of social and technical survey works
3.	22 Dec 2015	GESI Specialist/Water Supply Engineer	Solma (Ward No :6) -Local leader, beneficiaries, WUSC representative etc.	Issues of service area delineation and modality of TSTWSSSP
4.	30 Dec 2015	GESI Specialist/Engineer	Three Brother Hotel, Diktel Bazaar -WUSC executive body, advisors & stakeholders	Issues of service area delineation and modality of TSTWSSSP
	26 Nov 2017	Consultant Team	DWSS Building Panipokhari	Presented draft study report and discussed technical and social aspect of the design.
5	23 Jan 2018	Consultant Team, DWSSDO, WUSC members, TDF, team, Local people	Three Brother Hotel, Diktel WUSC executive body, CDO, Mayor of the Municipality, Local leader, beneficiaries, etc	Presented draft study report and discussion about additional water source, land for structure & Commitment of Upfront 5% cash from User.
6	24 May 2018	Consultant Team, DWSSDO, WUSC members, TDF, team, Local people	District Co-ordination Committee Hall, Diktel Bazaar WUSC executive body, CDO, Mayor of the Municipality, Local leader, beneficiaries, etc	Presented final report and discussion about additional water source, land for structure & Commitment of Upfront 5% cash from User.

Source: Due Diligence Report, 2018

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

10. GRIEVANCE REDRESS MECHANISM

10.1 Purpose of the Grievance Redress Mechanism

307. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate and facilitate resolution of affected persons' concerns, complaints, and grievances related to social, environmental and other concerns on the project. The GRM will aim to provide a time-bound and transparent mechanism to resolve such concerns. The mechanism, developed in consultation with key stakeholders, will ensure that: (i) the basic rights and interests of every person adversely affected by the social and environmental performance of a Project are protected; and (ii) their concerns are effectively and timely addressed.
308. A common GRM will be in place for social, environmental or any other grievances related to the project. The GRM will provide an accessible forum for receiving and facilitating resolution of affected persons' grievances related to the project. Project will publish the sample grievance registration form on its website, and publish it in local language, at the hoarding board of each of the participating WUA or municipalities' office. Every grievance shall be registered with careful documentation of process adopted for each of the grievance handled, as explained below. The environmental and social safeguards officer (ESO/SSO) at the project management office (PMO) will have the overall responsibility for timely grievance redress on environmental and social safeguards issues. The Social Safeguards Officer at the Regional Project Management Office (RPMO) will be the focal person for facilitating the grievance redress at the local level.
309. A municipal-level public awareness campaign will be conducted on a regular basis as shown in the Communication and Public Participation Plan (CAPP) of the project to ensure awareness on the project and its GRM. The social and environmental safeguards experts of the PMQAC and RDSMCs will support the WUA or municipalities in conducting municipality-wide awareness campaigns, which will ensure that all stakeholders including poor and vulnerable are aware of the GRM and project's entitlements.

10.2 Proposed Set-Up

310. A Grievance Redress Committee (GRC) will be formed at the Municipality level, comprising the Mayor as Chairperson of GRC, and Regional Project Manager

RPMO as Secretary. The GRC members will comprise of (1) WUSC Secretary; (2) RPMO Engineer; (3) RPMO social /environmental (as relevant) officer, (4) representative of affected persons, (5) RDSMC's safeguards specialist (social/environment as relevant), (6) a representative of reputable and relevant CBO/SHG/organization working in the project area as invitee⁴ , and (7) contractor's representative. The secretary of the GRC will be responsible for convening timely meetings and maintaining minutes of meetings. The concerned social safeguards expert of RDSMC will support the RPMO safeguard's officer and Project Manager of RPMO to ensure that grievances, including those of the poor and vulnerable are addressed. All GRCs shall have at least two women committee members. Along with representatives of the APs, civil society and eminent citizens can be invited as observers in GRC meetings.

311. The functions of the local GRC are as follows: (i) provide support to affected persons on problems arising from environmental or social disruption; asset acquisition (if necessary); and eligibility for entitlements, compensation and assistance; (ii) record grievances of APs, categorize and prioritize them and provide solutions within 15 days of receipt of complaint by WUA or local bodies; and (iii) ensure feedback to the aggrieved parties about developments regarding their grievances and decisions of the GRC.
312. The GRM procedure is depicted in Figure 5, and is outlined below in detail, with each step having time-bound schedules and responsible persons to address grievances and indicating appropriate persons whose advice is to be sought at each stage, as required:
- (i) First Level of GRM (WUA level): The first-level, which is also the most accessible and immediate venue for quick resolution of grievances will be the contractors, RDSMC field engineers and RPMO supervision personnel, who will immediately inform the WUA. Any person with a grievance related to the project works can contact UWSSP to file a complaint. The municipal-level field office of the RPMO, in WUA's building, will document the complaint within 24 hours of receipt of complaint in the field, and WUA or local bodies will immediately address and resolve the issue at field-level with the

⁴ If the complaints are related with IP/Dalits/other vulnerable groups, specific NGO/CBO that actively involved in development of these communities shall be involved.

contractor, supervision personnel of RPMO and RDSMC field engineers within 5 days of receipt of a complaint/grievance. The assigned RDSMC's Social Mobilizer will be responsible to fully document: (i) name of the person, (ii) date of complaint received, (iii) nature of complaint, (iv) location and (v) how the complaint was resolved. If the complaint remains unresolved at the local level within 5 days, the WUA will forward the complaint to the municipality level GRM.

- (ii) Second Level of GRM (Municipality level): The complainant will be notified by the WUA that the grievance is forwarded to the Municipality-level GRC. The M level GRC will be called for a meeting, called and chaired by the Mayor. The GRC will recommend corrective measures at the field level and assign clear responsibilities for implementing its decision within 10 days of receipt of complaint by WUA. If the grievance remains unresolved within 10 days of receipt of complaint by WUA, the matter will be referred to the third level. The RPMO Engineer will be responsible for processing and placing all papers before the GRC, recording decisions, issuing minutes of the meetings, providing feedback to complainants and taking follow up actions so that formal orders are issued and decisions are carried out.
- (iii) Third Level of GRM (PMO Level): Any unresolved or major issues at Municipality level will be referred to the PMO for final solution. The PMO's Project Director (PD) will have special meeting to find solutions. Decision has to be made within 15 days of receipt of complaint by WUA. The PD will sign off on all grievances received by the PMO. The concerned Deputy Project Director (DPD) and environmental and social safeguards officers (ESO & SSO) of PMO will be involved with support from the PMQAC's social/environment safeguards experts. The SSO will be responsible to convey the final decision to the complainant.

313. The complainant will have to fill up Grievance Redress Form as shown in **Annex 2C** to file the complaint. All paperwork (details of grievances) needs to be completed by the WUA member secretary assisted by RDSMC and circulated to the WUA Chairperson and members. At Municipality level, the RPMO Engineer will be responsible for circulation of grievances to the Regional Project Manager, DWSS, Mayor and other GRC members, prior to the scheduled meetings. The RPMO's Engineer will be responsible for follow-through of all escalated

grievances. All decisions taken by the GRC will be communicated to the APs by the RPMO's SSO.

314. Despite the project GRM, an aggrieved person shall have access to the country's legal system at any stage and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.
315. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use ADB's Accountability Mechanism (AM) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Nepal Resident Mission. The complaint can be submitted in any of the official languages of ADB's developing member countries (DMCs). The ADB's AM information will be included in UWSSP Information Datasheet (PID), to be published in web and distributed to the affected communities, as part of the project GRM.

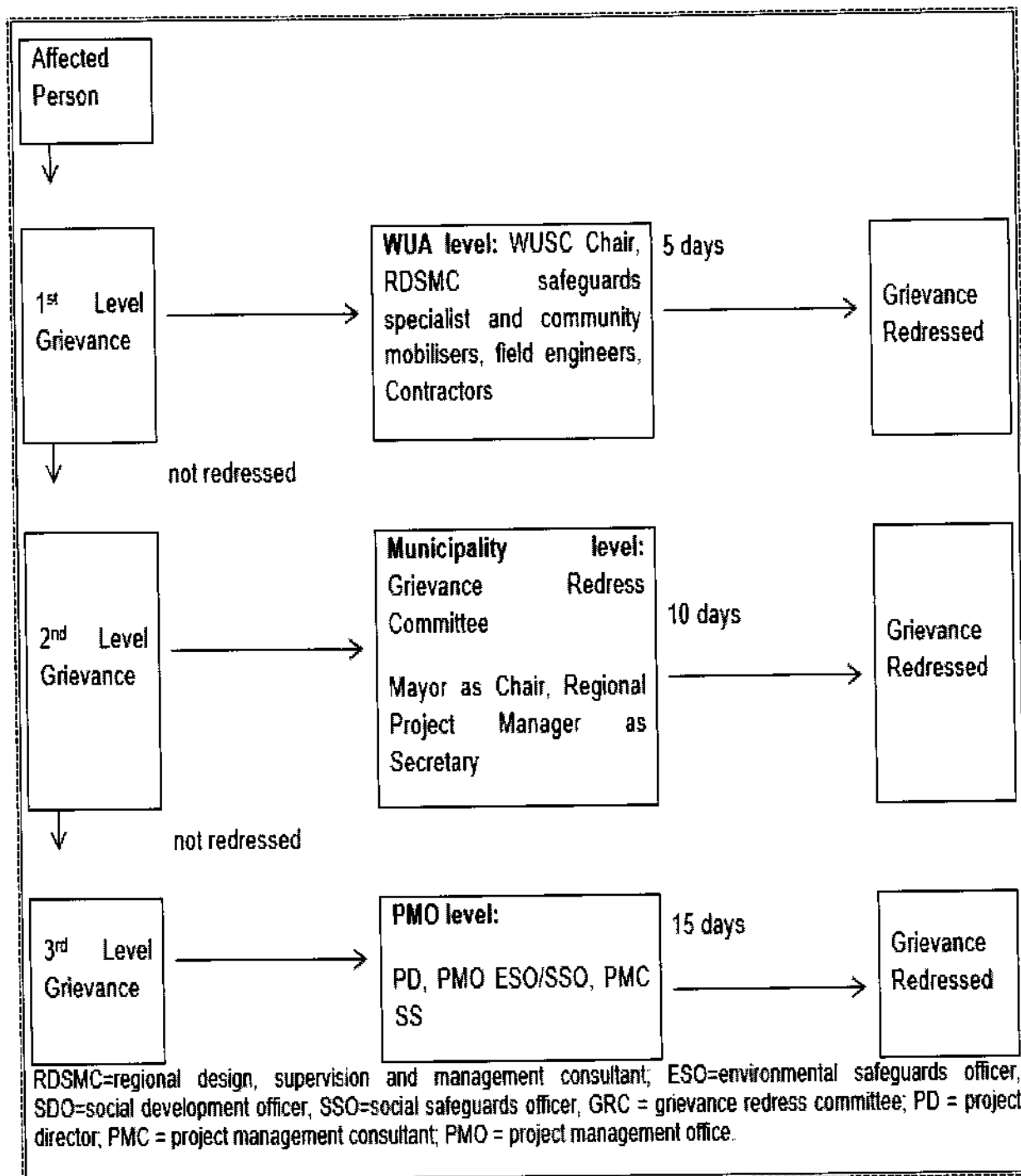


Figure 5: Grievance Redress Mechanism (Formal Approach)

11. ENVIRONMENTAL MANAGEMENT PLAN

11.1 Introduction

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

11.2 Institutional Arrangement

11.2.1 Executing and implementing agencies

318. The Ministry of Water Supply (MoWS) will be the executing agency with the responsibility of project execution with the responsibility of project execution delegated to the Department of Water Supply and Sewerage Management (DWSSM). The Water Supply and Sanitation Division/Sub-division Office (WSSDOs) are the project implementing agencies. Water User's and Sanitation Committees of the proposed towns are the implementing agencies.
319. The key responsibilities of the executing and implementing agencies are as follows:
- a) **Prior to construction:**
- MoWS will deputize a qualified staff to act as the Environmental Safeguard Officer of the Project management office (PMO).
 - MoWS will establish the grievance redress mechanism, including setting up the Grievance Redress Committee.

- The Water Supply and Environmental Division of the MoWS will be responsible for reviewing and approval of the IEE Report.
- DWSSM will review the IEE Report prepared by the Design, Supervision and Management Consultant Team's Environmental Safeguard Expert (DSMC-ESE) before forwarding this to MoWS.
- DWSSM will prepare the ToRs for the Environmental Safeguard Specialist that will engage to support PMO and for the Environmental Safeguard Specialists of the two Design, Supervision and Management Consultants that will be appointed to prepare the projects.

b) During construction and operation:

11.2.2 Safeguard Implementation Arrangement

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

- (i) review and confirm existing IEEs and EMPs are updated based on detailed designs, that new IEEs/EMPs prepared by DSMCs comply to exclusion criteria and project selection guidelines as stipulated in the EARF and government rules; and recommend for approval to PMO;
- (ii) approve subproject environmental category;
- (iii) ensure that EMPs are included in bidding documents and civil works contracts;
- (iv) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by RPMOs and contractors;
- (v) establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the EMP;
- (vi) facilitate and confirm overall compliance with all Government rules and regulations regarding site and environmental clearances as well as any other environmental requirements as relevant;
- (vii) supervise and provide guidance to the RPMOs to properly carry out the environmental monitoring and assessments as per the EARF;
- (viii) review, monitor and evaluate effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken;

- (ix) consolidate monthly environmental monitoring reports from RPMOs and submit semi-annual monitoring reports to ADB;
- (x) ensure timely disclosure of final IEEs/EMPs in project locations and in a form accessible to the public;
- (xi) address any grievances brought about through the Grievance Redress Mechanism (GRM) in a timely manner as per the IEEs;
- (xii) undertake regular review of safeguards-related loan covenants, and the compliance during program implementation; and
- (xiii) organize periodic capacity building and training programs on safeguards for project stakeholders, PMO, RPMOs, and WUAs.

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

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

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

- (i) ensure that the quality of the designs and construction of all water supply and sanitation components implemented under the project are to the required standards; and

- (ii) assist the PMO with the overall planning, implementation and monitoring of the project during all stages of implementation including adherence to all environmental and social safeguards' requirements.

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

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

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

325. **Capacity Building:** The PMQAC safeguards experts (environmental and social) will be responsible for training the (i) PMO's safeguards officers (environmental and social); (ii) RPMOs' engineers and social development officers. Training

modules will need to cover safeguards awareness and management in accordance with both ADB and government requirements as specified below:

- (i) Environmental Safeguards
 - (a) sensitization on ADB's policies and guidelines on environment;
 - (b) introduction to environment and environmental considerations in water supply and wastewater projects;
 - (c) review of IEEs and integration into the project detailed design;
 - (d) improved coordination within nodal departments; and
 - (e) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites.
- (ii) Social Safeguards
 - (a) sensitization on ADB's policies on Involuntary Resettlement and Indigenous People;
 - (b) introduction to social safeguards assessment and document requirements;
 - (c) Consultation and participations requirements;
 - (d) Project GRM and ADB's Accountability Mechanism (AM); and
 - (e) monitoring and reporting system.

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

Before construction

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

During construction

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

During operation

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

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

11.3 Environmental Management Plan (EMP) Matrix

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

Table 37: Environmental Management Plan Matrix

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
1. Impacts on Physical Environment					
a) Design Phase					
Topography/Geology	Soil Erosion & Slope Instability	- Incorporate measures and sites for handling excessive spoil materials - Incorporate drainage plan in final design	PMO, RPMO & DSMC	Incorporated design in final and communicated to contractors	Before award of contract, During Detailed Design Phase
b) Construction Phase					
Topography/Geology	Erosion & Land Surface Disturbance	- Protecting the foundation from damage during backfilling - Using the right backfill materials - Compacting the backfill - Final finishing the subgrade to ensure that water drains away from the foundation - During construction of Internal Access Road, Soil Erosion & Land Surface Disturbances will be mitigated through appropriate slope protection measures like Gabion Wall Construction, Retaining Wall Construction and Construction of Drainage Structures	Contractor	- Site Condition - Contractor's Log Book regarding construction activities - Field Photographs	Weekly Basis During Construction Phase
Spoil Management	Inappropriate disposal of spoils from the construction activities may result in gully and erosion of soil tips especially when it is combined with unmanaged surface water runoff.	- Follow Spoil Management Plan as included in Annex 2E. - Use of excess Spoil or Soil for filling depressed areas or borrow pits wherever possible. - Appropriate disposal of Spoil at the designated places. - Spoils should not be disposed on natural drainage paths, canals and other infrastructures. - Provision of toe walls and retaining walls to protect the erosion of disposed spoils.	Contractor	- Spoil Management Plan - Photographs - Construction of Spoil Disposal Site	During Construction Phase

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Air Quality	Air Pollution	Provision of proper drainage, vegetation and adequate protection against erosion at the Spoil Disposal Site.	Contractor	Written Notice/Code of Conduct	During award of contract
		Strict Prohibition of open burning of solid waste		Visible Emission	Weekly Basis During Construction
		Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, as necessary;	Contractor	Parameters related to monitoring of solid waste management	
		If re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces;		- Number of water Tank/s - Capacity of Water Tank/s - Daily/Weekly Frequency/Timing of water spraying - Locations of water spraying - Contractors Log Book of Materials to ensure the use of crushed gravel - Photographs	Weekly Basis During Construction
Air Quality	Air Pollution	Use of Construction/ Transportation Vehicles complying with NVMES,2069	Contractor	Number and types of vehicles in use	During Construction
		Regular inspection & maintenance of construction/transportation vehicles		Certifying documents for each vehicle	
		Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking.	Contractor	Contractor's/Consultant's log book of vehicle inspection & maintenance	Daily Basis/During Construction
		Restricting noisy activities to daytime and overtime work to avoid using noisy equipment;	Contractor	Written Notice/Code of Conduct	Prior to construction
Acoustic Environment	Noise Pollution	Prohibit the use of pressure horn by	Contractor	Type of fuel supplied to camps	Weekly Basis during construction
		Prohibit the use of pressure horn by		Quantity of fuel supplied to camps	Weekly Basis during construction
			Contractor	Written Notice	Prior to construction
			Contractor	Written Notice/Code of	Daily Basis

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Solid Waste Haphazard Disposal of Wastes		transportation vehicles		Conduct Number of vehicles fitted with pressure horns Maximum Sound Level of Pressure Horn	
		Regular inspection & maintenance of construction/transportation vehicles to ensure the use of Vehicles complying with NVMES, 2069 B.S.	Contractor	Contractor's/Consultant's log book of vehicle inspection & maintenance	Daily Basis
		Regular inspection & maintenance to ensure the use of equipments/machinery that comply with applicable emission standards of GoN i.e., National Noise Standard Guidelines, 2012	Contractor	Contractor's/Consultant's log book of equipment/machinery inspection & maintenance	Daily Basis
		Regular inspection & maintenance to ensure the use of Diesel Generators complying with National Diesel Generator Emission Standard, 2012	Contractor	Contractor's/Consultant's log book of equipment/machinery inspection & maintenance	Daily basis
		a) Construction Wastes			
		Adopt 3R (Reduce, Reuse & Recycle) concept	Contractor	Daily/Weekly quantity/volume of reusable/recyclable SW collected	Daily basis
		Ensure storage areas are secure, safe & weatherproof.	Contractor	Locations of stockpiling sites	Daily basis
		Management of reusable wastes	Contractor	Number of cases of on site reuses	Daily basis
		Sale of Recyclable wastes to scrap dealer	Contractor	- Daily/Weekly quantity/volume of such wastes sold to or given to scrap vendors - Frequency of sale to scrap vendors	Daily basis
		Final Disposal of Bio degradable solid wastes	Contractor	- Number/size of burial pits for final disposal of bio-degradable solid waste - Location of burial sites - Frequency of burials	Daily basis
		Avoid over ordering of construction materials to	Contractor	Contractor's log book	Daily basis

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		the extent possible. This will be challenging as it requires strong coordination with the concerned contractors as it cannot be made mandatory. However, it is not impossible too to coordinate with the contractors in this regard. - Use standard size & quantity of construction materials. - Construct garland drains to reduce the runoff from the stockpiles.		of construction materials	
Solid Waste	Haphazard Disposal of Wastes	b) Solid Wastes, Wastewater and Sewage from labour camp - Adopt Segregation of Solid Waste (3R Concept) on the basis of being biodegradable or non-biodegradable. It is because non-biodegradable wastes cannot be broken down by decomposers and their disposal poses a big problem. - Management of biodegradable wastes that includes food waste, paper waste, biodegradable plastic, etc. by any suitable processes that include Composting & Incineration. If these two processes are not possible then, the wastes shall be either managed by handing over these wastes to the municipality waste collectors who will finally dispose those wastes to the landfill sites of the project town or by disposing those wastes to the burial pits at suitable place. - Non biodegradable wastes like glass, plastics & metals shall be managed by reusing them for site use or selling them to scrap dealers instead of disposing them - Strict Prohibition on open incineration of solid wastes & use of plastic materials to minimize the quantity of plastic wastes. - Construction of the temporary latrines with temporary soak pits & septic tanks within the camp site for proper disposal of sewage. - Provide temporary but proper drainage system	Contractor	Location of construction sites	Daily basis
			Contractor	Number of Colored Bins to segregate wastes into biodegradable & non biodegradable wastes	Daily basis during construction
			Contractor	- Daily/Weekly quantity/Volume of Biodegradable waste collected - Site Photographs - Contractor' Log Book	Daily basis during construction
			Contractor	- Daily/Weekly quantity/volume of such wastes sold to or given to scrap vendors - Frequency of sale to scrap vendors/dealers - Written Notice	Daily basis during construction
			Contractor		Prior to Construction & During Construction
			Contractor	State of well managed camp site with latrine facilities	Daily basis
			Contractor	State of well managed	Daily basis

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		for proper outlet of waste water generated from cooking practices adopted by the workers Employ local people from nearby villages to maximum extent possible. It will minimize the number of workers residing at worker's camp. Lesser the number of people, lesser will be the solid waste & effluent generated. However, it cannot be made mandatory because availability of local people with required skills will not be ensured at the time of construction.	Contractor	camp site with drainage facilities Contractor's Log Book	Prior to the construction
Handling of Fuels/Chemicals	Accidental Leakage or Spillage of Stored Fuel/Chemicals	Provision of well managed storage site	Contractor	Location of storage site	Weekly Basis during construction
		Organize awareness programs for the workers responsible for handling fuel/chemicals	DSMC & Contractor	Records of awareness programs in the form of minutes, photographs	Prior to the construction
		Supervise workers to handle fuel/chemicals properly	DSMC & Supervisor of Contractor	Records of any accidental spillage/leakage	Daily Basis During Construction
		Use of spill kit materials to block flow and prevent discharge to nearby water bodies	Contractor	Contractor's log book of materials procured for construction	Weekly Basis During Construction
		Scatter the Sawdust, sand or dry soil over the area of spill and leave for few minutes to soak up the fuel/chemical. So, availability of saw dust, sand or dry soil should be ensured in the store	Contractor	Frequency of use of saw dust, sand or dry soil	Weekly Basis During Construction
		Regular Inspection Visit to the storage site to inspect the leakage of the stored container of fuel/chemical	DSMC & Contractor	State of well maintained storage container	Weekly Basis During Construction
Land Use Pattern	Change in land use pattern in haphazard manner	- Selection of barren and public land only for the construction of project components - Avoid the acquisition of private and agricultural land for the construction of project components.	PMO & DSMC	Details of land ownership and State of proposed land	During Detailed Design Phase

