नेपाल सरकार

खानेपानी मन्त्रालय

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

VISIT Nepal Year 2020

पत्र संख्या:- ०६८/७६
चलानी नं.:- ९६३

मिति २०७६।०६।०२

श्री खानेपानी तथा ढल व्यवस्थापन विभाग,
पानीपोखरी, काठमाडौं ।

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

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

बोधार्थ :

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

संलग्न :

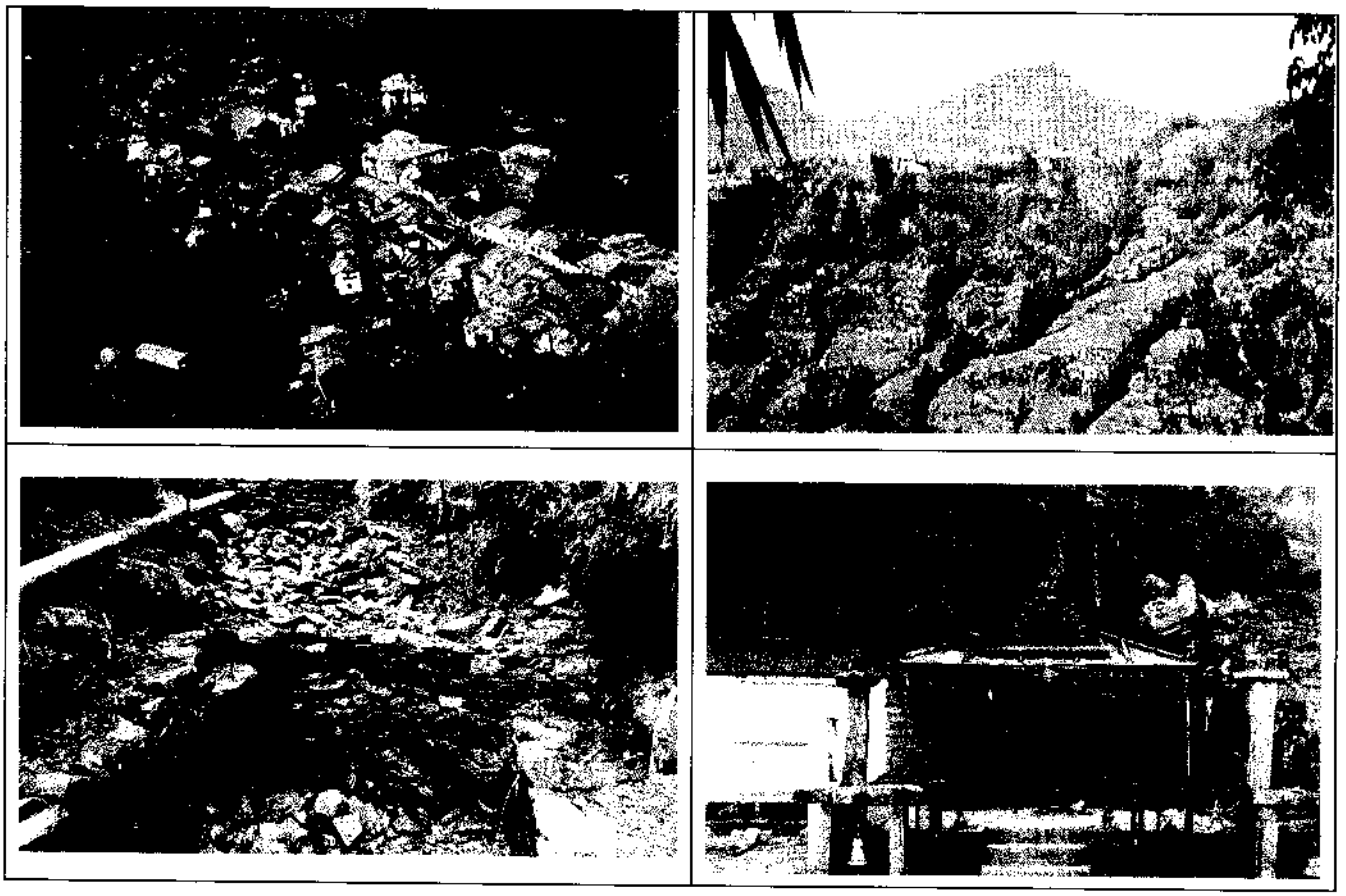
स्वीकृत प्रारम्भिक वातावरणीय परीक्षण (IEE) प्रतिवेदन २ प्रति ।

(अन्जना महर्जन)
ईन्जिनियर

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

Initial Environmental Examination (IEE)
Of
Bhojpur Water Supply and Sanitation Project