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		Monitoring on the haphazard land use & planning by the concerned authority.			
Drainage	Disruption to Natural Drainage	Avoid the natural drainage pathways for pipe laying works.	DSMC Contractor	Pipe Layout plan	During Construction
Drainage	Disruption to Natural Drainage	Stockpile the excavated materials at safe but nearby place.	DSMC Contractor	Location of Spoil Disposal	Daily Basis During Construction
		Restore natural drainage system if the drainage system during construction is blocked.	Contractor	State of well maintained natural drainage system	Daily Basis During Construction
		Immediate Response on handling of dismantled debris	Contractor	State of well maintained site condition after the completion of dismantling works	Daily Basis After Construction and Prior to Operation
		- Segregation of Dismantled Debris - Adopt 3R (Reduce, Reuse & Recycle) concept	Contractor	Number of Colored Bins	Daily Basis
Dismantled Debris	Haphazard Disposal of Dismantled Debris	Sale of Recyclable Wastes to Scrap Vendors/Dealers	Contractor	- Quantity/Volume of such wastes sold to or given away to scrap vendors - Frequency of sale to scrap vendors	Daily Basis
2. Impacts on Biological Environment					
a) Construction Phase					
Flora & Fauna	Loss of vegetation, Loss of habitat of faunas	- Replace the excavated top soil to its original position after the completion of pipe laying work - Re-vegetating disturbed slopes and grounds, as applicable; - Awareness programs regarding conservation of existing flora & fauna, to the workers and the community - Regular Monitoring	Contractor	State of before and after condition of the site	Daily Basis During Construction
Flora & Fauna	Loss of vegetation, Loss of habitat of faunas		Contractor	State of revegetated slopes & grounds	Weekly Basis During Construction
			PMO, DSMC & Contractor	Minutes & Photographs of Programs	Prior to Construction
			DSMC & RPMO	Contractor's Log Book	Daily Basis During Construction

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Aquatic Life	Loss of habitat of aquatic life	Strict Monitoring on the daily activities of workers	Contractor & DSMC	State of Labor Camp Site	Weekly Basis
		Provision of temporary but well equipped toilets	Contractor & DSMC	Location of these temporary facilities	Weekly Basis
		Restriction to workers from fishing	Contractor & DSMC	Written Notice	Daily Basis During Construction
		Adopt measures mentioned above for the solid waste management	Contractor & DSMC	- Number of Colored Bins to segregate wastes - Daily/Weekly quantity/Volume of Biodegradable solid waste collected	Daily Basis During Construction
b) Operation Phase					
Aquatic Life	Pollution of water bodies endangering aquatic lives	- Direct discharge of the raw sludge to the water bodies will be discouraged through strict monitoring to the operators involved. - Proper Implementation of Water Safety Plan (WSP)	WUSC	State of disposal of raw sludge and State of nearby water bodies	Weekly Basis
3. Impacts on Chemical Environment					
a) Construction Stage					
Water Quality	Pollution on surface water sources by crossing of pipelines over water bodies, poorly managed construction sediments and other wastes, poor sanitation practices by workers	Appropriate Design of Septage Disposal through design of toilets with septic tanks	Contractor, DSMC	- Semi Annual Environmental Monitoring Report - State of well managed toilets	Prior to Construction as well as During Construction
		Disposing of spoils or excess soils as free filling materials as soon as possible	Contractor	- Spoil Management Plan - Location of Spoil Disposal Site	During Construction
		- Locating temporary storage areas on flat grounds and away from main surface drainage routes; - Shielding temporary storage areas with sandbags	Contractor	State of well managed temporary storage area	Monthly Basis
		Adopt measures mentioned above for the solid waste management	Contractor	- Number of Colored Bins to segregate wastes - Daily/Weekly quantity/Volume of	Daily Basis

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
				Biodegradable solid waste collected	
		- providing adequate water supply and sanitation facilities at work sites. - Strict supervision on the behaviour of workers for the waste management as well as sanitation behaviour and monitoring the workers to manage the wastes properly.	Contractor	State of camp site with required temporary facilities	Weekly Basis
b) Operation Stage					
Water Quality	Degradation of Quality of water stored within the reservoir	Proper Implementation of Water Safety Plan (WSP).	WUSC O & M Team	State of well maintained reservoirs	Monthly Basis
		Removing of Algae grown within the reservoir at regular intervals by the O & M team deployed by the WUSC.	WUSC O & M Team	State of well maintained reservoirs	Monthly Basis
Water Quality	Impact on Water Bodies	Disposal of raw sludge to the appropriate landfill or burial sites of the proposed project town	WUSC O & M Team	- Frequency of Burials - Location of Burial Sites	During Cleaning of sedimentation tank
		Use of raw sludge for agricultural land	WUSC O & M Team	Quantity/Volume of Raw Sludge Scraped from sedimentation tank	During Cleaning of sedimentation tank
		Avoid direct discharge of the raw sludge to the water bodies through strict monitoring to the operators involved	WUSC O & M Team	Written Notice	During Cleaning of sedimentation tank
		Proper Implementation of Water Safety Plan (WSP)	WUSC O & M Team	WUSC Monitoring Reports	During entire operation phase, Monthly Basis
4. Impact on Socio-economic Environment					
a) Design Phase					
Structural Instability	Cracking of structure leads to facility failure and public discomfort due to construction of water supply components in high earthquake zones	Proper Design of each & every component as per standard and code of practice.	PMO, RPMO & DSMC	Detailed Design Documents	During detailed design phase
Health & Safety of Community & Workers	Lack of provision will have impact during construction	Preparation of training manuals in Nepali with sketches on community health and safety and potential occupational health and safety.	PMO, RPMO & DSMC	Bid document	During detailed design phase

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Existing facilities	Disruption of services & False Claims by the People	- Coordinate with the concerned agencies to finalize the pipe network layout to avoid damage to the existing utilities. - Design & Locate pipelines away from existing utilities during design as far as possible. - Provide budget for restoration/replacement of damaged utilities. - Photographs of construction sites before and after the construction to avoid the false claims.	DSMC, RPMO, PMO, Contractor	List of affected utilities and operators; Bid document to include 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)
b) Construction Phase					
Community Health & Safety	- Cross-cutting threats from construction's impacts on air and water quality, ambient noise level, mobility of people/goods/services; accesses to properties/economic activities/social services; service disruptions, etc. - Communicable and transmittable diseases may potentially be brought into the community by construction workers.	Contractor's implementation of EMP	Contractor, RPMO, DSMC	Review of EMP	During Phase, Weekly Basis
		Adequate lighting, temporary fence, reflecting barriers and signage at active work sites;	Contractor	State of well managed construction site with lighting, fencing and signage facilities.	During Phase, Monthly Basis
		Contractor's preparedness in emergency response;	Contractor	Emergency Response Plan	During Construction, Weekly Basis
		Adequate dissemination of GRM and Contractor's observance/implementation of GRM.	Contractor	- Grievance Form - State of GRC	During Construction, Monthly Basis
		- Comply Labor Act (1992) of GoN - Train all site personnel on environmental health and safety - Provide Personal Protective Equipment (PPEs) to workers that includes protective clothing, helmets, goggles and other equipments designed to protect the wearer's body from injury or infection and ensure their effective usage - Require workers to wear high visibility clothes - Exclude public from worksites	Contractor	- Site plan - Record of H&S orientation training - Availability of personal protective equipment at construction site - Environmental Site Inspection Report	Visual inspection by RPMO (monthly) and DSMC-ESS on a weekly basis. Frequency and sampling sites to be finalized during detailed design and final location of project components
Workers Health & Safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards, which can arise from working at height and excavation works.		Contractor	State of properly fenced	Weekly Basis during

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		- Maintain accident reports and records. - Make first aid kits readily available	Contractor	- construction site area - Number of accidents as per site records	Weekly Basis during construction
Workers Health & Safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards, which can arise from working at height and excavation works.	- 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 adequate space and light to the camp site - Adequate supply of potable water to the camps and good sanitation within camps - Provide medical insurance coverage for workers - Provide orientation for guest visitors - Ensure that visitors do not enter hazard areas unescorted. - Ensure moving equipment is outfitted with audible backup alarms. - Hearing protection equipment enforced in noisy environment - Chemical and Material storage areas need to be marked clearly	Contractor	- State of well managed workers' camp - Records of supply of uncontaminated water - Medical Insurance Documents - Record of Orientation training (Photographs & Minutes) - Contractor's Log Book of Machinery & Equipment - Clear Signage Board for Chemical Storage and Material Storage Area - Site Visit and Photographs of Sites - Traffic Management Plan	- Monthly Basis during construction - Weekly Basis during construction - Monthly Basis during construction - Weekly Basis during construction - Monthly Basis during construction - Daily Basis
Traffic Congestion	Interference in the daily activities of people	- The trench for pipeline should not be abandoned and the contractor should be recommended to backfill the trench immediately. - The contractor will be accountable to provide signage at appropriate locations indicating available alternate access routes to minimize traffic disruptions. - The contractor will have to ensure access to shops and residences using simple wooden	Contractor		

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		- walkways. - Follow Traffic Management Plan			
Local Vendor's Business	Provide discomfort to the customers to get access to the shops	Avoid delay in construction works and Prompt Backfilling right after completion of pipe laying works.	Contractor	Field Visits and Contractor's Work Schedule	Weekly Basis
Local Vendor's Business	Provide discomfort to the customers to get access to the shops	Provision of temporary access to the shops through provision of planks	Contractor	Photographs	Weekly Basis
		Pre-notify the vendors regarding the construction works that may hinder their daily activities and Coordinate with them properly	Contractor	Written Notice or Miking	Prior to the construction
		As the Child Labor Prohibition Act, 2000 states that "No Child having not attained the age of 14 years shall be engaged in works as a laborer" during mobilization, provision for the requirement of submission of the citizenship certificate of each labor, should be made.	Contractor & PMO	Citizenship Certificate of the workers	Prior to Construction
Deployment of Child Labor	Deprivation of Children's right to education, health, safety and moral development is deprived	During contract agreement, the agreement by the contractor to follow Child Labor Prohibition Act, 2000 and Child Labour Prohibition Rules & Regulations, 2006, should be made.	Contractor & PMO	Contract Document	During award of contract
Sustainability of Works	Damage to unsettled/unfinished/uncured and/or completed structures and affecting their structural integrity by seismic event if any.	After every seismic event, the contractor must conduct engineering investigation of built structures and implement the necessary corrective actions immediately	Contractor	Monthly Progress Report and Contractor's Log Book	Construction Phase
Existing Facilities	Damage to the existing utilities creating discomfort to the people	Monitor construction workers to adopt carefulness and to strictly follow the layout drawings.	Contractor, RPMO, DSMC	Site Condition and Pipeline Layout Plan	During Construction Phase on Daily Basis
c) Operation Phase					
Occupational Health & Safety	Worker's exposure to,	Installation of clear, visible signage in premises	WUSC	Site Visit	Weekly Basis

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Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	and/or mishandling of chemicals and other hazardous substances pose health and safety hazards.	- on safety measures - Setting up a mechanism for the quick response to spills of chemical and hazardous substances.	WUSC	- Frequency of use of chemical & hazardous substances - Quantity of chemical/hazardous substances used for the proposed project	Monthly Basis
	- Extraction of unsatisfactory raw water quality - Delivery of unsafe water to the distribution system - Inadequate protection of intake - Health Hazards arising from inadequate design of facilities for receiving, storing and handling of CI & other chemicals	- Ensure the correct operation of water treatment plant to meet satisfactory water quality - Provide Safe Storage for chemicals - Ventilation of "Housed" dosing unit for chlorine - Train operators for handling chlorine	PMO, RPMO & DSMC	State of operation system of water treatment plants	Monthly Basis during operation
	Drinking water supply Engineer	Regular Monitoring by the WUSC	Contractor	State of Safe Storage Site	Monthly Basis during operation
	Consumer's Health	- Regular Monitoring by the WUSC - Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC. - Monitoring & Proper Implementation of WSP.	Contractor, PMO & DSMC	Detailed Drawings & Contractor Working drawings	During Construction
	Consumer's Health	- Regular Monitoring by the WUSC - Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC. - Monitoring & Proper Implementation of WSP.	RPMO, PMO & WUSC	Minutes & Photographs of Training	Prior to operation right after completion of construction
	Consumer's Health	- Regular Monitoring by the WUSC - Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC. - Monitoring & Proper Implementation of WSP.	WUSC	WUSC Monitoring Reports	Monthly Basis
	Consumer's Health	- Regular Monitoring by the WUSC - Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC. - Monitoring & Proper Implementation of WSP.	WUSC	Frequency of Algae Removal	Monthly Basis
	Consumer's Health	- Regular Monitoring by the WUSC - Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC. - Monitoring & Proper Implementation of WSP.	WUSC	WUSC Monitoring Reports	Monthly Basis
	Non Sustainability of Services or Completed Works	- Monitoring of source yield closely by WUSC, especially in the dry season and during a climate-change-induced drought. - After every seismic event, WUSC will conduct	WUSC & the local body	Visual Inspection & Mobilization of Human resources if required	During Dry Season and Immediate action after seismic event if any
			WUSC	WUSC Monitoring Report	Immediate after any seismic event

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		engineering investigations of completed works and implement the necessary corrective actions without delay.			
		Preparation of Emergency Response Plan and Immediate implementation of this plan after any seismic event	WUSC	WUSC Monitoring Report	Immediate after any seismic event

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11.4 Environmental Monitoring Program

329. Environmental monitoring will be done during construction at three levels:

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

330. In addition to regular monitoring onsite (at town level) by the ICG and DSMC-ESS on the EMP implementation of the mitigation measures, monitoring of key environmental parameters is proposed. Table 38 presents the indicative environmental monitoring plan for the project which includes relevant environmental parameters, with a description of the sampling stations, the frequency of monitoring, applicable standards, and responsible agencies.

Table 38: Environmental Monitoring Program

S. No.	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) for the construction period	National Ambient Air Quality Standards, 2003	Contractor
2.	Noise and vibration levels	- Prior to 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) for the construction period	National Noise Standards, 2012	Contractor
3.	Water quality	- Prior to 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 (DRTAC or DSMC))	Twice a year (pre-monsoon and post-monsoon) for the entire period of construction	National Drinking Water Quality Standards, 2006	Contractor
4.	Survival rate of landscaping, tree plantation	O&M phase	Survival rate	In the areas where re-plantation/ landscaping proposed	Twice a year for 2 years	None	WUSC

11.5 Institutional Capacity Development Program

331. Considering the limited capability of the Project's key players in environmental management, technical assistance from environmental specialists and capacity development during loan implementation will be needed. Capacity development will consist of hands-on training in implementing the responsibilities in EMP (as well as in EARF) implementation, complemented with a short-term series of lectures/seminars on relevant topics.
332. WUSC cannot monitor the quality of supplied water as prescribed in NDWQS and its Directives. Although monitoring kits and laboratory rooms will be provided, this would not guarantee WUSC can handle monitoring appropriately. DWSSM has five regional laboratories; however, some are not functioning fully due to lack of human resources. Considering that public health is a critical concern associated with water supply, it is recommended that a licensed and accredited laboratory be engaged to conduct water quality monitoring for at least the first 2-3 years of operation with WUSC actively participating in developing its capacity. Water quality monitoring should be carried out in such a way that WUSC will be "learning by doing." After the engagement period, there should be continuing periodic training of new persons to ensure that the capacity of WUSC is sustained. The cost for monitoring during operation is based on the assumption that a licensed laboratory will be engaged in both the monitoring requirements and to train WUSCs. A Water Safety Plan is included in the project design and will oblige the operator to carry out water quality monitoring accordingly. The amount of NRs. 500,000 will be provided annually to implement the Plan. There will be sufficient fund to include training by the licensed and accredited laboratory while monitoring water quality.
333. The contractors will be required to conduct environmental awareness and orientation of workers before deployment to the work site. The proposed training project along with the frequency of sessions is presented in Table 39. The Environmental Safeguard specialist & EMP Field Monitoring Staff are responsible for organizing different training programs for Environmental Management.

Table 39: Training Program for Environmental Management

Items	Pre-construction/prior to construction	Construction	
		Orientation program/ workshop for contractors and supervisory staff	Experiences and best practices sharing
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 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

11.6 Staffing Requirement and Budget

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

environmental engineers in each subproject town; (iii) engagement of a PMO-environmental safeguards specialist to provide technical assistance and guidance to the PMO and partly to the RPMOS and capacity development/training; and (iv) a DSC environmental safeguards specialist to conduct the IEEs and prepare the IEE reports according to the provisions of this EARF.

335. The cost 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.

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

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

338. The operation phase for mitigation measures are good operating practices to mitigate the environmental impacts of this phase & the responsibility remains to WUSC. WUSC will conduct all monitoring during the operation and maintenance phase. To ensure the delivery of safe drinking water from its catchment to the consumers, there is provision of Water Safety Plan (WSP) for the proposed project. If a licensed laboratory is engaged for the first 2-3 years of operation for training purposes, the cost can be accommodated under the Water Safety Plan. The cost of awareness program & WSP during the contract period is NPR 500,000.00 under provisional sum.

339. The indicative costs of EMP implementation are shown in Table 40.

Table 40: Indicative Cost of EMP Implementation

SN	Particulars	Stages	Unit	Total Number	Rate (NPR)	Cost (NPR)	Cost covered by
A.	Local Level Monitoring & Mitigation Measures						
a)	Local Level Monitoring Measures						
1	Air quality Monitoring	- Pre-construction - Construction	Per location	2	100,000.00	200,000.00	Civil works contract
2	Noise levels Monitoring	- Pre-construction - Construction	Per location	2	25,000.00	50,000.00	Civil works contract
3	Water Quality Monitoring	- Pre-construction - Construction	Per location	2	25,000.00	50,000.00	Civil works contract
4	Mitigation Measures						
		- Pre-construction - Construction - Operation	lump sum			700,000.00	Civil works contract
			Total of A)			1,000,000.00	Civil works contract

340. The above given table shows that the total indicative cost for EMP implementation in NRs. 1,000,000.00. This has been included under provisional sum in BoQ and this total cost includes local level monitoring cost and mitigation costs that also includes necessary environmental mitigation measures for the anticipated impacts during the entire construction period.



341. The environmental management will be implemented during the detailed design phase that will continue through the procurement, construction, and operation phases. Table 41 & 42 presents the indicative timeframe of key EMP activities about the project implementation schedule & the proposed topics for Capacity Building/Training respectively.

Table 41: Environmental Management Implementation Schedule

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

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

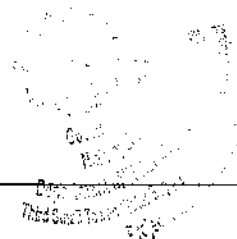
Table 42: Proposed Topics for Capacity Building/Training

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

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Topic			Target Participants	Timing
	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)	CapacityDev. Program
		B.1 Climate change impacts on infrastructure		
		B.2 Climate-proofing of infrastructure		
	C	Strategic environmental assessment of WSS sector policy, development plans, and programs		
	D	Other relevant topics that may be suggested by MoWS, DWSSM, PMO, ICG& WSSDO		

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12. MONITORING AND REPORTING

342. RPMO is the main monitoring agency of the proposed project that will monitor and measure the progress of EMP implementation with assistance from DMSC. The monitoring activities will correspond with the project's risks and impacts, and will be identified in the IEEs for the subprojects. In addition to recording information on the work and deviation of work components from original scope, PMO, RPMOs & DSMC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. Along with this, Ministry of Water Supply (MoWS) under Government of Nepal will also undertake monitoring process through random field visits to review the project performance.
343. RPMOs will submit monthly monitoring and implementation reports to PMO, who will take follow-up actions, if necessary. PMO will submit semi-annual monitoring reports to ADB. This report will be based on the Sample Semi-Annual Monitoring Report Template given in **Annex 2F** and Sample Environmental Site Inspection Report given in **Annex 2G**. The subproject budgets will reflect the costs of monitoring and reporting requirements.
344. For subprojects likely to have significant adverse environmental impacts, PMO will retain qualified and experienced external experts to verify its monitoring information. PMO environmental safeguard specialist will document monitoring results, identify the necessary corrective actions, reflect them in a corrective action plan, and for each quarter, will study the compliance with the action plan developed in the previous quarter. Compliance with loan covenants will be screened by the PMO.
345. ADB will review project performance against the MoWS commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. ADB will monitor projects on an ongoing basis until a project completion report is issued. ADB will carry out the following monitoring actions to supervise project implementation:
- (i) conduct periodic site visits for projects with adverse environmental or social impacts;

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

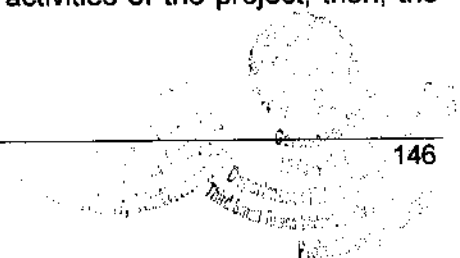
13. CONCLUSION

346. The IEE study indicates that:

- The proposed project, its components, are not within or adjacent to environmentally sensitive areas.
- The proposed project will fulfill the demand of Diktel bazaar area regarding the reliable water supply system. It will definitely address the problems raised by the hardship that people of the project town are facing for safe, reliable & potable water at core Diktel Bazaar Area for years.
- The proposed project will bring about: (i) the benefits of access to reliable supply of safe and potable water; (ii) promotion of good hygiene and sanitation practices and reduced health and safety risks as positive impacts; and (iii) enhanced community health, improved quality of life and safe communities as outcomes.
- Along with positive outcomes, the proposed project will also have negative impacts as discussed above in Chapter 7. As per our IEE study, four of the adverse impacts that includes *Air Pollution, Noise Pollution, Impacts on Water Quality of nearby rivers and Impact on Sustainability of Works* are evaluated as "Very Significant". However, these impacts would not be problematic for the project implementation if the activities that stimulate this impact to occur are properly controlled through the mitigation measures.
- Some of the adverse impacts are also evaluated as *Significant*. However, these will not be sufficient to threaten or weaken the surrounding resources. Mitigation measures, integral to socially and environmentally responsible construction practices, will be commonly used at construction sites and the contractors will be aware about it. Hence, mitigation measures would not be difficult to implement.
- Similarly, Insignificant impacts can either be avoided or simply mitigated through the proposed mitigation measures.
- The environmental management plan (EMP) as mentioned above in Chapter IX, if duly considered, followed and implemented during project construction activities, then the environmental issues will not be issues to be worried about.
- If the responsible body mentioned in the EMP matrix shown in the Table 30 properly takes up the responsibility for the implementation of mitigation measures for the likely impacts resulting from the various activities of the project, then, the



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

- Regular monitoring with good operation & maintenance service including prompt action on leaks and complying of the water supplied as prescribed in the National Drinking Water Quality Standards Directives will lessen the risks of the ineffective implementation of the proposed project and will sustain the system.
- None of the anticipated environmental impacts is significant enough to go for either detailed EIA study or further especial study.
- As per ADB Categorization, the proposed project falls under "Category B". As per EPR 1997 (Latest Amendments 2017) Schedule H, this IEE study fulfills the requirements of IEE criteria. This IEE thus fulfills the policy requirements of both the ADB and the GoN. This indicates that IEE study is sufficient for the effective implementation of Diktel Water Supply & Sanitation Project.