Bhojpur, Nepal



AUGUST, 2019

SUBMITTED TO: Ministry of Water Supply, Singhadurbar, Kathmandu

---

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

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

ABBREVIATIONS

2ndSTWSSSP	Second Small Towns' Water Supply and Sanitation Sector Project
AD	Anno Domini
ADB	Asian Development Bank
AIFC	Average Incremental Financial Cost
AM	Accountability Mechanism
APF	Armed Police Force
AP	Affected Person
ATP	Ability to Pay
BDS	Bulk Distribution System
BOD	Biological Oxygen Demand
BoQ	Bill of Quantities
B.S.	Bikram Sambat
BW	Brickwork
BWF	Barbed Wire Fencing
CAPP	Communication And Public Participation
CDO	Chief District Officer
C-EMP	Contractor's Environmental Management Plan
CITES	Convention on International Trade in Endangered Species of Wild Fauna & Flora
CLBW	Chain Link Boundary Wall
CO	Carbon Monooxide
Coliform P/A	Coliform Presence/Absence
CRO	Complain Receiving Officer
CSA	Concerned Sector Agency
DAO	District Adminstration Office
DCC	District Coordination Committee
DDR	Due Diligence Report
DEDR	Detailed Engineering Design Report
DI	Ductile Iron
DMA	District Metered Area
DMC	Developing Member Countries
DO	Dissolved Oxygen
DPH	Dosing Pump House
DRTAC	Design Review and Technical Audit Consultant
DS	Distribution System

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

DSMC	Design, Supervision and Management Consultant
DWSSM	Department of Water Supply and Sewerage Management
EARF	Environmental Assessment and Review Framework
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
EMR	Environmental Monitoring Report
EO	Environmental Officer
EOCC	Economic Opportunity Cost of Capital
ENPHO	Environment and Public Health Organization
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	Financial Internal Rate of Return
FRP	Ferro Reinforced Plastic
GH	Guard House
GI	Galvanized Iron
GoN	Government of Nepa
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
H_2S	Hydrogen Sulphide
HHs	Households
HRF	Horizontal Roughening Filter
IBAT	Integrated Biodiversity Assessment Tool
ICG	Implementation Core Group
ID	Indirect
IEC	Information Environment and Communication
IEE	Initial Environmental Examination
IP	Indigenous People
IUCN	International Union for Conservation of Nature
LC	Least Concern
LDO	Local Development Office

LGs	Local Groups
LT	Long Term
MoFE	Ministry of Forests and Environment
MoWS	Ministry of Water Supply
MT	Medium Term
MWSS	Manufacturer Waste Scrap Shingles
ND	Nominal Diameter
NDWQS	National Drinking Water Quality Standard
NEPAP	National Environment Policy & Action Plan
NGO	Non Governmental Organization
NO_2	Nitrogen Dioxide
NPR	Nepalese Rupees
NVMES	Nepal Vehicles Mass Emission Standards
OD	Outer Diameter
ODF	Open Defecation Free
O&M	Operation and Maintenance
PAF	Project Affected Families
Pb	Lead
PD	Project Director
PE	Polyethylene
pH	Potential of Hydrogen
$PM_{2.5}$	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
PPHA	Population Per Hectare
PPTA	Project Preparation Technical Appraisal
PSC	Project Steering Committee
RCC	Reinforced Cement Concrete
RDSMC	Regional Design Supervision Management Consultants
REA	Rapid Environmental Assessment
RL	Relative Level
RoW	Right of Way
RRM	Random Rubble Masonry
RPMO	Regional Project Management Office
RVT	Reservoir Tank
SDG	Sustainable Development Goal

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

SLC	School Leaving Certificate
SO_2	Sulphur Dioxide
SPS	Safeguard Policy Statement
SS	Sub System
SS	Site Specific
SSF	Slow Sand Filter
SSO	Social Safeguard Officer
ST	Short Term
STWSSSP	Small Towns' Water Supply and Sanitation Sector Project
TDF	Town Development Fund
TDS	Total Dissolved Solids
ToR	Terms of Reference
TSS	Total Suspended Solids
TSTWSSSP	Third Small Town Water Suppy & Sanitation Sector Project
USD	United States Dollar
UWSSSP	Urban Water Supply and Sanitation (Sector) project
VDC	Village Development Committee
VU	Vulnerable
WASH	Water Sanitation & Hygiene
WHO	World Health Organization
WN	Ward Number
WSP	Water Safety Plan
WSSDO	Water Supply and Sanitation Divisional Office
WtP	Willingness to Pay
WTP	Water Treatment Plant
WUA	Water User's Association
WUSC	Water Users' and Sanitation Committee

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

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
m^3/sqm/hr	cubic meter per square meter per hour
mg/l	milligram/s per liter
mm	millimeter/s
NRs.	Nepalese Rupees
NTU	Nephelometric Turbidity Unit
PPHA	Population Per Hectare
Rs.	Rupees