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


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ANNEXES

ANNEX 1
APPROVED TERMS OF REFERENCE (ToR)

10/10/2010



नेपाल सरकार
खानेपानी मन्त्रालय
वातावरण तथा जल व्यवस्थापन शाखा

परसफाई-०४४/७८
खानेपानी नं. २४०

संलग्न नं. ०४४/७८
कठमाडौं २०७४/०९/१०
सिंहबहादुर शाह
कठमाडौं, नेपाल।
मिति: २०७४/०९/१०

श्री खानेपानी तथा जल व्यवस्थापन विभाग,
पानीपोखरी, काठमाडौं।

६३३
०६६/९/११

विषय : प्रारम्भिक वातावरणीय परिक्षण(IEE) को कार्यसूची(TOR) स्विकृति सम्बन्धमा।

प्रस्तुत विषयमा तह विभागबाट स्वीकृतीको लागि पेश भै आएको दिक्तेल खोटाङ सहरी खानेपानी तथा सरसफाई आयोजनाको प्रारम्भिक वातावरणीय परिक्षण (IEE) को कार्यसूची नेपाल सरकार (सचिवस्तरी) को मिति २०७४/०९/०८ को निर्णयानुसार प्राप्त कार्यसूचीमा उल्लेख गरिएको Issue/Impact का अलावा प्रतिवेदन तयारीका समयमा अन्य Issue/Impact देखा परेमा सो पनि समावेश गर्नपर्ने शर्तमा प्राप्त कार्यसूची वातावरण संरक्षण नियमावली २०५४ को नियम ५ बमोजिम स्वीकृत भएको व्यहोरा आदेशानुसार अनुरोध छ।

स्वीकृत प्रारम्भिक वातावरणीय परिक्षणको कार्यसूची (TOR) प्रतिवेदन १ प्रति यसै साथ संलग्न छ।

०४४/७८

कातिकेश झा
इन्जिनियर

सोधार्थ:

श्री आयोजना व्यवस्थापन कार्यालय,
तेश्रो साना शहरी खानेपानी तथा सरसफाई आयोजना,
पानीपोखरी, काठमाडौं।

का ३ ति थ्री प्रमाणित
आयोजना गरि IEE प्रमाणित
पेश गरि लागू गरि
०६६/९/११

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Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban 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, Urban Water Supply and Sanitation (Sector) Project, Department of Water Supply and Sewerage Management, Panipokhari, Kathmandu	Ministry of Water Supply, Singhadurbar, Kathmandu
Prepared by: TAEC Consult P. Ltd. – Integrated Consultants Nepal (P) Ltd. JV	

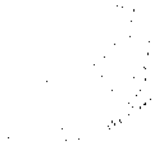
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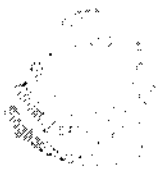

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OCTOBER, 2018



Final Technical Environmental Examination of Diktel Water Supply and Sewerage Project

List of Abbreviations

ADB	Asian Development Bank
CBS	Central Bureau of Statistics
DC	District Council
DDC	District Development Committee
DI	Distribution
DL	Distribution Line
DMA	District Meter Area
DSMC	Design Supervision and Management Consultant
DIW	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
HDP	High Density Polyethylene Pipe
H	Horse Power
IA	Implementing Agency
IEE	Initial Environmental Examination
IO	International Organization
KV	Kilovolt
KVA	Kilovolt Ampere
MoWS	Ministry of Water Supply
NDWQS	National Drinking Water Quality Standard
NGO	Non-Governmental Organization
NPR	Nepalese Rupee
OM	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

31

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Letter for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

RVT	Reserve Tank
SS	Stainless Steel
SETWSSSP	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
WSSDC	Water Supply and Sanitation Division
WTP	Water Treatment Plant
WUA	Water Users' Association
WUSC	Water Users' & Sanitation Committee

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2012

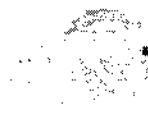


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1. NAME AND ADDRESS OF THE PROPONENT

This Terms of Reference (TOR) has been prepared concerning the Feasibility Study Report to carry out the Initial Environmental Examination (IEE) of Diktal 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:

Panipokhari, Kathmandu

Tel: 977 1 442388, 977 1 4412348

Fax: 977 1 4413280

E-mail: info@stwssp.gov.np

Website: www.stwssp.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 benefited 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° 9' N to 27° 16' N and Longitude 86° 45' E to 86° 50' E.

Rupakot Majuwagadhi Municipality was established on 5 March, 2017 after merging neighbouring nine VDCs: Nerpa, Chuindanda, Nirmalidanda, Patheka, Kharmi, Jalapa, Nunthala, Buelpa 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.



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ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

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 Nepre VDC
7	WN 1, 2, 5, 7 and 9 of former Chaurandanda VDC
8	WN 3, 4, 5 and 8 of former Chaurandanda VDC
9	WN 1 to 9 of former Nimaldanda VDC
10	WN 1 to 9 of former Pathika VDC
11	WN 1 to 9 of former Khami VDC
12	WN 1 to 9 of former Laaps VDC
13	WN 1 to 9 of former Numbusa VDC
14	WN 1 to 9 of former Buleka VDC
15	WN 1 to 9 of former Bughharka 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-Loguvaghat-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 observed between 1,000-2,000 meter elevations, while a cold temperate type of climate exists 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.



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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 *Alanchi*, *Amliso*, *Aakubara* 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*, *Mandira* are sold on a large scale. There is a weekly Hat bazaar in the project area.

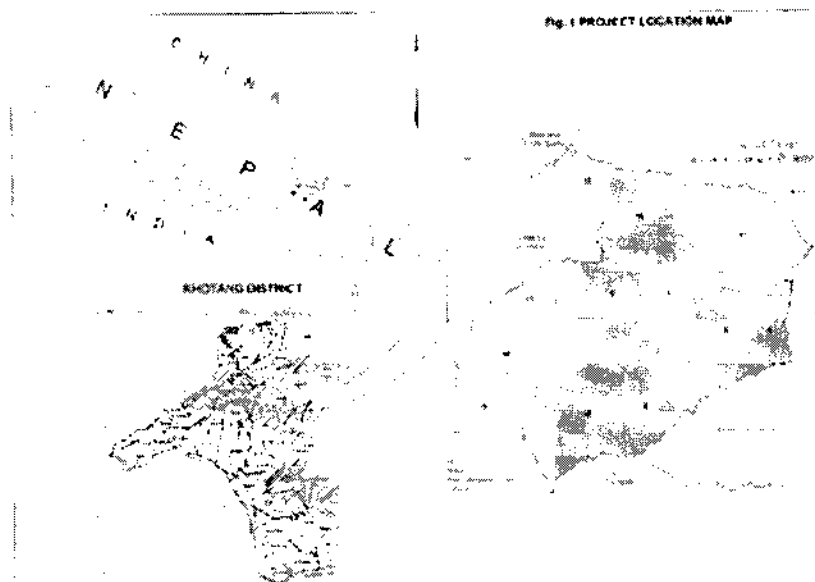


Figure 2-1: Project Location



1:R for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

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	Khulung
	UDC/Municipality	Rupakot Majuwagadh 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 (Ghum Diktel Bhopur)
	Supply Water System	JWS/Municipality/WUSC and hand pump
	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)	0.785
	Design Year (2038)	1.037
8	Source Characteristics	
	Source Name	Existing source Rambo and Majh Khola Proposed Chebbe Khola
	Source Type	Existing source Rambo and Majh Khola - Gravity Proposed Chebbe Khola-Gravity
	Source Location	All sources are within the municipality
	Safe Yield (lps)	Existing Rambo and Majh Khola - 800 lps Proposed Chebbe Khola-Gravity - 5 lps



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S.N.	Items	Description
9	Type of Structures	
	Intake	2 No. 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 (Backs/RCC-Surface Valve Box)	4/10*0
	Office/Caret GH/Guard House	1/2
	Household Connection	1,049
	Fire Hydrant	0
	Transmission Line and BDS (meter)	Cumulative of 18,178
	Distribution Network (meter)	24,351
10	Total Cost of WS Component (inclusive of all) NRs.	296,305,339.45
11	Cost Sharing Arrangement	
	GON Component (75 %)	207,416,537.62
	TDF Loan (25 %)	14,077,334.80
	WUSC's Contribution 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	
	ADR Category	B. Only IEE necessary
	IEE finding	No significant adverse impact
15	Per Capita Cost for WS component	
	Base Year	38749.3
	Design Year	14460.0

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 developed 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 Mah 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 16.176 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 x 1.7 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 system 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 (CU.M)	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 Kholi 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		
	10 Kg /sqcm	10Kg /sqcm	6Kg /sqcm
PE pipe 50 OD	3,457	4,692	
PE pipe 63 OD		3,267	
PE pipe 75 OD		416	945
PE pipe 90 OD		18	700
PE pipe 110 OD		0	390
Sub-Total	3,457	18,633	2,035
DI SPIGOT-SOCKET			
GI pipe of OD 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 females. 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

ToR for Initial Engineering Examination of Diktel Water Supply and Sanitation Project

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.



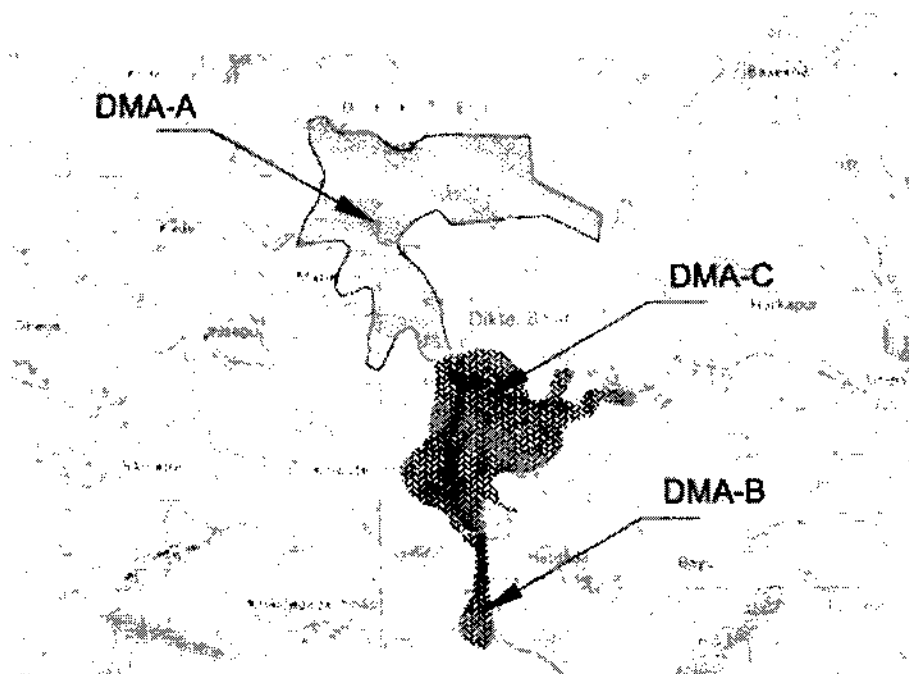


Figure 2-2: District Metering Area (DMA) of the Proposed System

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

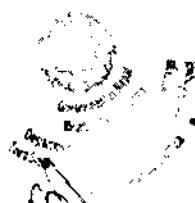
There are three important approaches to sanitation planning for urban and peri-urban areas of developing countries which recognize that stakeholder involvement is a prerequisite to effective planning and seek to overcome the shortcomings of top-down and supply-driven approaches.

- 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.

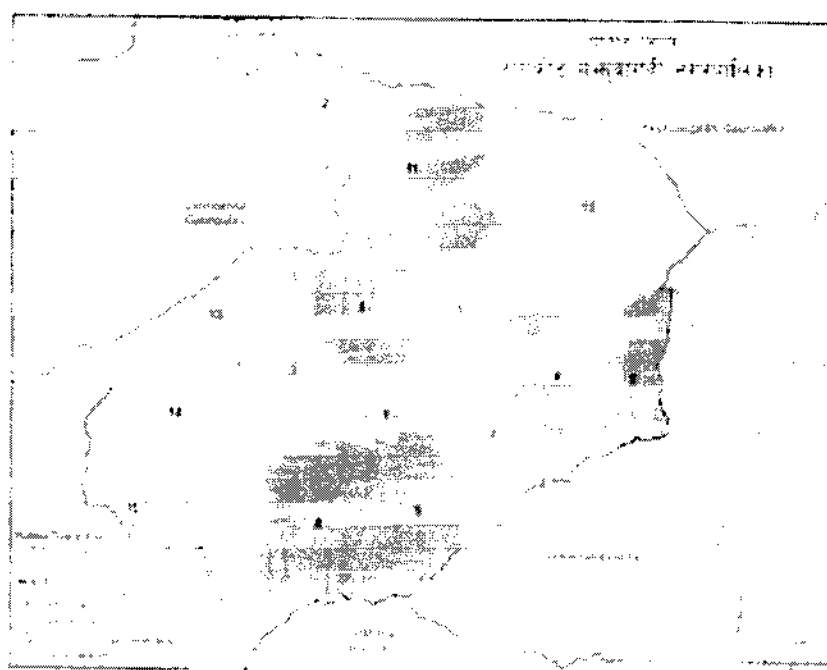


Figure 2-3: Proposed service area of the project

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. Density (PPHA)	HHs	Pop	P. Density (PPHA)	
1	575	987	4,976	8.7	1,218	5,342	9.3	0.71
2	1412	858	3,430	2.4	719	3,525	2.4	0.27
3	1488	997	3,120	2.1	648	2,878	1.9	-0.61
4	1988	578	3,208	1.7	648	3,192	1.7	-0.05
5	1623	579	3,133	1.9	420	2,854	1.8	-0.61
6	5589	852	3,458	0.6	249	3,009	0.5	-1.38
7	1470	340	1,958	1.3	204	3,099	2.1	4.72
8	1526	272	1,588	1.0	204	2,449	1.6	4.68
9	1093	402	2,121	1.9	210	1,957	1.8	-0.76
10	3410	710	4,374	1.3	171	3,872	1.1	-1.21
11	2491	767	4,064	1.7	153	3,499	1.5	-1.49
12	940	544	2,839	3.0	96	2,839	2.7	-1.11
13	1028	359	1,792	1.7	181	1,596	1.6	-1.15
14	2373	1,010	5,381	2.3	258	4,530	1.9	-1.69
15	1714	530	2,769	1.6	209	2,542	1.5	-0.85
Total	28,850	9,042	48,187	1.7	5,848	46,903	1.6	-0.27

Source: CBS 2001 and 2011

The total population of Rupakot Majuwagadh 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 1 to 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	258	978
2		468	3293
3		180	1337
4	Partial Area of WN 2	77	547
5		63	617
9	Partial Area of WN 3	4	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 Brahmins/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	6		
1	Brahmin/Chhetri	145	199	126	22	23	2	520	56
2	Janaajati	74	165	37	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	390	170	67	56	5	930	100

Source: Socio-economic Survey 2075

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 Baniya 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	6		
1	< Rs.7,500	9	11	2	12	11	0	45	4.8
2	Rs.7,501-10,876	14	31	7	4	2	1	59	6.3
3	Rs.10,876-20,000	104	126	86	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		238	396	172	67	56	5	930	100

Source: Socio-economic Survey 2026

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 cum.	Very Old
Diktel	Ferro cement (4 Nos.)	20 cum.	Fairly Good Condition
Diktel	Ferro cement (1 No.)	16 cum.	Fairly Good Condition
Diktel	Ferro cement (1 No.)	10 cum.	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 ferro cement tanks are in good condition.

As it has been mentioned already, small storage reservoirs having less than 40 cum capacity and the entire distribution 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. 100,000/-
2	Institutions HHs	NRs. 100,000/-

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 Mejn 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 8-5-2016	Chhabe Khola 6-16-2017	Ramba Khola 6-16-2017	Majh Khola 6-16-2017	
1	pH (25°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	165	78	32	1000
8	Total hardness as CaCO ₃	mg/l	38	112	80	16	5(15)
9	Chloride	mg/l	0.95	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	0.06	0.15	0.29	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	0.06	0.08	0.07	0.5-1.5
16	Calcium	mg/l	3.2	36.4	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	0.18	0.2
21	Cadmium	mg/l	< 0.003	< 0.003	< 0.003	< 0.003	0.003
22	Chromium	mg/l	< 0.01	< 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

N.D. = Not Detected

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;

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- 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. or Former Municipality						Total	%
		1	2	3	4	5	9		
1	No Toilet	1			3			4	2.4
2	Pit Latrine	34	36	4	9	3	1	88	9.5
3	Ventilated Pit Latrine	146	256	7	2	13		423	45.6
4	Water Seal/Pour Flush	55	100	159	54	40	4	415	44.6
5	Custom 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 of 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	21-30 Cum	>30 Cum
Processed 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.

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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)	11.46	14.04	30.2	44.88	160.04	241.88	282.6	212.8	162.06	33.24	4.36	0.0

Source: DDM, 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
1206_Okhalbhunga	89.35	113.53	131.36	149.24	172.84
1211_Khotang	91.11	135.93	158.06	196.19	236.03
1222_Diktel	71.82	98.45	118.59	138.74	165.36
Average Daily	85.25	115.97	130.68	161.19	191.41

Source: DDM, 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: DDM, 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

Local	Name	Scientific	Family	CITES	IUCN	Forest Act
	English					
Ban Biralo	Jungle cat	<i>Felis Chaus</i>	Felidae	2	LR/c	
Bandar	Monkey	<i>Macaca Assamensis</i>	Cercopithecoidea	2	VU	Protected
Chan Baph	Leopard cat	<i>Felis banyalensis</i>	Felidae	1	LR/nt	
Chitwa	Common Leopard	<i>Panthera pardus</i>	Felidae	1	LR/nt	
Dhedu	Langur Monkey	<i>Presbytis pardalis</i>	Cercopithecoidea	1	LR/nt	
Dums	Porcupine	<i>Hystrix indica</i>	Hystriidae			
Fayuro	Fox	<i>Vulpes bengalensis</i>	Canidae	3	DD	
Ghorai	Ghorai	<i>Ursus arctos</i>	Ursidae	1	LR/c	
Kharayo	Indian hare	<i>Lepus nigricollis</i>	Leporidae			
Lokharce	Squirrel	<i>Funambulus pennisi</i>	Sciuridae			
Mai samproo	Yellow-throated marten	<i>Marter flavigula</i>	Vestralidae	3		
Sayal	Jackal	<i>Canis aureus</i>	Canidae	3		

LR/c= 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

Local	Name	Scientific Name	Family	CITES
	English			
Bhanga-d	Sparrow	<i>Passer domesticus</i>	Passeridae	
Dhukur	Red Turtle Dove	<i>Streptopelia turtur</i>	Columbidae	
Huch	Owl Bait	<i>Tyto alba</i>	Tyrontidae	2
Kag	Crow	<i>Corvus macrorhynchos</i>	Corvidae	
Kali	Parrot	<i>Loxia curvirostris</i>	Psittacidae	
Koli	Cuckoo	<i>Cuculius indicus</i>	Cuculidae	
Lidone	Jungle Fowl	<i>Gallus gallus</i>	Phasianidae	
Mayur	Peacock	<i>Pavo cristatus</i>	Phasianidae	
Piura	Hill Partridge	<i>Arreophila hypoleuca</i>	Phasianidae	
Sarung	Myna	<i>Gracula religiosa</i>	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 (*Goviatis 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 (*Schinus wallichii*), and Utlis (*Alnus nepalensis*) dense mix forests, and Gobresalla. *Michelia 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)	<i>Bambusa nana</i> / <i>Dendrocalamus hookeri</i>	Gramineae			
Banjhi	<i>Quercus lanata</i>	Fagaceae			
Bot dhayera	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae			
Champ	<i>Michelia champaca</i>	Macnoliaceae	Protected	Listed	3
Chilaune	<i>Schinus wallichii</i>	Theaceae			
Dhale Kulus	<i>Cystonotus indica</i>	Fagaceae			
Dudilo	<i>Ficus neriifolia</i>	Moraceae			
Gobre Salla	<i>Pinus wallichiana</i>	Pinaceae			
Gurans	<i>Rhododendron arboreum</i>	Ericaceae			
Kafal	<i>Myrica asculenta</i>	Myricaceae			
Kaulo	<i>Machilus odoratissima</i>	Lauraceae			
Khama	<i>Sapium insignis</i> (Roxb.) Benth. Ex Hook f.	Euphorbiaceae			
Khole sala	<i>Pinus roxburghii</i>	Pinaceae			
Kyamun	<i>Syzigium cerasoides</i>	Myrtaceae			
Lampata	<i>Daubanga sonneratioides</i>	Lythraceae			
Mayal	<i>Pyrus pashia</i>	Rosaceae			
Mahuwa	<i>Engelhardtia spicata</i>	Juglandaceae			
Musure	<i>Castanopsis tribuloides</i>	Fagaceae			
Nibaro	<i>Ficus auriculata</i>	Moraceae			
Oak	<i>Quercus lamellata</i> , <i>vicana</i> , <i>glabata</i>	Fagaceae			
Pagun	<i>Prunus cerasoides</i>	Rosaceae			
Pnsaledo	<i>Erythrina speciosa</i>	Leguminosae			
Sissioo	<i>Dalbergia sissoo</i>	Leguminosae			
Tanko	<i>Bauhinia purpurea</i> L.	Leguminosae			
Utlis	<i>Alnus nepalensis</i>	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	<i>Ashotoda varicosa</i>	Acanthaceae
Aiselu	<i>Rubus ellipticus</i>	Rosaceae
Argeli	<i>Girardinia versifolia</i>	Urticaceae
Aasaro	<i>Viburnum erubescens</i>	Caprifoliaceae
Bhogara	<i>Maesa macrophylla</i>	Myrsinaceae
Dhure	<i>Colebrookia oppositifolia</i>	Labiatae
Ghodtapre	<i>Centella asiatica</i> (L.) Urban.	Umbelliferae
Lajjavati	<i>Mimosa pudica</i> L.	Leguminosae
Sajvan/Kadam	<i>Ocimum vitifolium</i> L.	Labiatae
Simali	<i>Vilox negundo</i>	Verbenaceae
Vanmara	<i>Eupatorium adenophorum</i> Spreng	Compositae

Source: Field survey, 2015



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
Arhunge	<i>Heteropogon contortus</i> (L.) Beauvois	Gramineae
Babiyo	<i>Eulaliopsis binata</i> (Rutz.) C.E. Hubbard	Gramineae
Banso	<i>Digitaria</i> sps. <i>Eragrostis</i> sps	Gramineae
Dubo	<i>Cynodon dactylon</i>	Gramineae
Kans	<i>Saccharum spontaneum</i>	Gramineae
Khar	<i>Saccharum spontaneum</i>	Gramineae
Salima	<i>Chrysopogon gryllus</i> (L.) Trin.	Gramineae
Siru	<i>Imperata cylindrica</i>	Gramineae
Ulia	<i>Themeda caudata</i> (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 Diktal 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 Sources with	Up to 1 cusec and utilizing up to 50 % of	More than 1 cusec and utilizing the total	NA



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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.

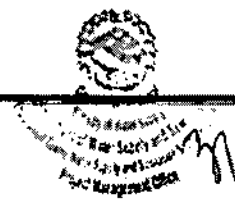
Primary data shall be obtained through Focus Group Discussions (FGDs) with communities, along with the pipeline routes under consideration. Additional data shall be collected from various Committees (Municipalities/VDCs, DDCs, NGOs, Community groups, etc.) through which the respective pipe alignments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

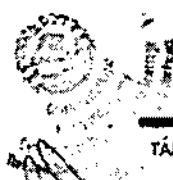
- Constitution of Nepal 2072 B.S. (2015 A.D.)
- Interim Constitution of Nepal 2063 B.S. (2007 A.D.)

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



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- 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)" 2068 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:

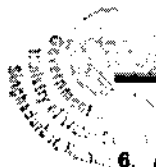
1. Environmental Specialist
2. Water Supply and Sanitation Engineer
3. Sociologist



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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

Pra-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 & route
- 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 increased 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.

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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 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.

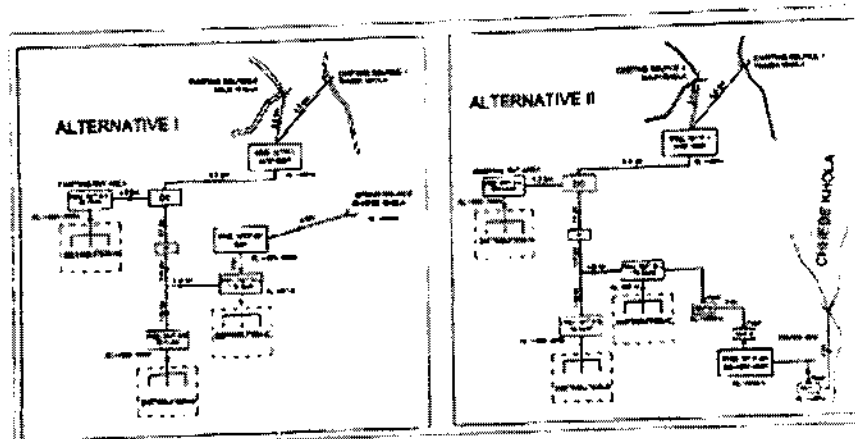


Figure 4-1: The Proposed Two System Alternatives

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), a separate



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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 best 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 MH	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

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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.

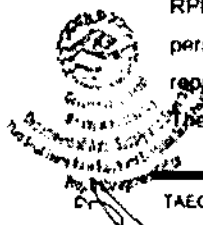
Public consultation and involvement should be given highest priority in the implementation of mitigation measures. Public consultation should take place and by decision of the consultation meeting, implementation of mitigation measures should be prioritized and should be carried out with the involvement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



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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

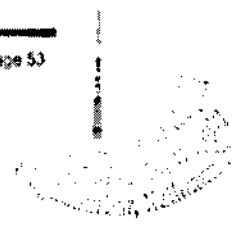
References

Annexes



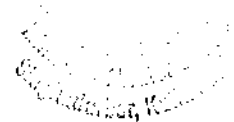
10. OTHER NECESSARY MATTERS

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.

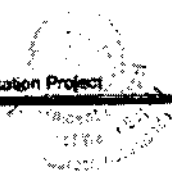


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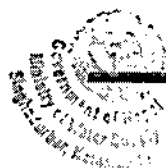


ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project



ANNEXES





TER for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

ANNEX I

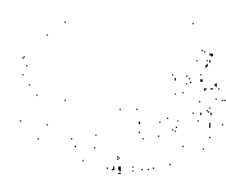
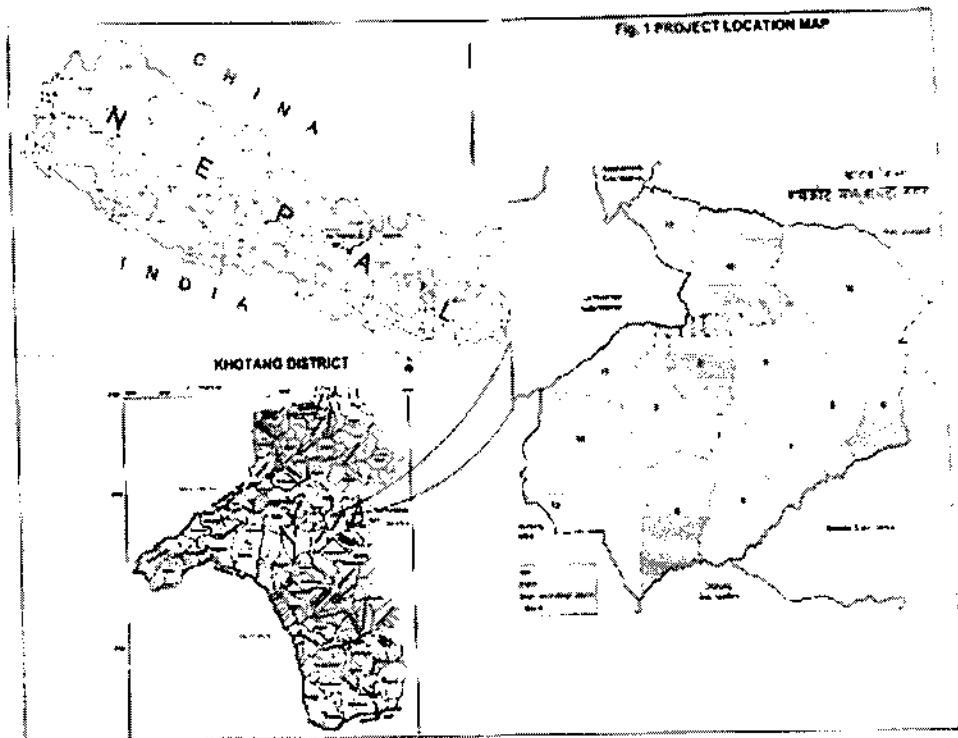
Project Location Map



Prepared by: JACED-ICDN JV

2018

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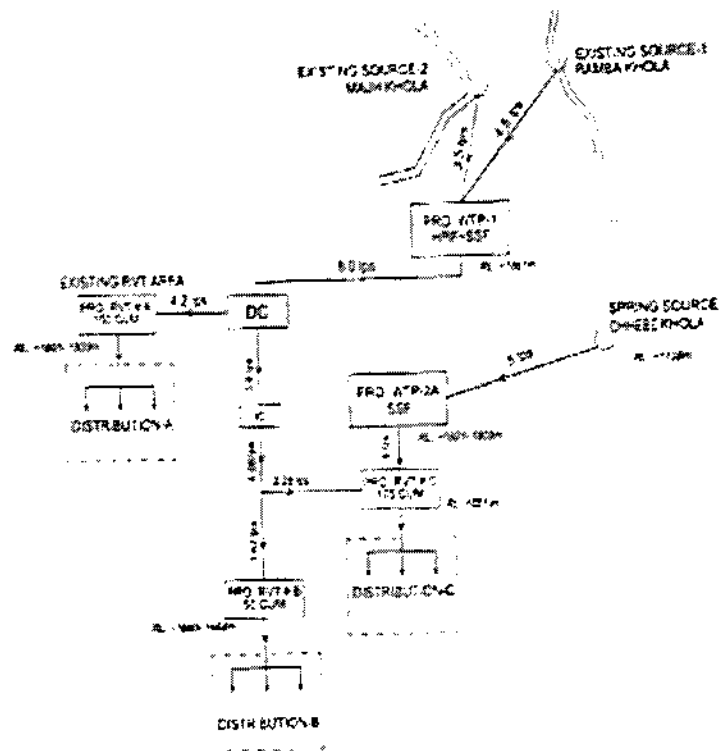


ANNEX II

Schematic & Layout Plan for the Proposed Project



ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project





ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

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



ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

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 checklist.

(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 Setting 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		☒	

ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

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/sites 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 NDVOS & its Directives.
Delivery of unsafe water to distribution system?	✓		Design proposes monitoring kiosk, a lab room. EMP recommends continuing training of WWSU in water quality monitoring, as prescribed in the NDVOS 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.

ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project



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?		✓	





ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

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 effluents (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
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Tool for Initial Environmental Examination of Diktel Water Supply and Sanitation Project



Location and design of project	Is the location and design of the project for its exposure likely to be affected by climate conditions including extreme weather related events such as flood, drought, storm, 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 used in flood pump etc.
Materials and maintenance	Would the project design get the exposure for material need to consider any high-moisture related parameters (e.g. sea-level, peak river flow, rainfall, water level, peak wind speed etc.)?	0	
	Would weather, climate and likely future climate conditions (e.g. increasing frequency level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity, and other meteorological parameters) affect the selection of project inputs over the life of project outputs (e.g. construction material)?	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 likely 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 created 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 which 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





ToR for Initial Environmental Examination of Diktel Water Supply and Sanitation Project

Checklist for Physical Environment

A. Topography/Physlography

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

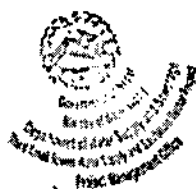
1. Collect any data on air quality of the area from previous literature
2. Investigate on the air polluting activities of the area (traffic, biomass burning, industries, other anthropogenic activities)

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



ToR for Initial Environmental Examination of Dikot Water Supply and Sanitation Project

CHECKLIST OF PLANT RESOURCES

Date:

[illegible]

Note:



CHECKLIST OF WILDLIFE ANIMALS

Date:

[illegible]

Note:



1. *Chlorophyll a* (Chl *a*)
 2. *Chlorophyll b* (Chl *b*)
 3. *Chlorophyll c* (Chl *c*)
 4. *Chlorophyll d* (Chl *d*)
 5. *Chlorophyll e* (Chl *e*)
 6. *Chlorophyll f* (Chl *f*)
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 124. *Chlorophyll atz* (Chl *atz*)
 125. *Chlorophyll auz* (Chl *auz*)
 126. *Chlorophyll avz* (Chl *avz*)
 127. *Chlorophyll awz* (Chl *awz*)
 128. *Chlorophyll axz* (Chl *axz*)
 129. *Chlorophyll ayz* (Chl *ayz*)
 130. *Chlorophyll azz* (Chl *azz*)
 131. *Chlorophyll azaa* (Chl *aza*
 132. *Chlorophyll abz* (Chl *abz*)
 133. *Chlor*



Date:

[illegible]

Note: 



For Initial Environmental Examination of Diktel Water Supply and Sanitation Project

Socioeconomic Questionnaire

१.१ जनजाति दिने व्यक्तिको नाम लेख्नुहोस्

(क) जिल्ला: (ख) गा.वि.स.
(ग) टोल स्थान: (घ) वार्ड नं.

१.२ पारिवारिक विवरण

(क) घरमालिकको नाम श्रीमान् र श्रीमती
(ख) जाति: (ग) उमेर: (घ) लिंग: ☐ पुरुष ☐ महिला ☐
(ङ) वैवाहिक स्थिति: (च) धर्म: (छ) व्यवसाय (घरमुर्तीका):
(ज) घरको वर्ष: (झ) शिक्षा:

(ञ) कुल परिवार सदस्य:

उमेर समूह	पुरुष	पेसा	महिला	पेसा	जम्मा
०-५ वर्ष					
६-१० वर्ष					
११-१५ वर्ष					
१६-४२ वर्ष					
४३-६० वर्ष					
६० भन्दा धेरै					
जम्मा					

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

जम्मा	विद्यालय गएका		विद्यालय नगएका	
	पुरुष	महिला	पुरुष	महिला

२. साक्षरता: (तपाईंको परिवारमा):

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

३. रोजी (मु.उपयोग):

३.१ नगण्डे वा परिवार सदस्यको नाममा गा.वि.स. र वडा भित्र जम्मा छ र

छ ☐ छैन ☐

३.२ यदि छ भने कति छ: रोजीमा भन्नुहोस्

क.स.	स्वामित्व	खेत	बारी	धरसारी	बन	कैलुखेत
१. आफ्नो						
२. मजदुरको						

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क्र.सं.	स्वामित्व	क्षेत्र	बारी	खरबारी	वन	कैफियत
३	कमाई बाएकी					
४	कमाउन दिएकी					
५	जग्गा					

३.३ गा.वि.स. या बडा बाहिर कुन ठाउँमा जग्गा छ ?

क्र.सं.	ठाउँको नाम	जग्गा				कैफियत
		क्षेत्र	बारी	खरबारी	वन	

३.४ तपाईंको जग्गा आयोजना भित्र पर्ने र एभिएलएम अभिलेखमा नभएको भएपनि प्रकृतियसँगै वा उच्चवर्धमान धनभावमा रहेको छैन

- घर क्षेत्र
- ☐ सम्झाई (फिटमा) ☐ पाखो बारी
- ☐ चौडाई (फिटमा) ☐ जंगल
- ☐ पानी ☐ अन्य
- ☐ तन्ना ☐ अन्दाजी मूल्य (सल्लुबन्नीमा) नेरु
- ☐ काँच

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

घर गोठ

क्र.सं.	विवरण	क्षेत्रफल
घर १		
घर २		
घर ३		

(१) कच्ची-खराने घरको (२) नक्की (दुहा, इटाको पत्राल र दुलान भित्रको) वा टिनको छानो ।

क्र.सं.	संख्या	क्षेत्रफल
गोठ		
अन्य (सल्लुबन्नी)		

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

क्र.सं.	आधान बाली	बाली लगाएको क्षेत्रफल	उत्पादन परिणाम
१	आधान बाली		
	धान		
	गहु		
	मकै		
	कोदो		

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घात गेडागुडी	
अन्य	
मैगदे बानी	
अन्य	
मैगदे	
तरकारी	
अन्य	

(ख) उक्त जग्गामा लगाएको फलफूल र अन्य घाट बिरुवाको विवरण दिनुहोस्

क्र.सं.	बोटबिरुवा	बिरुवा सख्या		जम्मा
		फल लागेको	फल नलाएको	
१	फलफूल			
२	कागती			
३	मुन्तन			
४	आम			
५	मैवा			
६	अन्य			
७	बिच्छी			
८	कटहर			
९	कुरा			
१०	आठ			
११	मासुसी			
१२	आठबलडा			
१३	अन्य			
१४	टुप्पे घाम			
१५	पाखुरी			
१६	काभ्रा			
१७	बहटा			
१८	खनायो			
१९	टाकी			
२०	गिद्धी			
२१	अन्य			
२२	इन्धनको लागि प्रयोग गर्ने घाट बिरुवा			
२३	काठमा प्रयोग हुने घाटबिरुवा			
२४	बालि निगालो			

३६ के तपाईंको जग्गामा भएको रन घाँगेको उत्पादनले तपाईंको परिवारलाई घान पुर्याउन भन्ने र

भयो ☐

नभयो ☐

३७ यदि अपर्याप्त भयो भने कति महिनाको लागि पुगेन र महिना

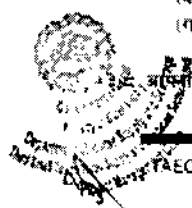
(क) शून्य महिना

(ख) छ महिना

(ग) नौ महिना

(घ) बाह्र महिना

अझै उत्पादन खाद्यान्न अपर्याप्त भएको बेलो आफ्नो परिवारलाई कमरी खुराउनु हुन्छ :



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- | | | | |
|---|-----------------------|---|------------------------------|
| क | बुध गरेर | ख | नाकरीबाट भएको आम्दानीबाट |
| ग | व्यापारीको आम्दानीबाट | घ | भारी बोक्रेर भएको आम्दानीबाट |
| ङ | दैनिक मजदुरबाट भएको | च | अन्य |

३९. पशुपालन सम्बन्धी :

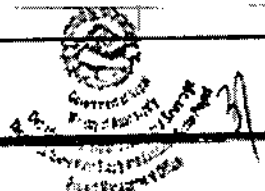
गर्पाईको घरमा कुति / कस्तो रसा पशीहरु पाल्नु भएको छ ?

क्र.सं.	पशुपंक्षी	संख्या
१	गाई	
२	बोक्रे	
३	भैँसी	
४	वाछु	
५	धोछु	
६	पाडा	
७	पाँडे	
८	रंगो	
९	धोडा	
१०	वाक्रे	
११	बोक्रे	
१२	ससी	
१३	वाछा / पाँडे	
१४	मंगुर / बगुर	
१५	हसि	
१६	कुखुरा	
१७	अन्य (खुलाउने)	

४. घर परिवारको वार्षिक औपत आम्दानी :

स्रोत	वार्षिक आम्दानी (रु.)	स्रोत	वार्षिक आम्दानी (रु.)
कृषिबाट		अन्य आयहरु	
सादात्म		भोकरी सेवा	
नगरवासी		ज्याला भजदुरी र अगुवा	
फलकृष		निर्वातकरण	
जम्मा (१)		ज्याला	
पशुपालनबाट		घरमा उद्योग	
दुग्ध उत्पादन		पेशागत सेवा	
अपडा कृषुग हाँस चिक		माछा बिक्री	
वाछा / वाछी / मोरु / चिक		अन्य	
अन्य रंगो चिक		जम्मा (२)	
वाक्रे / खरी / मेडा / वाछा			
चिक			
मंगुर / बगुर चिक			
कुखुरा हाँस चिक			
जम्मा (२)			
जम्मा आय (१+२)			

५. घर परिवारको वार्षिक औपत खर्च :



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विवरण	जम्मा रकम (रु.)	विवरण	जम्मा रकम (रु.)
शुभान		पिया	
गले		दाउरा	
मर्के		बिजुली	
लरकारी		मार्गगत	
दुध-दही		औषधि	
माछा-मासु		शिक्षा	
तेल-छ		कपडा	
भर-भसला		साइपब	
गुल		अन्य	
अन्य			
जम्मा खर्च			

५. पानीको आपूर्ति

क. तपाईंले यस खोलाको पानी उपयोग गर्नु हुन्छ कि हुदैन ?
 गर्नु ☐ गर्दैन ☐

ख. यदि खोलाको पानी प्रयोग गर्नु हुन्छ भने कुन प्रयोजनको लागि प्रयोग गर्नुहुन्छ ?
 सिँचाई ☐ नुहाउने, कपडा धुने ☐
 पिउने ☐ अन्य ☐

७. स्वास्थ्य सम्बन्धि:

क. तपाईंको परिवारमा कुनै सदस्य विगत वर्षमा बिगामी भएका थिए ?
 थिए ☐ थिएन ☐

ख. यदि थिए भने निम्न विवरण दिनुहोस् :

कस	नाता	पुरुष	महिला	उमेर	रोग
१					
२					
३					
४					

रोगको प्रकार - दिमाकझाला, भोट टाँडफाँड, हैजा, मलेरिया, टीबी, जर्डीम, छाया सम्बन्धी, निमोनिया, इस, रक्तचाप, एड्स र यीन रोग अन्य।

ग. बिगामी पसं सर्वप्रथम कहाँ जानुहुन्छ ?

घ. त्यहाँ निको नभए कहाँ जानुहुन्छ र कसमा उल्लेख गर्नुहोस् ।

कस	जाने ठाउँ	रहेको स्थान	दुरी (कि.मी.)
१	भक्तमान		
२	हेल्थसेन्टर		



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३	हेल्थ सेन्टर	
४	आयुर्वेदिक औषधालय	
५	निजि किर्तनक औषधी परस	
६	धामी भाकी	
७	अन्य	

८. महिलाको अवस्था:

(क) कामको वर्गिकरण

क्र.सं.	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
१	खनजोत		
२	मल राख्ने		
३	अमिन लवाये		
४	रोप्ने		
५	गोडमेल		
६	सिक्काई		
७	काट्ने		
८	योस्ने र बन्नुउने		
९	अन्न प्रमीधन (कुटाई पिसाई)		
१०	घाँस दाउग		
११	सौख्यो		
१२	मिलापल		
१३	खाना पकाउने		
१४	पानी पारे		
१५	अल्पावस्था र बढाउने रोगबाट		

(ख) सम्पत्तिमा अधिकार

क्र.सं.	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
१	घर		
२	जग्गा		
३	पशु		
४	सरसङ्गना		
५	उपयोग धन		
६	अन्य		

(ग) निर्णय प्रक्रियामा भागचुर

क्र.सं.	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
१	वाली योस्ने		

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क्र.सं.	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
१	पानी खरीदबिक्री		
२	मरगाहमा खरीदबिक्री		
३	अन्य खरीदबिक्री		
४	कमाफूस खरीदबिक्री		
५	पशुजन्य पदार्थ खरीदबिक्री		
६	काठ बाजुरा खरीदबिक्री		
७	बिहाकारी		
८	परिवार नियोजन		
९	छोराछोरी पढाई लेखाई		
१०	अन्य		

९. मुआवजा सम्बन्धी:

(क) तपाईंको घर र जग्गाको मुआवजा के मा चाहनु हुन्छ ?

नगद ☐ जग्गाको बराबरी जग्गा ☐ अन्य ☐

(ख) यदि तपाईंले मुआवजा नपढमा पाउनु भए भने उक्त मुआवजा रकम के मा प्रयोग गर्नु हुन्छ ?

जग्गा किन्ने ☐ घर बनाउने ☐ खान दिने ☐
स्थापना गर्ने ☐ अन्य ☐

१०. प्रस्ताव कार्यान्वयन गर्दा के जग्गा प्रभाव पर्ने सम्बन्धमा सम्बन्धी गण मुक्याप छ र
सकारात्मक: नकारात्मक:



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ANNEX IV

Comment Response Matrix





ANNEX 2: SAMPLE FORMS, FORMATS AND REPORT TEMPLATE



ANNEX 2A: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST FOR DIKTEL PROJECT AND PRELIMINARY CLIMATE RISK SCREENING CHECKLIST FOR SAMPLE PROJECT TOWNS

Instructions:

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

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

Country/Project Title: **NEP: Urban Water Supply and Sanitation (Sector) Project**

Project: **Diktel Water Supply and Sanitation project**

Screening Questions	Yes	No	Remarks
A. Project Siting : Is the project area			
Densely populated?	√		Rupakot Majhuwagadhi Municipality has moderate population density.
Heavy with development activities?	√		The distribution pipeline will partially go through the RoW in core bazaar areas of the Municipality. Development activities are of low moderate intensity.
Adjacent to or within any environmentally sensitive areas?			
Cultural heritage site		√	
Protected Area		√	
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	

Prepared by: [Signature]
Checked by: [Signature]
Reviewed by: [Signature]

Screening Questions	Yes	No	Remarks
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?	√		The proposed project proposes office building that also comprises water quality laboratory to deliver safe water. EMP recommends continuing training of WUSC in water quality monitoring as
Inadequate protection of intake works or wells, leading to pollution of water supply?	√		Design has considered the safest site for intake regarding environmental pollution and proposes enough measures to mitigate contamination.
Over pumping of ground water, leading to salinization and ground subsidence?		√	
Excessive algal growth in storage reservoir?		√	EMP provides mitigation measures.
Increase in production of sewage beyond the capabilities of community facilities?		√	EMP provides mitigation measures.
Inadequate disposal of sludge from water treatment plants?		√	Minimal sludge expected. EMP provides mitigation measures.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	



Screening Questions	Yes	No	Remarks
Impairments associated with transmission lines and access roads?	√		EMP provides mitigation measures
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	√		EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.
Health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?		√	EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.
Dislocation or involuntary resettlement of people?		√	
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
Noise and dust from construction activities?	√		EMP provides mitigation measures.
Increased road traffic due to interference of construction activities?		√	EMP provides mitigation measures.
Continuing soil erosion/silt runoff from construction operations?		√	
Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√		EMP incorporates monitoring of distributed water according to the Directives for the NDWQS.
Delivery of water to distribution system, which is corrosive due to inadequate attention to the feeding of corrective chemicals?	√		EMP provides mitigation measures through proper monitoring.
Accidental leakage of chlorine gas?		√	

Screening Questions	Yes	No	Remarks
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.
Large population influx during project construction and operation that causes an increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	
Social conflicts if workers from other regions or countries are hired?	√		Priority will be given to local workers.
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?	√		EMP provides mitigation measures.
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project area accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	√		EMP provides mitigation measures.



Preliminary Climate Risk Screening Checklist for the Project Town

Screening Questions		Score	Remarks
Location and design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides	0	Investments in the sample project will not likely be affected by climate change and extreme weather events due to the siting of project. For example all pipes will be constructed underground no investments will be sited in flood plains etc.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g. sea-level, peak river flow, reliable water level, peak wind speed etc.)	0	Not likely. There are various sources that will be used for the proposed project. Further source water protection will be carried out.
Materials and maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity, and hydro 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: RELEVANT ENVIRONMENTAL QUALITY STANDARDS

B.1 Ambient Air Quality Standards

Parameter	Averaging Period	Nepal's Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) *	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$) **	
			Global Update 2005	Second Edition ^
TSP	Annual	-	-	-
	24-hour	230	-	-
PM ₁₀	Annual	-	20	-
	24-hour	120	50	-
PM _{2.5}	1-year	-	10	-
	24-hour	-	25	-
SO ₂	Annual	50	-	-
	24-hour	70	20	-
	10-minute	-	500	-
NO ₂	1-year	40	40	-
	24-hour	80	-	-
	1-hour	-	200	-
CO	8-hour	10,000	-	10,000
	15-minute	100,000	-	100,000
Pb	1-year	0.5	-	0.5
Benzene	1-year	20	-	-

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

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

^ Air Quality Guidelines for Europe, Second Edition, 2000. WHO Regional Office for Europe, Copenhagen.

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

B.2 Noise Level Standards

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

* Guidelines for Community Noise, WHO, 1999.

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



B.3 National Drinking Water Quality Standards, 2006

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

* Health-based guideline values

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

^ These standards indicate the maximum and minimum limits.

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

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

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

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ANNEX 2C: SAMPLE GRIEVANCE REDRESS FORM

(To be available in Nepalese and English)

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

Date		Place of registration	
Contact Information/personal details			
Name	Gender	*Male *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: SAMPLE TRAFFIC MANAGEMENT PLAN

SAMPLE: TRAFFIC MANAGEMENT PLAN (TMP)

A. Principles

One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

- (i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
- (ii) protection of work crews from hazards associated with moving traffic;
- (iii) mitigation of the adverse impact on road capacity and delays to the road users;
- (iv) maintenance of access to adjoining properties
- (v) Avoid hazards in
- (vi) Addressing issues that may delay the project.

B. Operating Policies for TMP

The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.

- (i) Make traffic safety and temporary traffic control an integral and high-priority element of every project from planning through design, construction, and maintenance.
- (ii) Inhibit traffic movement as little as possible.
- (iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
- (iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
- (v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
- (vi) Train all persons that select, place, and maintain temporary traffic control devices.
- (vii) Keep the public well informed.
- (viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

C. Analyze the impact due to street closure

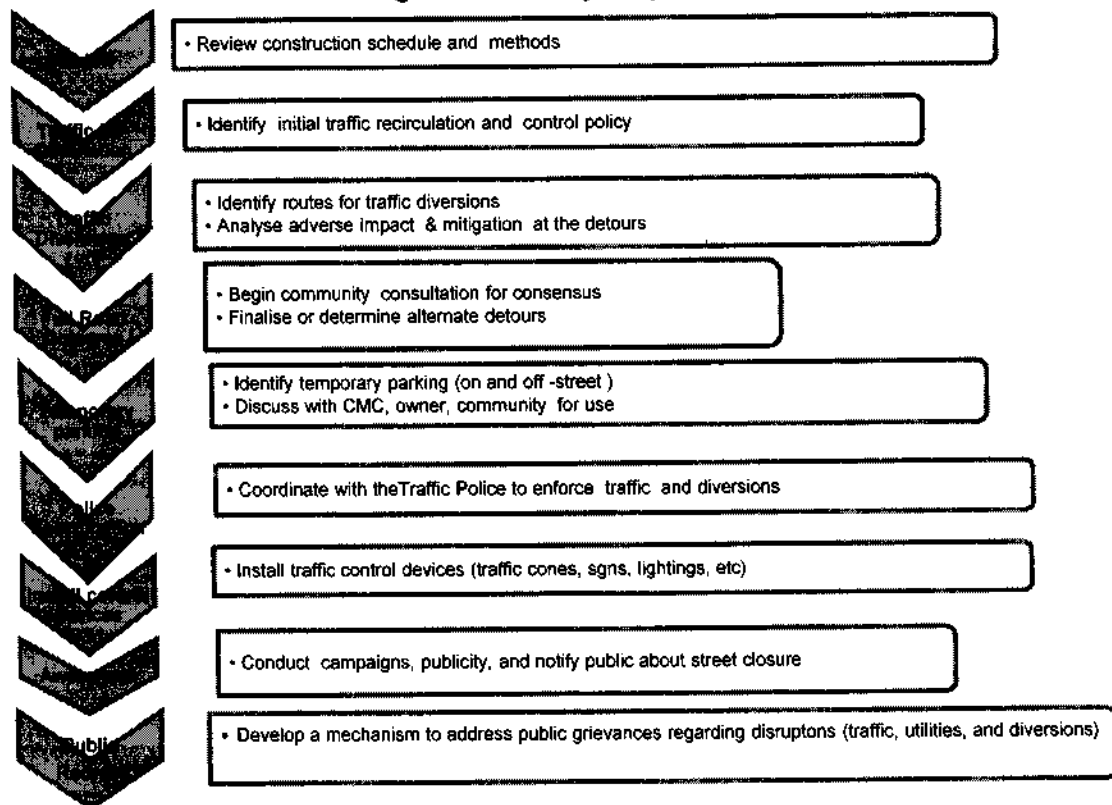
Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

- (i) approval from the ICG, local administration to use the local streets as detours;
- (ii) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
- (iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
- (iv) determining if additional traffic control or temporary improvements are needed along the detour route;
- (v) considering how access will be provided to the worksite;

- (vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- (vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

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

Figure A1: Policy Steps for the TMP



D. Public awareness and notifications

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

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

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

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

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

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

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

E. Vehicle Maintenance and Safety

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

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

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

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

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

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

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

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

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

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



ANNEX 2E:SPOIL MANAGEMENT PLAN

Spoil Management Plan (SMP)

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

Objectives of SMP: The objectives of SMP are:

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

Structure of SMP:

Section 1: Introduction of SMP

Section 2: Legal and other requirements

Section 3: Roles and responsibilities

Section 4: Identification and assessment of spoil aspects and impacts

Section 5: Spoil volumes, characteristics and minimization

Section 6: Spoil reuses opportunities, identification and assessment

Section 7: On site spoil management approach

Section 8: Spoil transportation methodology

Section 9: Monitoring, Reporting, Review, and Improvements

Aspects and Potential Impacts

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

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

Spoil volumes, Characteristics and Minimization

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

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

Adopt Spoil Reduce, Reuse Opportunities

An overview of the assessment methodology to be used is mentioned below.

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

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

Storage and stock piling

Transportation and haulage route

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

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

Appendixes

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection Report
- Others



ANNEX 2F: SAMPLE SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

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

INTRODUCTION

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

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

COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS

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

COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

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

COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

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



- Is there any chemical stored on site and what is the storage condition?
- Is there any dewatering activities if yes, where is the water being discharged;
- How are the stockpiles being managed;
- How is solid and liquid waste being handled on site;
- Review of the complaint management system;
- Checking if there are any activities being under taken out of working hours and how that is being managed.

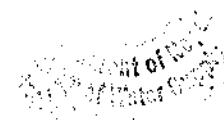
Summary Monitoring Table

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

Overall Compliance with CEMP/EMP

No.	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


 Department of Environment and Natural Resources
 Division Office - Marikina City

MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (AMBIENT AIR, WATER QUALITY AND NOISE LEVELS)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)

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

Water Quality Results

[illegible][illegible]

Noise Quality Results

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

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

ANNEX 2G: SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

NAME: _____
TITLE: _____
LOCATION: _____

DATE: _____
DMA: _____
GROUP: _____

WEATHER CONDITION:

INITIAL SITE CONDITION: _____

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory _____ Incident _____ Resolved
_____ Unresolved _____

INCIDENT:

Nature of incident: _____

Intervention Steps: _____

Incident Issues

Resolution

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Inspection

Emissions	Waste Minimization
Air Quality	Reuse and Recycling
Noise pollution	Dust and Litter Control
Hazardous Substances	Trees and Vegetation
Site Restored to Original Condition	Yes ☐ No ☐

Signature

Sign off

Position

Name
Position



ANNEX 3:
PUBLIC NOTICE, MUCHULKA, MINUTES OF MEETINGS, CONSENT LETTER &
CERTIFICATE OF WUSC REGISTRATION



PUBLIC NOTICE

[illegible][illegible]

MUCHULKA

सुचना टाँस गरिएको मुचुल्का

लिखितमा हामी तपशिलमा उल्लेखित व्यक्तिहरुको रोहवरमा खोटाङ जिल्ला दिक्तेल रुपाकोट मझुवागढि नगरपालिकामा संचालन हुने तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजना संचालनको शिलशिलामा गर्नु पर्ने कार्यक्रम अनुसारको यस योजना क्षेत्रको प्रारम्भिक वातावरणिय परिक्षण कार्यक्रमको सार्वजनिक सुचना टाँस मिति २०७५/०९/११ मा खानेपानी तथा सरसफाई सब डिभिजन को कार्यालय खोटाङमा टाँस गरिएको हुदाँ सो मुचुल्का गरिदिएका छौं ।

तपशिल

१. १७/०९/७५ मा १०.५०. १३.२३०० १३.२३०० १३.२३००

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३. १७/०९/७५ मा १०.५०. १३.२३०० १३.२३०० १३.२३००

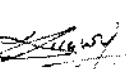
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५. १७/०९/७५ मा १०.५०. १३.२३०० १३.२३०० १३.२३००

सुचना टाँस गरिएको मुचुल्का

लिखितम हामी तपशिलमा उल्लेखित व्यक्तिहरुको रोहवरमा खोटाङ जिल्ला दिक्तेल रुपाकोट मझुवागढि नगरपालिकामा संचालन हुने तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजना संचालनको शिलशिलामा गर्नु पर्ने कार्यक्रम अनुसारको यस योजना क्षेत्रको प्रारम्भिक वातावरणिय परिक्षण कार्यक्रमको सार्वजनिक सुचना टाँस मिति २०७५।०९।११ मा जिल्ला समन्वय समितिको कार्यालय खोटाङमा टाँस गरिएको हुदाँ सो मुचुल्का गरिदिएका छौं ।

नगरपालिका

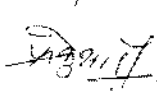
१. सम्पदा विकास जिल्ला उद्योग संस्थानको का. खोटाङ 
२. प्रिन्सिपल _____ " _____ 
३. जलसंधान विभाग _____ " _____ 
४. जलसंधान विभाग _____ " _____ 



सुचना टाँस गरिएको मुचुल्का

लिखितमा हामी तपशिलमा उल्लेखित व्यक्तिहरुको रोहवरमा खोटाङ जिल्ला दिक्तेल रुपाकोट मझुवागढि नगरपालिकामा संचालन हुने तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजना संचालनको शिलशिलामा गर्नु पर्ने कार्यक्रम अनुसारको यस योजना क्षेत्रको प्रारम्भिक वातावरणिय परिक्षण कार्यक्रमको सार्वजनिक सुचना टाँस मिति २०७५/०९/११ मा जिल्ला प्रशासन कार्यलय खोटाङमा टाँस गरिएको हुदाँ सो मुचुल्का गरिदिएका छौं ।

तपशिल

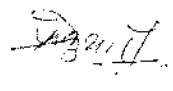
- १ सोम प्र. आचार्य जिल्ला प्रशासन कार्यलय 
- २ रमेश कु. शिपा जिल्ला " " 
- ३ लक्ष्मी प्र. आचार्य " — " 
- ४ रमेश कुमारी आचार्य " — " 
- ५



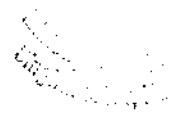
सुचना टाँस गरिएको मुचुल्का

लिखितम हामी तपशिलमा उल्लेखित व्यक्तिहरुको रोहवरमा खोटाङ जिल्ला दिक्तेल रुपाकोट मझुवागढि नगरपालिकामा संचालन हुने तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजना संचालनको शिलशिलामा गर्नु पर्ने कार्यक्रम अनुसारको यस योजना अन्तर्गत प्रारम्भिक वातावरणिय परिक्षण कार्यक्रमको सार्वजनिक सुचना टाँस मिति २०७५/०९/११ मा जिल्ला प्रशासन कार्यलय खोटाङमा टाँस गरिएको हुदाँ सो मुचुल्का गरिदिएका छौं ।

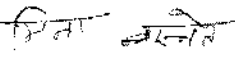
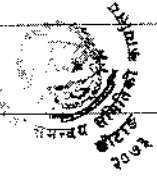
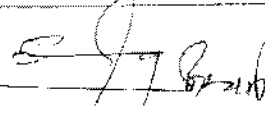
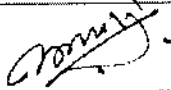
नमोशल

१. दौम प्र. आचार्य जिल्ला प्रशासन कार्यलय 
२. वीर कु. थापा जिल्ला " " 
३. लक्ष्मी प्र. आचार्य " — " 
४. रमेश कुमार आचार्य " — " 

५



श्री रम्वाखोला माझखोला साना शहरी खानेपानी तथा सरसफाई
उपभोक्ता संस्था

सिन	सुचना टाँस गरिएको कार्यालय	सुचना वुभिलिनेको नाम	सहि/छाप	कैफियत
१	जिल्ला प्रशासन कार्यालय खोटाङ			
२	जिल्ला समन्वय समितिको कार्यालय खोटाङ			
३	दिक्तेल रुपाकोट मझुवागढि नगरपालिकाको कार्यालय दिक्तेल			
४	खानेपानी तथा सरसफाई सब डिभिजन को कार्यालय खोटाङ			

MINUTES OF MEETING

आज भैरवी २०७६/१०/१७ गते यस सभा सभामा आभार स्वीकार
 गर्दै सभा सभरी स्वागतार्थी आयोजना बा. अध्यक्ष श्री जङ्गल
 मात्र राइको सम्पादनमा यस दिनेक ६-११ गते पालिकामा
 सम्पादनमा अध्यक्ष पालिकामा प्रस्तुतकरण कार्यक्रममा
 विमानसुसम्पन्न उपस्थिति रहि विमान प्रस्तावहरूमा
 हलफल गति विमानसुसम्पन्न विनिर्देशन गरियो ।

१. उपस्थिति

अध्यक्ष - श्री जङ्गल मात्र राइ
 प्रमुख अतिथि - श्री दिप जारायण रिजाल मगर दिनेक मगर
 विशेष अतिथि - प्रमुख जिल्ला अधिकारी श्री एकदेव अधिकारी मगर

२. उप-मेयर श्री विद्यादेवी राइ
 ३. सभासदहरू स्वागतार्थी आयोजना उप आयोजना निर्देशन श्री
 नारायण प्रसाद अधिकारी

४. DRTAC टिम कोआर्डिनेटर श्री हरी प्रसाद शर्मा
 ५. प्राविधिक सहयोग माहाबहादुर गज्जर विकास कोष प्रमुख
 श्री युवाशरण पन्थ

६. ADB कन्सल्टेन्स श्री केदार राज विष्ट
 ७. डिजाइन इन्जिनियर टेक आइकन श्री रिजत अर्वाल
 ८. G-EST इन्जिनियर टेक आइकन श्री रोमान सुवेदी
 ९. स्वागतार्थी इन्जिनियर टेक आइकन श्री दुर्गा ब. वासिया

१०. अतिथि - श्री. उत्तर बजिमर - स्वागतार्थी तथा सहकारिता वि. वि. वि.
 ११. श्री राम क. राइ -
 १२. सलोच राइ नेकपा (माओवादी) केन्द्र
 १३. सुदन म. तिवारी

१४. दिप बहादुर तामा (हिसाईट स्यान्डल सेक्टर)

१५. सुदामा पौडेल सैजि दिनेक मगर
 १६. राज कुमार रिजाल वाला मगर समाज नेपाल

१७. जे. नारायण रिजाल वडा नं. १ तामा
 १८. उदय राइ
 १९. लक्ष्मी दत्त राइ
 २०. राजेश राइ

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युधिर शास्त्रा
दिनेश कर्मा

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मा. उ. उमाय करन प्रेम ११

31/05/2024

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 निवास :

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दिपक शर्मा / वरुण राव हाडाहा
असल को शोधन बहादुर क. स. नं. १

॥ श्री गणेशाय नमः ॥
 श्री गणेशाय नमः ॥

श्री श्री गुरुदेव

गुमराज राजा दिनांक - १
चित्र का बखाना काशीना

पित्रे वरं वस्तुनः १०२५५५ दत्तकुशम्
गन्तव्यं जगतां योः १३

गणेश ज्ञानेश्वर ॥ १ ॥

१०/११/१९९९ (बुधवार) ११/११/९९

St. John's College

कुविराज जमल दि. 02.04.2018 2018

1879

उत्सव समिति के ग.नपा-१
देवराज सिन्हा क.प्र.न.पा. वाडने २.

पद्मेश आचार्य १
कमल कान्तिशर्मा १
ए.एम.एस.एस. १
रामन एस.एस. १

पद्मपुष्पा आचार्य क.प्र.न.पा. - ६ ५

च.एस.एस. क.प्र.न.पा. - १ ५

प्रा.एस.एस. १ ५

दिलीपकुमार बर्मा क.प्र.न.पा. - १ ५

पद्मेश आचार्य क.प्र.न.पा. - १ ५

कु.प्र.न.पा. - १ ५

कु.प्र.न.पा. - १ ५

कु.प्र.न.पा. - १ ५

कु.प्र.न.पा. - १ ५

कु.प्र.न.पा. - १ ५

१. संभाव्यता अध्ययन प्रतिवेदन प्रस्तुतिकरण करें.
२. संरचना निर्माण के लिए आवश्यक जगह उपलब्ध करावें.
३. आवश्यक आगमन रक्त २% उठाव करें.
४. आयोजकों को वातावरणीय तथा सामाजिक सुरक्षा करें.
५. विविध

निर्णय

पक्षानुसार १ मा कलकल गार्ड दिल्हेर नगर आयोजकों
संभाव्यता प्रतिवेदन परामर्शदाता TACE ICON JV
को टिप्पणी प्रस्तुत भयो। डिजाइन इन्जीनियर श्री सृज
अर्थात् जे.सी.वि. रोजन सुवेदीले संभाव्यता अध्ययन प्रति
वेदन प्रस्तुत गर्नुभयो। सो प्रतिवेदन माथि संशोधन गरा
हो, किन कारणले कलकल अलकिया भए पश्चात विकल्प
नं. १ अनुसार आयोजन अगाडी बढाउने निर्णय गरियो।

पक्षानुसार नं. २ मा कलकल गार्ड आयोजकों आवश्यक
संरचना निर्माण के लिए आवश्यक जगह उपलब्ध गरा
उन खानेपानी सप्लाय तथा सुवर्धित श्रोत गरावा
वह प्रतिवेदन अर्पण गरियो।

प्रस्ताव नं. ३ मा हस्तफुल गर्दा दिनेकै जार आयोजना
प्रमाण लागतको ४१% आगम रकम खर्चज गर्ने खानेपानी
धामेही तथा सम्बन्धित खरोकरवालाहरुबाट प्रतिवद्धता थप
गरियो ।

प्रस्ताव नं. ४ मा हस्तफुल गर्दा तेश्रा शम्पा सहरी खानेपानी
तथा सूर्यफर्छ आयोजनाले अपनाएको बातावरणीय
तथा सामाजिक सुरक्षा पद वारे जानकारी गरायो ।

प्रस्ताव नं. ५ मा हस्तफुल गर्नु पर्ने विषय सहित
ती कार्यक्रमको अन्त्य गरियो !

गोर्खा
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गोर्खा
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CONSENT LETTER FOR THE LAND DONATION

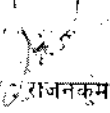
महोदय

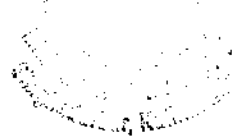
20/07/2020

विषयगत मन्त्रालय गारि दिनेकालामे चल्काविके
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वर्ष ६८ को रक्का बहादुर वनेत १०० एकर वन को
बुहारी रक्का बहादुर वि. श्रीमती को ००० दिनेकालामे
१०० एकर वन १०० एकर हाल दिनेकालामे १०० एकर
ने १०० एकर वन वि. कृष्ण प्रसाद वनेत १०० एकर
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निहवा दिनेकालामे १०० एकर वन १०० एकर हाल दिनेकालामे
४-४-२-२ प्रकाश ०-४-०-० भुजा भुजा कृष्ण भुजा
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२४ गते रोज २ २२०००

मन्त्रालय
१. श्रीमान श्रीमती कर्त कर्त कर्त कर्त कर्त कर्त कर्त
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CERTIFICATE OF WUSC REGISTRATION

	
दर्ता मिति : २०७४।६।१	(नियम ६ को उपनियम १०१ संग सम्बन्धित)
दर्ता नम्बर : १९७	उपभोक्ता संस्था/व्यक्ति प्रमाणपत्र
	खोटाङ जिल्ला जलश्रोत समिति
	मिति : २०७४।६।१
श्री रम्वाखोला माझखोला खाना सहरी खानेपानी तथा सरसफाई उपभोक्ता संस्था रुपाकोट मझुवागढी न.पा.वि.सं. १ खोटाङ	
श्री रम्वाखोला माझखोला खाना सहरी खानेपानी तथा सरसफाई उपभोक्ता संस्था रुपाकोट मझुवागढी न.पा.वि.सं. १ खोटाङ जलश्रोत ऐन, २०४९ को दफा ५ उपदफा (२) तथा जलश्रोत नियमावली, २०५० को नियम ६ को उप नियम (१) बमोजिम २०७४ साल अशोज महिना १ गते यस कार्यालयमा दर्ता गरी यो दर्ता प्रमाणपत्र प्रदान गरिएको छ । जलश्रोत ऐन, २०४९ र जलश्रोत नियमावली, २०५० बमोजिम आफ्नो कार्य संचालन गर्नुहोला ।	
सहि :	
नाम थर :	राजनकुमार वि.सी.
पद :	स्थानीय विकास अधिकारी



विश्वेस्वर रुपाकोट मझगाडी नगरपालिका

विश्वेस्वर रुपाकोट

पत्र ०५५/०५५
चन १५१०

प्रका. दि. २०७५/१०/१९

मिति २०७५/१०/१९

विषय: सिफारिस गरिएको बारे ।

श्री खानेपानी विभाग खानेपानी आयोजना आवस्थापन कार्यालय
सहरी खानेपानी आयोजना पानीपाखरी काठमाण्डौ ।

प्रस्तुत विषयमा यस विश्वेस्वर रुपाकोट मझगाडी नगरपालिकामा सञ्चालन हुने खानेपानीका लागि मुहानको प्रयोग आदी विषयमा अध्ययन गरि वातावरण सम्बन्धिको प्रतिवेदन तयार गरिसकेको र उक्त प्रतिवेदन सम्बन्धी छुट जानकारी यस नगरपालिकाको सुचना मिति २०७५/१०/१९ गते टाँस गरि राष्ट्रिय स्तरको मूल्यांकनमा प्रस्तुत गरि राख्न सकिने गरि सकेको छ । प्रतिवेदन मिति २०७५/१०/१९ गते सरोकारवाला हरूको माध्यमबाट प्रस्तुत गरिएको र सो प्रतिवेदन डिजाइनर, इन्जिनियर प्रस्तुत तथा अध्ययन पश्चात यस नगरपालिकामा सञ्चालन हुने खानेपानी आयोजनाले हाम्रो जनमानसमा कुनै भौतिक तथा जीव जलानयमा कुनै नकारात्मक असर पर्ने भन्ने कुराको स्यातीय स्तरको जानकारीहरूबाट राम्रो सुझाव प्राप्त भएकोले आयोजना सञ्चालनको लागि यस नगरबाट सिफारिस गरि पठाइएको व्यहोरा अनुरोध गर्दछु ।

दिपनारायण शिखल
नगर प्रमुख
विश्वेस्वर रुपाकोट मझगाडी नगरपालिका

www.rupakotimazhganon.gov.np
Mail: rupakotimazhganon@gmail.com

ANNEX 4: SURVEY QUESTIONNAIRE

**तेश्रो साना शहरी खानेपानी तथा सरसफाइ आयोजना
घरधुरी सर्वेक्षण वस्तित् प्रश्नावली**

(आयोजना प्रयोजनको लागि मात्र तथ्यांकको प्रयोग गरिनेछ)

नगर आयोजना: Diktel WSSP	घर नं.
जिल्ला: Khotang	नगरपालिका/गा.वि.स. Rupakot Majhuwagadhi
अन्तरवार्ता लिनेको नाम:	अन्तरवार्ता मिति: 29 Jan, 2019
सुपरिवेशकको नाम:	मोड नं.: J4-7

१. सामाजिक-आर्थिक तथा अन्य विवरण

(उपयुक्त कोठामा (✓) यो चिन्ह लगाउनुस् वा आवश्यक विवरणहरू भर्नुहोस्)

- १.१ अन्तरवार्ता दिनेको नाम: **Khadga Bahadur Rai**
- १.२ घरमालिको नाम: **Rai** लिंग: ☒ पुरुष ☐ महिला ☐ तैसा लिङ्ग ☐ पेशा: ☒ पेशा
- परिवार सदस्य: पुरुष **2** महिला **5** तैसा लिङ्ग ☒ जम्मा: **7** एकल महिला घरमालिक भए ☒
- १.३ यस परिवारमा शारीरिक रूपमा अशक्तता भएका परिवार सदस्य संख्या: ☒
- १.४ जाति/जनजातिमध्ये कुन हो: क) ब्राह्मण/क्षत्री ☐ ख) जनजाति ☒ ग) दलित ☐ घ) अन्य ☐
- परिवारको स्वरूप: एकल ☐ संयुक्त ☒
- १.५ घर परिवारका सदस्यहरूको विवरण दिनुहोस्

क्र.सं.	घरपरिवारका सदस्य	पेशा	शिक्षा	संस्था
१				
२				
३				
४				
५				
६				
७				
८				
९				
१०				

- नोट: पेशा: ☒ कृषि २. व्यापार ३. नोकरी ४. उद्योगधन्दा ५. रेमिटेन्स (वैदेशिक रोजगार)
६. ज्याला ७. अन्य ८. कुनै पेशा नभएका आश्रित जस्तै: विधार्थी, गृहिणी, अशक्त वृद्धावृद्धी, ५ वर्ष मुनिका बालबालिका आदि नोट गर्ने)
- १.६ शिक्षा: १. निरक्षर ☒ साक्षर २. प्राथमिकसम्म ४. माध्यमिकसम्म ५. एस.एल.सी. उत्तिर्ण
६. आई.ए. ७. बि.ए. ८. एम.ए. ९. अन्य
- १.७ यस परिवारमा बसोबास गर्ने अन्य सदस्यहरूको विवरण: सहयोगी ☐ डेरावाल ☐ कुल संख्या ☐
- १.८ यस नगर/शहरमा कहिले देखि बस्दै आउनु भएको छ? ☒ वर्ष
- स्वचाली ☒ बसाइ सरेको ☐ बसाइ सरी आएको भए कुन जिल्लाबाट
- १.९ बसाइ सर्नुको कारण: प्राकृतिक प्रकोप ☐ व्यापार/व्यवसाय ☐ शिक्षा ☐ द्वन्द्व ☐ जिविकोपार्जन ☐
- १.१० यो घर आफ्नै हो? हो ☒ भाडामा बसेको ☐ अन्य ☐ भाडामा बसेको भए मासिक कति तिर्नुहुन्छ ☐
- १.११ यस घरमा भान्सा कोठा बाहेक अन्य कुन वटा कोठाहरू छन्?

१ कोठा ☐ २ कोठा ☐ ३ कोठा ☒ कोठा वा सो भन्दा बढी ☐
 १.१२ घरको अवलोकन गरी घरको किसिम लेख्ने : पक्की ☐ पक्की ☐ कच्ची ☒
 (पक्की : छत ढलान, अर्ध पक्की : ढुङ्गा/इँहाको गान्छो, टीनको छान्ता/ढुङ्गा/स्लेट/फिगरी टायल आदि, कच्ची : माटो गान्छो र खर/टायल/खपडाको छान्ता)

१.१३ यस परिवारसँग जग्गा जमीन छ ? छ ☒ छैन ☐ छैन भने सुकुम्बासीको रूपमा गणना गर्ने।

जग्गा कति छ ? ३ आना

१.१४ यहाँले गाई/बैसी पाल्नु भएकोछ ? छ ☐ छैन ☒ छ भने कतिवटा ? एउटा ☐ दुईवटा वा बढी ☐

१.१५ तपाईंको परिवारमा तल उल्लेखित कुन कुन सामान छन् ? (भएको सामानको संख्या लेख्ने)

क्र.सं.	सामान	संख्या	काम	काम
१	साइकल/रिक्सा		१	सुतेप/ग्यास जुन
२	मोटरसाइकल		१०	रेफ्रिजेटर
३	बैलगाडा		११	वासिङ मेशिन
४	कार, जिप		१२	वाटर फिल्टर
५	मिनीबस/बस		१३	कम्प्युटर
६	ट्रयाक्टर/ट्रक		१४	इमेल/इन्टरनेटको पहुँच
७	मुडियो/क्यासेट	१	१५	अन्य भए उल्लेख गर्ने।
८	टेलिभिजन/भिडियोसेट	१	१६	Mobile

१.१६ यदि मुल पेशा कृषि भए कति महिना खान पुग्छ ? ३ महिना ☐ ६ महिना ☐ ९ महिना ☐ १२ महिना ☒

यदि तपुग भएमा कसरी धान्नु हुन्छ ? १. व ☐ वार २. करी ☐ करी ३. उ ☐ गधन्दा ४. रेमिटेन्स/वैदेशिक रोजगार ५. ज्याला ६. अन्य

१.१७ तपाईंको परिवारको औसत वार्षिक खर्च कति छ उल्लेख गर्नुहोस।

क्र.सं.	विवरण	मासिक खर्च	वार्षिक खर्च
१	(क) कृषि तर्फ		
१.१	रसायनिक मल, बिउ, किटनाशक आदी खरिद गर्ने		
१.२	माटोको तैयारी, रोप्ने, गोड्ने, बाली काट्ने, भित्राउने, ढुवानी र बिक्री गर्दा हुने खर्च		
१.३	अन्य भए (उल्लेख गर्नुस)		
	(क) को जम्मा		
२	(ख) गैर कृषि तर्फ		
२.१	खाद्यान्न (अन्न र दैनिक उपभोग्य वस्तु)		
२.२	कपडा		
२.३	शिक्षा		
२.४	घर भाडा/घर मर्मत		
२.५	यातायात/संचार		
२.६	बिद्युत		
२.७	पानी पठाउने/मर्मत सम्भार		
२.८	औषधि/उपचार (पानीबाट हुने रोग)		वार्षिक खर्च
२.९	औषधि/उपचार (अन्य रोग)		वार्षिक खर्च
२.१०	अन्य: चाडपर्व, कर्मकाण्ड, संस्कार आदि उल्लेख गर्ने		वार्षिक खर्च
	(ख) को जम्मा		
	क+ख को कुल जम्मा	5,000/-	

१.१८ तपाईंको परिवारको औसत मासिक आय कति छ ? उल्लेख गर्नुहोस।

क्र.सं.	विवरण	मासिक आय
१	(क) कृषि तर्फ	

१.१	कृषि उत्पादनको विक्रीबाट आय (मकै, गहुँ, धान, तरकारी, फलफूल)				
१.२	पशुजन्य उत्पादन (दुध, दही, घ्यू, बाख्रा, कखरा आदि)				
	(क) को जम्मा				
२	(ख) गैर कृषि तर्फ				
२.१	नोकरी / जागिर				
२.२	ज्याला मजदुरी				
२.३	पेन्सन / उपदान आदी				
२.४	वैदेशिक रोजगार (रेमिटेन्स)				
२.५	पसल, व्यापार				
२.६	उद्योग				
२.७	पसल/घर भाडा				
२.८	गाडी/दुवानी व्यवसाय				
२.९	अन्य भए उल्लेख गर्ने				
	(ख) को जम्मा				
	क+ख कुल जम्मा			5,000/-	

१.१९ यहाँको परिवारले कुनै ऋण लिएको छ ? छ ☐ छैन ☒ छ भने रकम रु.

२. खानेपानी तथा सरसफाइ व्यवस्थापन

२.१ तपाईंको परिवारले पिउन, खाना पकाउनको लागि प्रयोग गर्ने पानीको स्रोत कुन हो ? दैनिक कति लिटर पानी खर्चनु हुन्छ ? कृपया तलको कोठामा (✓) चिन्ह लगाउनुहोस् ।

१.	ईनार/कुवा	☐		ईनार/कुवा	☐
३.	टयुबेल/ह्याण्डपम्प/डिप टयुबेल	☐		टयुबेल/ह्याण्डपम्प/डिप टयुबेल	☐
६.	सार्वजनिक धारा	☒	500	सार्वजनिक धारा	☐
७.	निजी धारा	☐		निजी धारा	☐
८.	मूल, खोला, नदी, पोखरी	☐		मूल खोला, नदी, पोखरी	☐
९.	बिक्रेतासँग पानी किनेर	☐		बिक्रेतासँग पानी किनेर	☐
१०.	वर्षातको पानी संकलन गरेर	☐		वर्षातको पानी संकलन गरेर	☐
११.	अन्य	☐		अन्य	☐

२.३ दैनिक आवश्यक पानी आपूर्ति गर्नका लागि पानी संकलनबारे निम्न विस्तृत विवरण दिनुहोस् ।

क्र.सं.		जम्मा	जम्मा
१.	कति खेप/पटक		
२.	लिटर/खेप	6	
३.	कुल परिमाण		
४.	पानी ल्याउन लाग्ने समय (मिनेट)/खेप।		
	• पानीको मुहान सम्म पुग्न		
	• मुहानमा पखन्नु पर्ने समय		
	• फर्कदा लाग्ने समय		
५.	प्रति खेप लाग्ने समय	13 min	

नोट: अन्यत्राना जित्ने व्यक्तिले पानीको बाँडो हेरी सोको भमला यकिन गरि परिमाण उल्लेख गर्ने ।

३. निजी धारा जडान

३.१ के तपाईंले घरमा पाइप धारा जडान गर्नु भएको छ ? छ ☐ छैन ☒ यदि छ भने कस्तो प्रकारको छ ?

क) घरभित्र निजी धारा ☐ ख) कम्पाउण्डभित्र निजी धारा ☐ ग) सामुदायिक धारा ☐

३.२ तपाईंको घरमा प्रयोग हुने पानीको गुणस्तर कस्तो छ ? १। राम्रो २। ठिकै ३। खराब

३.३ के तपाई आफ्नो घरमा धारा जोड्न चाहनु हुन्छ ? चाहन्छु ☒ चाहन्न ☐

३.४ यदि तपाईको घरमा निजी धारा जडान भएको छैन भने, किन जडान नगरेको ?

- क) खर्च गर्ने क्षमता नभएकोले ☐ ख) जडान शुल्क धेरै पर्ने भएकोले ☐
 ग) मासिक पानी बिल धेरै आउने भएकोले ☐ घ) पानीको मात्रा पर्याप्त नभएकोले ☐
 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 ☒

३.५ हाल तपाईले पानीधारा बापत महितामा पानीको महशुल तिर्दै हुनुहुन्छ ? छ ☐ छैन ☐

सह-लगानि अवधारणा सम्बन्धी प्राथमिकता

४.१ यदि तपाईको नगरपालिका/गा.वि.स. मा विभिन्न योजना सञ्चालन गर्न रकम उपलब्ध छ भने निम्नलिखित मध्ये कुन कुन योजनालाई पहिलो प्राथमिकता दिनुहुन्छ ?

- | | | | |
|-------------------------------|-------------------------------------|----------------------|-------------------------------------|
| क) सडक वस्ती | ☐ | छ) विद्युत | ☐ |
| ख) कालोपत्रे सडक | ☐ | ज) संचार | ☐ |
| ग) विद्यालय | ☐ | झ) सुरक्षा/सुविधा | ☒ |
| घ) अस्पताल | ☐ | ञ) सिचाई | ☐ |
| ङ) व्यवस्थित खानेपानी प्रणाली | ☒ | ट) पाटीपौवा धर्मशाला | ☐ |
| च) पैदलयात्री सडक | ☐ | ठ) अन्य | ☐ |

४.२ यदि तपाईको घरमा धारा छैन र निजी धारा राख्न इच्छुक हुनुहुन्छ भने, कति रकम सह-लगानी गर्न सक्नुहुन्छ ? कृपया तल दिइएको तालिकामा निजी धारा राख्न कति रकम सम्म लगानी गर्नुहुन्छ लगानीको रकमको सीमामा ☒ चिन्ह लगाउनुहोस ।

क्र.सं.	सह-लगानी विवरण	☒ चिन्ह लगाउनु	क्र.सं.	लगानीको विवरण	☒ चिन्ह लगाउनु
१.	१५००० भन्दा माथि	☐	४.	३००१ देखि ६००० सम्म	☐
२.	१००१ देखि १५००० सम्म	☐	५.	१५०१ देखि ३००० सम्म	☐
३.	६००१ देखि १०००० सम्म	☐	६.	१५०० भन्दा कम	☒

४.३ निजी धारा जडान बापत लाग्ने शुल्क व्यहोर्नु पर्नेछ: मन्जूर छ ☒ मन्जूर छैन ☐

४.४ नयाँ खानेपानी योजना शुरु भएमा आफ्नो घरमा धारा जडान गरी नयाँ नियमानुसार मासिक पानी महशुल नियमित बुझाउनु तयार हुनुहुन्छ ? ☐

छ ☒ छैन ☐ यदि इच्छुक हुनु हुन्छ भने तल दिइएको तालिकामा पानी महशुलको सीमामा ☒ चिन्ह लगाएर आफ्नो इच्छा व्यक्त गर्नुहोस ।

क्र.सं.	मासिक पानी महशुल	☒ चिन्ह लगाउनु
१.	रु ५०० भन्दा माथि	☐
२.	रु ४५१ देखि ४००	☐
३.	रु ४०१ देखि ४५०	☐
४.	रु ३५१ देखि ४००	☐
५.	रु ३०१ देखि ३५०	☐
६.	रु २५१ देखि ३००	☐
७.	रु २०१ देखि २५०	☒
८.	रु १५१ देखि २००	☐

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- ४.५ नयाँ खानेपानी वितरण प्रणालीको व्यवस्था हुँदा तपाईंको परिवारबाट प्रतिवद्धता स्वरूप अग्रिम लागतको ५% रकम दिन तयार हुनु हुन्छ? छु ☒ छैन ☐
- ४.६ नयाँ सरसफाई सुविधा (सामुदायिक शौचालय तथा सतही ढल) निर्माणको लागि सह लगानी स्वरूप १५% स्थानीय निकाय र उपभोक्ताले सहलगानी गर्न इच्छुक हुनुहुन्छ? छु ☒ छैन ☐

५. लैङ्गिक दृष्टिकोणबाट महिला सहभागिता

(आयोजनाको विभिन्न चरणमा महिला सहभागिता सम्बन्धि, गैरलाभान्वित विपन्न वर्गको, आदिवासी जनजाति, दलित तथा पिछाडि एका वर्गको समावेशी सहभागिता सम्बन्धि जानकारी संकलन गर्न प्रत्येक घरदेखि सोधिने प्रश्नहरूको प्रस्तुत गरिएको छ ।)

क) महिलाहरूको उपस्थिति र सहभागीता

- ५.१ आयोजनाकोबारेमा छलफल गर्न कुनै बैठक बोलाईएको थियो ?
थियो ☒ थिएन ☐
- ५.२ के आयोजनाको छनौट गर्ने बैठकमा महिला उपभोक्ताहरूको उपस्थिति थियो ?
थियो ☒ थिएन ☐
- यदि थियो भने महिला उपभोक्ताहरूको भूमिका कस्तो थियो ?
सुन्ने मात्र ☐ अन्तर्क्रियात्मक ☒ निर्णायक ☐
- ५.३ आयोजनाको क्रियाकलापहरूको रेखदेख गर्न के खानेपानी उपभोक्ता तथा सरसफाइ समिति/संस्था गठन भएको छ ? छ ☐ छैन/थाहा छैन ☒

ख) लैङ्गिकताका आधारमा कार्य विभाजन

- ५.४ तलको तालिकामा दिइएको कामहरूअबसर कस्ले गर्ने गर्दछ? (✓) चिन्ह लगाउनुस् (दैनिक घण्टासा)

क्र.सं.	घरायसी क्रियाकलापहरू	पुरुष	महिला	कुल समय
१	खानेपानी भर्ने, बोक्ने, भण्डारण		✓	
२	भान्सा तयार गर्ने, भाडाँ माफ्न		✓	
३	बालबालिका र वृद्धवृद्धाको स्नाहार		✓	
४	सुमा धुने घर सफा गर्ने		✓	
५	खाद्यान्न भण्डारण तथा तयारी		✓	
६	अन्य			

ग) पारिवारिक व्यवस्थापन, आय श्रोत र अन्य विषयमा महिलाहरूको नियन्त्रण र पहुँच

- ५.५ तलको तालिकामा उल्लेखित पारिवारीक विषय वा क्षेत्रहरूमा निर्णय गर्दा यहाँको घर परिवारमा महिलाको भनाई सुन्वाई हुन्छ ? उपयुक्त कोठामा (✓) चिन्ह लगाउनुस्

क्र.सं.	विषय वा कार्यक्षेत्रहरू	हुन्छ (✓)	हुदैन (✓)
१	आर्थिक सरोकारका कुराहरू	✓	
२	केटाकेटीको शिक्षा दिक्षा		✓
३	केटाकेटी र वृद्धवृद्धाको स्वास्थ्य र स्नाहार	✓	
४	अचल सम्पति किनबेच (घर जग्गा)		✓
५	दैनिक क्रियाकलापहरू	✓	
६	सामाजिक विधि व्यवहार, विवाह, बर्तवन्ध, चाडपर्व तथा सामाजिक/पारिवारीक सुसम्बन्धन आदि	✓	
७	अन्य		

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५.६ यहाँको परिवारमा पारिवारीक सम्पत्तिको निम्न विषयमा महिलाको पहुँच र स्वामित्व रहेको छ छैन तलको तालिकामा उपयुक्त कोठामा (✓) चिन्ह लगाउनुस्

क्र.सं.	विवरण	पहुँच	स्वामित्व
१	जग्गा जमिन	✓	
२	घर तथा अन्य संरचनाहरू		
३	चल सम्पत्ति/संचित पैसा		
४	दैनिक क्रियाकलापहरू		
५	अन्य		

घ) खा.पा.उ.स.स. तथा समुदायमा महिलाको स्तर (हसियत) (निम्न बुँदाहरू फोकस ग्रुप छलफलको आधारमा जानकारी लिएर टिपोट गर्नुपर्नेछ)

क्र.सं.	विषय	उच्च	मध्यम	निम्न
१	आत्मसम्मानबोध			
२	आत्मविश्वास/नेतृत्व शीप			
३	दायित्वबोध र क्षमता			
४	ल्याकत, तर्क संगत, धैर्य र मेहनत			
५	अन्य			

६. सम विकासमा पहुँचका आधारमा सामाजिक समावेशी सहभागिता

क) आयोजना क्रियाकलापमा गैरलाभान्वित विपन्न वर्गहरू, पिछडिएका वर्ग, जातजाति, दलित, अपाङ्गता भएको व्यक्तिको उपस्थिति

६.१ आयोजनाको बारेमा छलफल गर्ने कुनै भेला/बैठकमा समावेशी तवरले बोलाईएको थियो ?
थियो ☒ थिएन ☐

६.२ के आयोजनाको छनौट गर्न बैठकमा समावेशीताको आधारमा सहभागीहरूको उपस्थिति थियो ?
थियो ☒ थिएन ☐

६.३ के खा.पा.उ.स.स.को गठनमा समावेशीता अंगीकार भएको थियो? थियो ☐ थिएन ☐

ख) निर्णय प्रक्रियामा समावेशी प्रक्रिया बपनाईएको थियो ?

६.४ आयोजना छनौट गर्ने जातजातिहरूको कस्तो भूमिका कस्तो थियो ?
उच्च ☐ मध्यम ☒ निम्न ☐

६.५ साना सहरि खानेपानी आयोजना कार्यान्वयन गर्न सामाजिक समावेशी आधारमा उपभोक्ताहरूको परिचालन गर्न भएको प्रयास कस्तो थियो? राम्रो ☒ मध्यम ☐ निम्न ☐

७. स्वास्थ्य र सरसफाई

क) खानेपानी

१ तपाईंको विचारमा पानीको गुणस्तर राम्रो (खराब) भएमा के समस्याहरू देखिन सक्छ ?
(एक भन्दा बढी उत्तर आउन सक्ने)

१.१ दुर्गन्ध आउने / नमिठो स्वाद ☒ १.२ दाँत विगिने/रंगीने ☐

१.३ विरामी बनाउने ☒ १.४ अन्य (उल्लेख गर्नु)

२ के तपाईंलाई पानी भर्ने र राख्ने भाँडो पानी भर्नु र भण्डार गर्नु पूर्व सफा गर्नुपर्छ भन्ने थाहा छ ? छ ☒ छैन ☐

यदि छ भने, पानी राख्ने भाँडो कसरी सफा गर्नु हुन्छ ?

२.१ खाली पानी मात्रले ☐ २.२ खरानी पानीले ☐ २.३ मुस/पिठो र पानीले ☐

२.४ साबुन पानीले ☒ २.५ अन्य (उल्लेख गर्नुस्)

३ तपाईं घरमा पानी कसरी राख्नु हुन्छ ?

६

(एक भन्दा बढी उत्तर आउन सक्ने)

३.१) पानी भर्नु पहिले भाँडा सफा गर्ने ☐३.२) बासी पानी फर्काउने ☐३.३) पानी राख्ने भाँडो राम्रोसँग ढाकेर/छोपेर राख्ने ☒ गर्ने

३.४) अन्य (उल्लेख

४. तपाईं गागो वा घोटोबाट पानी कसरी निकाल्नुहुन्छ ?

४.१) पानी सार्नु अघि अम्बोरा, लौटा, करुवा, मग धोएर ☐४.२) गिलास, मग, कप गाग्रीमा डुवाएर ☐४.३) गागोबाट, लौटा, अम्बोरा, करुवा, गिलासमा पानी सारेर ☒४.४) अन्य (उल्लेख गर्ने) ☐

ख. चर्पी

१. के तपाईंको घरमा चर्पी छ ? छ ☒ छैन ☐ (छैन भने १.३ जाने)१.१. यदि छ भने, कस्तो प्रकारको चर्पी छ ? ☐१) खाल्डो चर्पी ☐१) मिस्टर्न फ्लस ☐२) भेन्टिलेटेड खाल्डो चर्पी ☒२) अन्य ☐

३) बाटर सिल/पोर फ्लस

१.२. यदि छ भने, तपाईंको घरमा चर्पी कसकसले प्रयोग गर्नुहुन्छ ? ☒

(१. सबैले, २. अल्पा बाहेक सबैले ३. वयस्क र प्रौढले मात्रै ४. विरामी मात्रैले)

१.३. यदि छैन भने, दिसा गर्ने कहाँ जानुहुन्छ ? ☐ ☐

(क. खोला/जङ्गल/किनार ख. खुला मैदान/ठाउँ ग. घर/मडक छेउ घ. जहाँ सजियो हुन्छ)

१.४. के तपाईंको समुदाय खुल्नदिसामुक्त क्षेत्र घोषणा भएको छ ? छ ☐ छैन ☐

ग. खानेकुराको सरसफाइ

१. खाद्यपदार्थ दूषित हुनबाट कसरी बचाउनुहुन्छ ? (एक भन्दा बढी उत्तर आउन सक्ने)

१.१) पकाएको खाना छोपेर/ढाकेर राख्ने ☐१.२) सफा हातले खाना पस्कने गर्नाले ☐१.३) काँचै खाइने खानेकुरा राम्रोसँग पखालेर छोपेर ☐ १.४) हात गोडा सफा गरेर मात्र खानामा पसेर ☐१.५) धेरै बासी वा मडे गलेका खाना, फलफूल बिमृज्जन गर्ने ☒१.६) डाडु पन्थु, धाल भाँडाकुँडा सफा गरेर मात्र खाना पस्कने/खाने ☒१.७) चुलो चौकी पकाउने भाँडा, ढकनहरू सफा राख्ने ☒२. के तपाईं खानेकुरा छोपेर/ढाकेर राख्नुहुन्छ ? राख्छु ☒ राख्दिन ☐

घ. व्यक्तिगत सरसफाइ (घरपरिवारको संख्या अनुसार कृयाकलापमा टीक चिन्ह लगाएर संख्या राख्ने । जस्तो चारजनाको परिवार भए हरेक कृयाकलापमा टीक सहित चारको संख्या आउनुपर्ने)

१. तपाईं र परिवारका अन्य सदस्यले कहिले र के गरेपछि हात धुनुहुन्छ ? धुने भए यस्तो (✓) चिन्ह लगाउनुहोस् र नधुने भए यस्तो (X) चिन्ह लगाउनुहोस् । (एक भन्दा बढी उत्तर आउन सक्ने)

क्र.सं.	विवरण	हाम्रो अभियान		महिला		पुरुष	
		गो (A)	नखने (B)	धुने (C)	नखने (D)	गो (E)	नखने (F)
१	खाना खानु अघि	✓		✓		✓	
२	खाना खाएपछि	✓		✓		✓	
३	दिसा गएपछि			✓		✓	
४	फोहर मैला छोएपछि	X		✓		✓	

५	कामबाट फर्केपछि			✓		✓	
६	केटाकेटीलाई दिसा पिसाब गराइ सकेपछि	✓					
७	अन्य (उल्लेख गर्ने)						

२. तपाईं र परिवारका अन्य सदस्यले के ले हात धुनुहुन्छ ? धुनेमा यस्तो (✓) चिन्ह लगाउनुहोस् र नधुनेमा यस्तो (x) चिन्ह लगाउनुहोस् ।

१	पानी मात्रै						
२	खरानी पानी						
३	भुस/पिठो पानी						
४	साबुन पानी			✓		✓	
५	अन्य (उल्लेख गर्ने)						
जम्मा							

३. तपाईं र परिवारका अन्य सदस्यले कहिले कहिले नुहाउनुहुन्छ ?
नुहाउने भए यस्तो (✓) चिन्ह लगाउनुहोस् र ननुहाउने भए यस्तो (x) चिन्ह लगाउनुहोस् ।

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					

ड. फोहर मैला व्यवस्थापन

१. तपाईंको 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 क्यानमा ☐ १.४ अन्य (उल्लेख गर्ने) ☐
२. ठोस तथा तरल फोहर वस्तुलाई अव्यवस्थित तरिकाले विसर्जन गर्नाले हुने नराम्रा असरहरूको के हुन् ? (एक भन्दा बढी उत्तर आउन सक्ने)
२.१ फोहर बातावरणमा बढि ☐ २.२ लामखुट्टे, भिगा, किराहरूको बढि ☒
२.३ रोग सन्तर्मा बढि ☒ २.४ अन्य (उल्लेख गर्ने) ☐
३. तपाईंको घरबाट निस्कने फोहर पानी कहाँ विसर्जन गर्नुहुन्छ ?
३.१ खाल्डोमा (Soak-pit) ☐ ३.२ तरकारी बारीमा/कुरेसा बारीमा ☒
३.३ सार्वजनिक ढलमा ☐ ३.४ अन्य (उल्लेख गर्ने) ☐

च. वस्तुभाउको फोहर व्यवस्थापन

१. के तपाईंले वस्तुभाउ पाल्नु भएको छ ? छ ☐ छैन ☒ छैन भने पानी जस्तै सरुवा रोगमा जान ?
यदि छ भने कुन कुन प्रकारका छन् र तिनीहरूलाई कहाँ राख्नु हुन्छ ?

१	गाई, भैसी		
२	बंगुर/मंगुर		
३	बाख्रा		

४	कचरा/होस		
५	मृगज		

२. वस्तुभाउबाट निस्कने फोहोर कहाँ र कसरी बिसर्जन गर्नुहुन्छ ?

- २.१ मलखादमा ☐ २.२ आगा वाल्ने/गुईछ बनाउने ☐
 २.३ गोबर ग्यास प्लांटमा प्रयोग गर्ने ☐ २.४ अन्य (उल्लेख गर्ने) ☐

३. वस्तुभाउको फोहोर मैलाको जवाबि अवस्थित तवरने बिसर्जन गर्दा हुने खराब असरहरूके के हुन् ? (एक भन्दा बढी उत्तर आउन सक्ने।)

- ३.१ शान्तिवर्णीय फोहोरमा वृद्धि हुने ☐ ३.२ सामुदायिक भिगा, किराडरुको वृद्धि हुने ☐
 ३.३ रोगवाधक बढ्ने नया सन् ☐ ३.४ गाउँ, छरछिमेक तथा नगर अधोभिनय देखिने ☐
 ३.५ अन्य (उल्लेख गर्ने) ☐

छ: सेफ्टेज (फोहोरलेदो) व्यवस्थापन (चर्पीबाट सेफ्टीट्याकमा जम्मा भएको फोहोरलेदो थप प्रशोधन सहित)

१। चर्पीबाट बिसर्जित मलमूत्र व्यवस्थापन जम्मा कहाँ गर्ने गरेको छ ?

खान्डो ☒ रिड खान्डो ☐ सेफ्टी ट्याक ☐ अन्य ☐

२। सो सेफ्टी ट्याक/खान्डोको क्षमता कति ठुलो सानो साइज ? छ ?

३। हालसम्म कहिल्यै सफा गर्नु भएको छ ? छ ☐ छैन ☐ छ भने कति वर्षमा भरियो ? ☐

सफागन कति रकम तिन भयो ? रु:

४। सेफ्टी ट्याकबाट निस्कने फोहोर प्रशोधन पछि मलका रुपमा प्रयोग गर्ने तयार हुनुहुन्छ ? छ ☐ छैन ☐

५। सेफ्टी ट्याकबाट निस्कने फोहोर सफागन कतिरकम रकम तिन तयार हुनुहुन्छ ? छ ☐ छैन ☐

५.१ तिन तयार भए कतिरकम तिनहुन्छ ? रु २००० सम्म ☐ रु २००० माथि ☐

६। तपाईंको घरबाट सेफ्टीट्याकमा जम्मा भएको फोहोर लेदो (सेफ्टेज) कसरी भान्को गर्नुहुन्छ ?

१ आफै सफा गर्ने ☐ २ सफागन भान्ने प्रयोग गर्ने ☐ ३ व्यवस्थित कम्पनीको सेवालिन ☐ ४ अन्य ☐

७। सेफ्टेज/फोहोर लेदो कहाँ व्यवस्थापन गर्ने गरेको छ ?

१ खेतवारीमा ☐ २ खोलानाला, खोल्साखोल्सीमा ☐ ३ जनजंगल सार्वजनिक स्थानमा ☐ ४ सडक बाटो छेउछाउ ☐ ५ अनुकुल अनुसार ☐ ६ अन्य ☐

८। सेफ्टेज/फोहोर लेदो व्यवस्थापन सुधार गर्ने चाहनुहुन्छ ? चाहन्छु ☒ चाहन्न ☐

९। सेफ्टेज/फोहोरलेदो व्यवस्थापन सुधार गर्दा के गर्न चाहानु हुन्छ ?

- १ सेफ्टीट्याक बनाउने ☒ २ भएको सेफ्टीट्याक/चर्पीको खान्डो सुधार गर्ने ☐
 ३ तपाईंको चर्पीबाट हुन जोडी सामुहिक रुपमा सेफ्टेज प्रशोधन प्रणाली व्यवस्थापन गरे सेवालिन तयार हुनुहुन्छ ? ☒
 ४ अन्य (उल्लेख गर्ने) ☐

१०। सुधार गर्न कति रकम सम्म लगानी गर्न ईच्छा छ ? सोधेर नोट गर्ने रु:

ज. पानीजन्य सरुवा रोगहरु

१। पानीजन्य सरुवा रोगको कारणहरूके के हुन् ? (एक भन्दा बढी उत्तर आउन सक्ने।)

१.१ दूषित पानी प्रयोग गर्दा ☒ १.२ दूषित खाना खाँदा ☒

१.३ घर तथा सार्वजनिक स्थलमा फोहोर बढ्नाले ☒ १.४ मानिसको मलमूत्र जवाबि बिसर्जन गर्नाले ☐

१.५ फोहोर मैला जवाबि फ्याँके गर्दा ☒ १.६ स्वास्थ्य शिक्षा तथा स्वस्थ बानीको अभाव ☒

१.७ सरसफाई र स्वास्थ्य सम्बन्धी ज्ञान र चेतनाको अभावले ☒ १.८ अन्य ☐

२। तपाईंको परिवारमा कोही बिरामी परेमा के गर्नुहुन्छ ? प्राथमिकता अनुसार नम्बर लेख्ने।

- २.१ घरायसी उपचार गर्ने ☐ २.२ धामी, भौकी, पुजारी कहाँ लाने ☐
 २.३ औषधि पसलमा जाने ☒ २.४ स्वास्थ्य चौकि वा अस्पतालमा जाने ☒
 २.५ अन्य (उल्लेख गर्ने):

३. यदि परिवारमा कसैलाई भाडापखाला लागेमा के गर्नुहुन्छ ? (प्राथमिकता अनुसार नम्बर लेख्ने)

- ३.१ जीवनजल खुवाउने ☒ ३.२ घरायसी उपचार गर्ने ☐
 ३.३ धामी, भौकी वा पुजारी कहाँ जाने ☐ ३.४ औषधि पसलमा जाने ☒
 ३.५ स्वास्थ्य चौकि वा अस्पतालमा जाने ☐ ३.६ अन्य (उल्लेख गर्ने):

४. गत एक सालभित्रमा तपाईंका परिवारका सदस्यहरु भाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरुबाट प्रभावित थिए ? प्रभावित भएका भए कति जना थिए तलको तालिकामा सख्या नोद गर्ने ।

१	भाडापखाला				
२	आर्				
३	जका				
४	टाइफाइड				
५	हैजा				
६	छाला सम्बन्धी रोग				
७	औलो रोग (मलेरिया)				
८	कमलपित्त (जण्डीस)				
९	अन्य				
	जम्मा	X	X	X	X

५. गत एक वर्षभित्र तपाईंको परिवारमा भाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरुबाट कसैको मृत्यु भएको छ ? (मृत्यु अवस्था)

भाडा पखाला			
आर्			
पानीजन्य अन्य सरुवा रोगहरु			
जम्मा	X	X	X

७. गत एक वर्षभित्र तपाईंको परिवारका सदस्यलाई भाडापखाला र पानीजन्य अन्य सरुवा रोगहरुको उपचारमा कति रकम खर्च गर्नु भयो ?

भाडापखाला	
पानीजन्य अन्य सरुवा रोगहरु	
जम्मा	X

धन्यवाद!

ANNEX 5: 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)*
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*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 6:
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
Tel: +977-1-4433748, E-mail: aastha2065@gmail.com

(Center for complete scientific solution)

Test Report/CertificateReport No.: 167/2074
Entry No.: AASTHA-109A-2074
Sample: Water
Client: TAEC-ICON JV
Source: Chhepe Khola, KhotangDate 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, 22 nd Edition	7.2	6.5-8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22 nd Edition	235	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22 nd Edition	1.2	5 (10)
4.	Taste and Odor		N.O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA-AWWA-WEF 2012, 22 nd Edition	0.13	5 (15)
6.	Total Hardness as CaCO ₃ , (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22 nd Edition	112	500
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA-AWWA-WEF 2012, 22 nd Edition	145	1000
8.	Total Residual Chlorine, (mg/l)	4500-Cl B, APHA-AWWA-WEF 2012, 22 nd Edition	N.D. (<0.10)	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl B, APHA-AWWA-WEF 2012, 22 nd Edition	3.72	250
10.	Ammonia, (mg/l)	4500-NH ₃ D, APHA-AWWA-WPCF, 17 th Edition	0.08	1.5
11.	Nitrate, (mg/l)	4500-NO ₃ -B, APHA-AWWA-WEF 2012, 22 nd Edition	0.73	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA-AWWA-WEF, 22 nd Edition	0.08	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA-AWWA-WEF 2012, 22 nd Edition	0.08	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO ₄ C, APHA-AWWA-WEF 2012, 22 nd Edition	8.62	250
15.	Mercury*, (mg/l)	3500-Hg-C, APHA-AWWA-WPCF, 17 th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WF 2012, 22 nd Edition	30.4	200
17.	Iron*, (mg/l)		<0.05	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)	3111 B, APHA-AWWA-WEF 2012, 22 nd Edition	<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		0.10	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA-AWWA-WEF 2012, 22 nd Edition	<0.01	0.05

Remarks: Water quality meets NDWQS requirements

Analyzed By

Checked By

Authorized By

- Note:**
1. The issued report refers only to the tested sample and applicable parameters. Endorsement of products is neither inferred nor implied.
 2. This report is neither to be reproduced wholly or partially nor can be used as an evidence in the court of law.
 3. Liability of our institute is limited to the invoiced 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.
 5. Parameters in * are not accredited by NBSM.

MS Lab Accreditation No.: 09-2068/62

Regd. No. 53875/004/065



AASTHA SCIENTIFIC RESEARCH SERVICE PVT. LTD.

P.O. Box No. 4315, Dillibazar, Kathmandu, Nepal
Tel: 4977-1-4423748 E-mail: aasthalab2065@gmail.com

(Center for complete scientific solution)

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 26°C	4500-H APHA-AWWA-WEF 2012, 22 nd Edition	7.1	6.5 - 8.5
2	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22 nd Edition	129	1500
3	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22 nd Edition	1.3	5 (10)
4	Taste and Odor		N. O.	Not Objectionable
5	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22 nd Edition	0.19	5(15)
6	Total Hardness as CaCO ₃ , (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22 nd Edition	60	500
7	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22 nd Edition	78	1000
8	Total Residual Chlorine, (mg/l)	4500-Cl B, APHA - AWWA - WEF 2012, 22 nd Edition	N.O (<0.10)	0.1-0.2
9	Chloride, (mg/l)	4500-Cl B, APHA-AWWA-WEF 2012, 22 nd Edition	1.86	250
10	Ammonia, (mg/l)	4500-NH3 N, APHA, AWWA, WPCF, 17 th Edition	0.15	1.5
11	Nitrate, (mg/l)	4500-NO ₃ B, APHA-AWWA-WEF 2012, 22 nd Edition	0.44	50.0
12	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22 nd Edition	0.06	0.20
13	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22 nd Edition	0.08	0.5-1.5
14	Sulfate, (mg/l)	4500-SO ₄ ²⁻ C, APHA - AWWA - WEF 2012, 22 nd Edition	9.45	250
15	Mercury*, (mg/l)	3500-Hg C, APHA-AWWA-WEF, WPCF, 17 th Edition	<0.001	0.001
16	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WEF 2012, 22 nd Edition	22.4	200
17	Iron*, (mg/l)		<0.05	0.30(3)
18	Manganese*, (mg/l)		<0.05	0.20
19	Lead*, (mg/l)		<0.01	0.01
20	Cadmium*, (mg/l)		<0.003	0.003
21	Chromium*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22 nd Edition	<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, 22 nd Edition	<0.01	0.05

Remarks: Water quality meets NDWQS requirements.

[Signature]
Analyzed By

[Signature]
Checked By

[Signature]
Authorized By

- Note :**
1. The issued report refers only to the tested sample and applicable parameters. Endorsement of products is neither inferred nor implied.
 2. This report is neither to be reproduced wholly or partially nor can be used as an evidence in the court of law.
 3. Liability of our institute is limited to the invoiced 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.
 5. Parameters in * are not accredited by NBSM.

[Signature]
Ministry of Water
Singhadarbar, Kathmandu

NS Lab Accreditation No.: 09-2058/69

Regd. No. 53875/064/065

**AASTHA SCIENTIFIC RESEARCH SERVICE PVT. LTD.**P.O. Box No. 4316, Dillibazar, Kathmandu, Nepal
Tel: +977-1-4433749, E-mail: aasthalab2065@gmail.com**(Center for complete scientific solution)****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	5(15)
6.	Total Hardness as CaCO ₃ , (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	16	500
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)		3.42	0.30(3)
18.	Manganese*, (mg/l)		0.16	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		0.11	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.

Analyzed By

Checked By

Authorized By

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3. Liability of our institute is limited to the invoiced detrimands and amount only.
4. Even in the case of stable samples such as limestone, minerals, soil etc. they will not be stored more than six months.
5. Parameters in * are not accredited by NBSM.

ANNEX 7
CHECKLISTS

Checklist for Physical Environment

A. Landforms & Topography

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

B. Land Use Pattern

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

C. Geology & Soils

1. Soil & Rock Type
2. Identification of erosion prone area along the pipeline alignment
3. Investigate the erosion features and potentials of the local streams and gullies

D. 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

E. 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, and other anthropogenic activities if any).

F. Water Quality

1. Collect data on water quality of the existing sources regarding physical & chemical parameters to check its compliance within NDWQS standards.

G. Acoustic Environment

1. Investigate on the noise polluting activities of the area (vehicle movements, industrial activities, construction activities and other anthropogenic activities).

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Diktel WSSP

CHECKLIST OF FLORA

Date: January, 2015

S.No.	Name of plants	Uses			Others
		Fuel-wood	Fodder	Medicine	
1.	Acacia			✓	
2.	Albizia			✓	
3.	Bamboo				Fruits, bark, leaves, edible leaves, Agroforestry
4.	Banyan	✓	✓		
5.	Bauhinia				Fruits
6.	Borassia		✓		
7.	Cassia			✓	
8.	Cassia			✓	
9.	Cassia	✓			Medicinal, Fruits, seeds, drying
10.	Cassia			✓	
11.	Cassia			✓	
12.	Cassia			✓	
13.	Cassia			✓	Edible leaves, Agroforestry
14.	Cassia			✓	
15.	Cassia			✓	
16.	Cassia			✓	Edible leaves
17.	Cassia			✓	Edible leaves
18.	Cassia			✓	Edible leaves, Agroforestry
19.	Cassia			✓	Edible leaves
20.	Cassia			✓	Edible leaves
21.	Cassia			✓	Edible leaves
22.	Cassia			✓	Edible leaves
23.	Cassia			✓	Edible leaves
24.	Cassia			✓	Edible leaves
25.	Cassia			✓	Edible leaves
26.	Cassia			✓	Edible leaves
27.	Cassia			✓	Edible leaves
28.	Cassia			✓	Edible leaves
29.	Cassia			✓	Edible leaves
30.	Cassia			✓	Edible leaves
31.	Cassia			✓	Edible leaves
32.	Cassia			✓	Edible leaves
33.	Cassia			✓	Edible leaves
34.	Cassia			✓	Edible leaves
35.	Cassia			✓	Edible leaves
36.	Cassia			✓	Edible leaves

Note:

Diktat WSCP

CHECKLIST OF BIRDS

Date: January, 1965

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Note:

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Journal of Interpersonal Violence

Digital WSP

CHECKLIST OF REPTILES, AMPHIBIANS & FISHES

Date: January, 2015

S.No.	Name	Remarks
1.	Chhepara, Mausuli	
2.	Bhynguta	
3.	Haridwar	
4.	Asola	
5.	Fakir	
6.	Chuche Buduna	
7.	Mungri	
8.	Singli	
9.	Gradela	
10.	Tite	
11.	Hile	

Note: _____

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CHECKLISTS FOR FOCUS GROUP DISCUSSION

A. FOCUS GROUP DISCUSSION 1

Date: 21 December, 2015

Project: Diktel Water Supply & Sanitation Project

Venue: Three Brothers Hotel, Diktel Bazaar

Number of Participants: 8

Purpose Statement: Information Dissemination to the participants, Discussions regarding the proposed project and Roles & Responsibilities of various Stakeholders

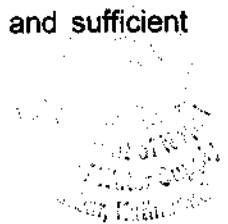
Questions:

1. Do you know about Urban Water Supply & Sanitation (Sector) Project? If yes, can you please share the information you know about this project?
2. How do you feel about the project proposed in your town? Do you think that this proposed project is important for your town?
3. How familiar are you with the term "Environment"?
4. Are there any community forests and protected areas within this project area?
5. Do you have any idea about the environmental concerns regarding the proposed project?
6. Do you have any objection regarding the project activities that will be carried out at core bazaar area?
7. As a stakeholder, how can you contribute from your side to minimize the anticipated environmental issues?
8. Lastly, what would you say are the most important issues you would like to express about this project?


Ministry of Water & Sanitation
Government of Karnataka

FINDINGS OF FOCUS GROUP DISCUSSION

1. All the participants are aware about the proposed project.
2. According to the participants, they are in need of the improved water supply system as they are facing hardship of water for years. Thus, they expect this proposed project to improve the existing water system.
3. The participants are also found aware about the environment.
4. No such protected areas as well as community forests are known to be existing within the project area.
5. Their main concerns regarding the environmental aspects are Dust Emissions, Water Quality, Noise Pollution, Traffic Congestion, Obstruction to the vendors & passersby, Damage to the existing facilities and Construction Waste & Solid Waste Management during construction period. They are also concerned about effective operation & management and anticipated leakage problems during operation phase.
6. They stated "No Objection" regarding the project activities that will be carried out at core bazaar area. However, they urged to carry out the project activities at this area with proper care and prompt actions regarding excavation & backfilling works.
7. After assuring about the mitigation measures for the environmental concerns they raised, they committed to contribute to support safeguard implementation of the proposed project.
8. Their positive response towards the implementation of the proposed project indicates Willingness to Pay for this project. The most important issue they raised about the proposed project is the assurance for the provision of safe, reliable and sufficient water supply system.



B. FOCUS GROUP DISCUSSION 2

Date: 22 December, 2015

Project: Diktel Water Supply & Sanitation Project

Venue: Ward no. 2 of Former Solma VDC

Number of Participants: 8

Purpose Statement: Information Dissemination to the participants, Discussions regarding the proposed project and Roles & Responsibilities of various Stakeholders

Questions:

1. Do you know about Urban Water Supply & Sanitation (Sector) Project? If yes, can you please share the information you know about this project?
2. How do you feel about the project proposed in your town? Do you think that this proposed project is important for your town?
3. How familiar are you with the term "Environment"?
4. Are there any community forests and protected areas within this project town?
5. Do you have any idea about the environmental concerns regarding the proposed project?
6. Do you know that this area will be used for intake construction and transmission route construction? Do you have any objection regarding this?
7. As a stakeholder, how can you contribute from your side to minimize the anticipated environmental issues?
8. Lastly, what would you say are the most important issues you would like to express about this project?

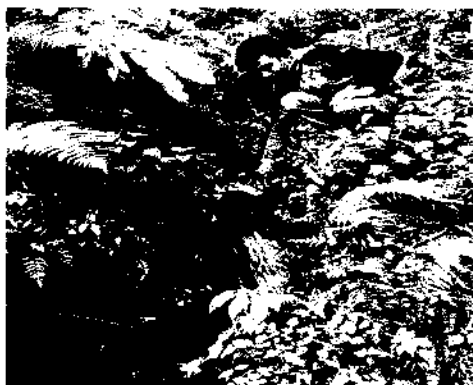


FINDINGS OF FOCUS GROUP DISCUSSION

1. All the participants are aware about the proposed project.
2. According to the participants, they are in need of the improved water supply system as they are facing hardship of water for years. Thus, they expect this proposed project to improve the existing water system.
3. The participants are also found aware about the environment.
4. No such protected areas as well as community forests are known to be existing within the project area.
5. Their main concerns regarding the environmental aspects are Dust Emissions, Water Quality, Noise Pollution, Traffic Congestion, Obstruction to the vendors & passersby, Damage to the existing facilities and Construction Waste & Solid Waste Management during construction period. They are also concerned about effective operation & management and anticipated leakage problems during operation phase.
6. They stated "No Objection" regarding the project activities that will be carried out at Solma area. However, they urged to carry out the project activities at this area with proper considerations regarding source protection measures, prompt actions regarding excavation & backfilling works etc.
7. After assuring about the mitigation measures for the environmental concerns they raised, they committed to contribute to support safeguard implementation of the proposed project.
8. Their positive response towards the implementation of the proposed project indicates Willingness to Pay for this project. The most important issue they raised about the proposed project is the assurance for the provision of safe, reliable and sufficient water supply system



ANNEX 8: PHOTOGRAPHS



7. Kaule Khola Source



8. Land (parcel no.378) for the proposed WTP of Kaule Khola Source



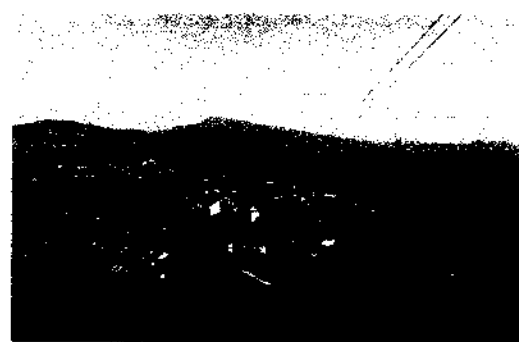
9. Existing Condition of Distribution Pipelines



10. Local Participants during presentation & meeting



11. Core Market Area of the project town



12. Service Area (Diktel Bazaar)



ANNEX 9: COMMENT RESPONSE MATRIX



Comment and Response Matrix
Diktel Water Supply & Sanitation Project, Khotang

S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
A.	By Mr. B.R. Manandhar (Environmental Engineer & Freelancer)			
a)	Comments received during Diktel WSSP Presentation			
1	Executive Summary	The Executive Summary is quite comprehensive and thus gives a complete picture of the entire report.	Executive Summary	Sincere thanks for the appreciation.
2	Chapter 2, Section 2.4.12, Page 21 to 24	A project layout map superimposed on topo-map also showing locations of all temporary construction facilities such as camps, stockpiling sites, muck/spoil disposal sites, quarry sites (if applicable) etc. with clear legends need to be presented as well.	Chapter 2, Section 2.4.12, Figure 4; Page 28	This has been incorporated.
3	Chapter 2, Section 2.4.11 and Chapter 8	It should be clearly stated whether or not a crusher plant and internal access roads are also among the project components. If yes, this IEE study should have covered adverse impacts due to them as well.	Chapter 2, Section 2.4.11 (d) Page 24 Chapter 7, Section 7.2.1.2, Page 82	This has been incorporated.
4	Chapter 2	A categorical list of project construction and operation activities needs to be presented in a separate sub-chapter of Project Description.	Chapter 2, Section 2.5.1 & 2.5.2, Page 30 & 31	This has been incorporated.
5	Chapter 3, Section 3.7	Delineating project impact area as core area and surrounding area is fine. However, it'd be wrong to relate direct impact and indirect impact with core area and surrounding area respectively. It should also be made sure that the construction sites of all associated structural components of the project are	Chapter 2, Section 2.4.12, Page 26 & 27	This has been incorporated and included in Chapter 2 under sub chapter Project Area Delineation

[Signature]

Engineer

[Stamp]
Project Engineer
Khotang
P.O. Box 1000

S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
		covered within the core area.			
6	Chapter 3, Section 3.1, Page 25	The detailed Engineering Design Report seems to be left out of the literature reviewed.	Chapter 3, Section 3.1, Page 32	This has been incorporated.	
7	Chapter 3	Under Methodology, specific standard methods/tools used for impact identification and in-situ measurements and sampling/laboratory analysis, if any, for physico-chemical baseline information collection and methods of quantitative prediction of impacts used should be mentioned as well with their samples annexed to the report.	Chapter 3, Section 3.2.1, Page 33	This has been incorporated.	
8	Chapter 3, Section 3.2.1, Page 26	It is confusing how data on climate, rainfall and other meteorological conditions were collected as primary information/data through field survey as mentioned in section 3.2.1.	Chapter 3, Section 3.1, Page 32	This has been incorporated.	
9	Chapter 5, Section 5.1.3, Page 43	It'd be better to present the existing land use pattern with % distribution of various land uses at least for the core area.	Chapter 5, Section 5.1.3, Page 55	No existing data could be obtained during field study.	
10	Chapter 7 & 8	Adverse impacts of (i) mismanaged/haphazard disposal of debris from dismantled temporary facilities, (ii) disruption to natural drainage particularly in the service area (iii) accidental leakage/spillage of stored fuel/chemicals and (iv) disposal of raw sludge from the sedimentation tanks need to be included as well in chapter 7. The above suggested adverse impacts need to be addressed in the following chapter with appropriate MMs described.	Chapter 7, Section 7.2.1.2 (f), (h), (i), Page 83, 84 & 85 & Section 7.2.3.2 (b) Page 87 Chapter 8, Section 8.1.2 (f), (h) (i), Page 98 & 99, Section 8.3.2 (b), Page 101	This has been incorporated.	

Signature
Engineer

Dr. Smita Tripathi
Dr. Smita Tripathi
Page 10/10

S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
11	Chapter 3	A simple checklist or a simple interaction matrix should have been used as a standard tool for identification of issues/impacts during preparation of the ToR itself.	Chapter 3, Section 3.2.1, Page 33	This has been incorporated in the IEE report.	
12	Chapter 7, Section 7.2.1.2 (f), Page 66	Explanation of unavoidable adverse impact on current land-use due to placement of project infrastructures within the core area is missing.	Chapter 7, Section 7.2.1.2 (g), Page 84	This has been incorporated.	
13	Chapter 8, Section 8.1.2 (e), Page 77	Avoiding over ordering of construction materials and employing local people from nearby villages to maximum extent possible as mentioned in paragraph 236 are definitely very good reduction at source measures for minimizing generation of wastes from camps and construction sites. However, monitoring of implementation of these measures might be quite challenging and worthwhile experimenting at the same time.	Chapter 8, Section 8.1.2 (e), Page 97	This has been explained.	
14	Chapter 8	Separate measures for management of biodegradable SW and non-biodegradable SW need to be provided indicating their safe & final disposal mechanism.	Chapter 8, Section 8.1.2 (e), Page 97 & 98	This has been incorporated.	
15	Chapter 8, Section 8.3.3 c), Page 82	If management of additional wastewater generated on account of improved water supply is also within the scope of this IEE study, impacts of haphazard wastewater disposal and appropriate mitigation measures need to be elaborately explained. Mere training for and raising awareness among the water users/beneficiaries as mentioned in paragraph 262 may not be adequate.	Chapter 8	As per expert's suggestion and as this does not fall under scope of the work, this has been omitted.	

Signature
Engineer

S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
16	Chapter 8, Section 8.1.2 b) & c) Page 75 & 76	Mitigation measures identified/proposed for controlling air and noise pollution from various construction activities are quite comprehensive and good. However, ensuring use of equipment/machinery complying with applicable environmental standards of GoN could be an effective MM to control air/noise pollution particularly during construction phase.	Chapter 8, Section 8.1.2 c) & d), Page 96 & 97	This has been incorporated.
17	Chapter 11, Section 11.2, Page 99 to 107	Monitoring parameters should be selected based on source oriented monitoring approach rather than sink oriented monitoring approach.	Chapter 11, Section 11.3, Table no: 37, Page 123 to 135	This has been incorporated.
b) Generic Comments received during other Presentations				
	All Chapters with tables	Sources are missing in many tables	All Chapters with tables	This has been incorporated.
	Annex 3	Unnecessary repetition of project location map and schematic diagrams of transmission/distribution systems of the project could have been avoided.	Omitted	Project Location Map & Schematic Diagrams have been omitted from the Annex part.
B. By Mr. Kamal Adhikari (Sociologist, DWSSM)				
a) Comments received during Diktel WSSP Presentation				
1	Executive Summary	Executive Summary	Executive Summary Page xv	This has been incorporated.
		Old, inadequate to water demand (mention few specific features)		
		Extension of existing system: little elaboration is needed about it.	Page xv	This has been incorporated.


 Engineer


 Department of Water Supply and Sewerage
 Kathmandu

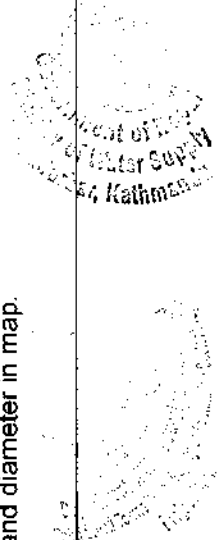
S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant		Remarks
			In chapter/ section/ paragraph no. / page no.	Description of change	
	Page xvi, Line 15	Tree cutting and uprooting (NRs. 11,00,000): tree type, number, location etc.		There is no requirement of tree cutting; This is included only because it is provided under provisional sum in the design estimate. Hence this is omitted as per expert suggestion.	
	Page xiii to xvii	Weightage of executive summary: equal to be given to field findings	Page xv to Page xxii	This has been incorporated.	
	Page xv, Line 9	Rationale of alternative selection: both environmental cause as well as economic cause	Page xix, Line 13	This has been incorporated.	
2	Chapter 1, Section 1.3	Clarity in presentation of objective (OK) and scope of work to provide..... provides	Chapter 1, Section 1.3	This has been incorporated.	
3	Chapter 2	Delineate linkage between water quality and treatment system adopted	Chapter 2, Section 2.4.4, Page 14 to 16	This has been incorporated.	
4	Chapter 2, Section 2.4.11 g) & h), Page 20	Soil disposal site: away (where?)	Chapter 2, Section 2.4.11g) & h), Page 26 & 2.4.12, Figure 4, Page 28	This has been incorporated.	
5	Chapter 4, Table 9, Page 31 to 34	Policy: WSS policies in chronological order	Chapter 4, Table 9, Page 38 to 44	This has been incorporated.	
6	Chapter 5, Section 5.1.6, Line 124, Page 44	WQ: dig out basis of categorization by people (good/satisfactory)	Chapter 5, Section 5.1.6, Line 137, Page 56	This has been incorporated.	
7		WQ test: 3 times, Ecoli test missing, Arsenic (presence?), calcium (high)....but report mentions that all parameters are within permitted value???	Chapter 5, Section 5.1.6, Line 139, Page 56 & 57	This has been incorporated	

[Signature]

Engineer

S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
8		What about water supply and sanitation demand of schools, health center, temples....	Chapter 1, Section 1.4, Line 11, Page 3 & 4	This has been incorporated	
9		Impact/benefit: specific target groups	Chapter 7, Section 7.1.1.1, Page 77, 78, 79	This has been incorporated.	
10	Chapter 9, Section 9.2, Page 84	Both issues raised by public and study team: limited, too generic.....	Chapter 9, Section 9.2, Page 108 & 109	This has been incorporated.	
11	Chapter 9, Section 9.2, Line 262, Page 84	Clarify if issues addressed by study team OR recommendations of study team?	Chapter 9, Section 9.2, Line 304, Page 109	This has been incorporated.	
b) Generic Comments received during other Presentations					
	Executive Summary (Nepali) Line 3, Page xviii	Executive summary: ADB र नेपाल सरकार अनुसारको सट्टा ADB र नेपाल सरकारको नीति अनुसार राख्दा ठीक होला	Executive Summary (Nepali), Line 3, Page xxiii	This has been incorporated.	Ilam Presentation
	Chapter 4	Rural Water Supply and Sanitation National Policy, Strategy and Sectoral Strategic Action Plan 2004: Insert pertinent IEE related issues	Chapter 4, Table 9, Page 38	This has been incorporated.	Ilam Presentation
	Chapter 3, Section 3.2.3, Line 93, Page 26	Project Affected Families (PAFs): categorically-who??	This term has been omitted as no private land needs acquisition and has no resettlement issues.	This has been incorporated.	Ilam Presentation
	Chapter 7, Section 7.1.1.1 a), Line 188, Page 61	Grand opportunity: what, whom and what extent?	Chapter 7, Section 7.1.1.1 a), Line 211, Page 77	This has been incorporated.	Ilam Presentation
	Chapter 7, Section 7.1.1.2 c), Page 63	Women empowerment: factors/process?....as the term empowerment is holistic	Chapter 7, Section 7.1.1.2 c), Page 79 & 80	This has been revised.	Ilam Presentation
	Chapter 9, Section 9.1	Crucial roles of a wide range of stakeholders: other	Chapter 9, Section 9.1, Line 300,	This has been incorporated.	Ilam Presentation

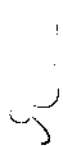
S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
		than what is mentioned in the report (e.g. palikas, security personnel, forest office personnel....)	Table 35, Page 106-108.	incorporated.	
	Chapter 12, Page 117	What about site/field monitoring by central team?	Chapter 12, Line 343, Page 144	This has been incorporated.	Ilam Presentation
	Chapter 6, Line 177, Page 58	With and Without project alternatives and without sub project or do nothing alternatives: justification- why only SDG, why not country policies and constitutions and people's pressing needs. Need convincing data to strongly justify it.	Chapter 6, Section 6.1.1, Page 72 & 73	This has been incorporated.	Katahariya Presentation
	Chapter 6, Page 59 & 60	Option or Alternative: mention consistently	Chapter 6, Page 72 & 76	This has been incorporated.	
C. Other Comments					
a) Comments received during Diktel WSSP Presentation					
1	Chapter 11, Section 11.5, Line 310, Page 114	Although there is no forest area within the project area but fund is allocated for uprooting, why?	Chapter 11, Line 341, Page 140	This cost is allocated under provisional sum. It is not mandatory. For assurance, it has been omitted from the report.	
2	Chapter 2, Figure 2-Page 8, Figure 3-Page 18, Figure 4-Page 21, Figure 5-Page 22, Figure 6-Page 23, Figure 7-Page 24	Please make map clear and include legends	Chapter 2: Figure 1, Page 7 Figure 3, Page 22 Figure 4, Page 28	This has been incorporated.	
3	Figure 4 to 7, Page 21-24	If possible, include spot point elevation, pipe series and diameter in map.	Figure 4, Page 28	It is not possible to include all those mentioned features in the map as this has	



Engineer

S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
				already been included in design report.	
	Chapter 2, Section 2.3, Table 4, Page 9 & 10	Include protection works in salient features section also.	Chapter 2, Section 2.3, Table 4, Page 11 & 12	This has been incorporated.	
		Incorporate other comments given by experts.		This has been incorporated.	
	b) Generic Comments received during other Presentations				
	Page (i), (ii) & (iii)	Include all abbreviation used in the report	Page (i), (ii), (iii), (iv) & (v)	This has been incorporated.	
	Chapter 7, Section 7.2.4.2 e), Page 71	Seismic data is hypothetical correct it with some reference data	Chapter 7, Section 7.2.4.2 (f) Page 88	This has been incorporated.	
	D. Generic Comments By Ms. Jwala Shrestha (Under Secretary, MoFE) in Bhojpur Presentation relevant to Diktel IEE Report				
	Chapter 2, Section 2.4.11 d), Page 19 & 20	Quantity of Construction materials should be provided.	Chapter 2, Section 2.4.11 d), Page 24 & 25	This has been incorporated.	
	Chapter 2, Section 2.4.11 a), Page 19, Table 8	Details on Land Requirement	Chapter 2, Section 2.4.11 a), Page 23, Table 8	This has been incorporated.	
	Chapter 2, Section 2.4.11 c), Page 19	Number of Human Resources should be provided.	Chapter 2, Section 2.4.11 c), Page 24	This has been incorporated.	
	Chapter 2, Section 2.4.11 e), f), g), h), Page 20	Camp Site, Spoil Disposal Site & Stockpiling Site Location should be determined. Quantity of earthworks should be provided.	Chapter 2, Section 2.4.11 e), f), g), h), Page 25 & 26	This has been incorporated.	
	E. Comments By Mr. SubashAcharya, MoFE				
	Executive Summary	Chapter heading should be given in the executive	Executive Summary	This has been incorporated.	

S.N.	Chapter/Section/Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
		summary.			
	Chapter 4	More Policy, Legal & Administrative Framework is required.	Chapter 4, Table 9	This has been incorporated.	
	F. Beside these comments, some other changes within the report were also made as per the report requirement that was felt necessary during the report incorporation.				


 Director
 Department of Water Supply
 Kathmandu


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