Engineer

Government of Nepal
Ministry of Water supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

TABLE OF CONTENTS

Engineer

Project Management

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

LIST OF TABLES

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector
Project Management Directorate

LIST OF FIGURES

Engineer

Government of Nepal
Ministry of Water supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

LIST OF ANNEXES

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

EXECUTIVE SUMMARY

Introduction

1. Bhojpur 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 of this project town, it has been identified that the existing Silingchung Water supply system has been providing water supply services to public for only 4 hours a day while to major government offices, the supply system is continuous or 24 hours. This intermittent water supply service is not able to meet the increasing water demand of the public. It is also observed that the current system serve only about 68.6% of total 2190 service area population.It has been observed that the existing water supply service is limited to partial areas of ward 7, 8, 9 & 10 only. Similarly, our study also shows that there is no provision of water treatment facility in this existing system. The proposed project expects to improve the existing water supply condition of the project town through provision of water treatment plants and continuous water supply service.

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.

4. 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.

5. The proposed project is the extension of the existing Silingchung Water Supply system. The proposed project will extend the distribution system to new areas of Bhojpur municipality (complete areas of wards 6 to 8 and partial areas of wards 3, 4, 5, 9, 10 &

Engineer

11) which are not covered by the existing Silingchung system. Similarly, three existing spring intakes will be rehabilitated and used for this proposed project while the existing Jorsanghu stream intake will be reconstructed for the project. Hence, this project has been proposed in the form of the combination of rehabilitation of old system and construction of the proposed water supply components required for upgrading the system. The existing condition of Silingchung system will be improved by the proposed project by considering new expanded service areas with provision of continous water supply system along with proper water treatment system.

6. 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 entire distribution network is to be supplied from multiple (ten) reservoir system. All the water treatment plants will act as main distributors. The total supplies of the sub-systems have been divided in to these ten reservoirs in order to manage RVT wise demand.

Description of the Project

7. Four existing sources will be used for the proposed project that includes Bhulke, Tindhara, Jorsanghu and Daduwa. Our study shows that among these four sources, the first three sources are spring type while the fourth one is stream type. Apart of these existing sources, Tinbhangale is the new proposed source for this project. Altogether, six intakes have been proposed. Out of these six intakes, three existing spring intakes will be rehabilitated while the existing stream intake will be reconstructed. The remaining two intakes at the bank of Tinbhangale source will be newly constructed. According to the detailed sedign engineering report, the cumulative amount of water that will be used from the existing sources is 10.74 lps while from the proposed source is 13.5 lps.

8. The proposed project will have two new water treatment plants and ten service reservoirs in this project. The cumulative capacity for these reservoirs proposed in this project is about 925 cubic meters. The main project components of the proposed project are Intakes, Collection Chambers, Transmission Mains, Water Treatment Plant, Service Reservoirs, Bulk Distribution Mains, Distribution Mains, House Connections, Appurtenances, Guard Quarter & Boundary Wall. This project also emphasizes on the construction requirements like Land Requirement, Energy Requirement, Human Resource Requirement, Worker's Camp, and Stockpiling Site etc.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office
Engineer

Methodology

9. The basic methodology for the prepartion 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. On the basis of literature review and field study, the Impact Area Delineation is carried out to determine the area of the project area affected by the proposed project activities. 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

10. 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, 2075 B.S. (2019 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

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

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

11. 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.

12. 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 judgment and interaction with the locals & the concerned bodies during field study. No existence of protected areas as well as community forest areas within the project area was observed during the field study.

13. Similarly, details on water quality were collected through sampling process followed by water quality tests on approved laboratory. The test reports show that all parameters of

water quality of the sample collected from Tinbhangale Source and Other Sources that includes Jor Sanghu,Tindhare & Daduwa sources within the permitted value of NDWQS.

14. 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 household survey, 90% of total 2190 HHs expressed willingness to contribute for up-front cash contribution for the proposed project. This indicates the desire of people of this project town, for the proposed project to get rid of the existing acute water shortage problem. The survey also shows that only 14.70% (321) of 2190 HHs fall under poor category and only 26.70% (584) of 2190 HHs expend less than Rs. 7,500 per month. Hence, this indicates the affordability of the community for the proposed project in terms of monthly income level and the expenditure level.

Analysis of Alternatives

15. Analysis on the alternatives of the proposed project is another important process of IEE study that will help to assess the feasibility of the project in regard to technical, environmental & social aspects. Primarily, this involves two alternatives that includes "Without Project" or "Do-nothing" Alternative and "With Project" Alternative. The limitation of "Without Project" Alternatives regarding continuous water supply system, treatment system and susceptibility to water borne diseases leads to opt for "With Project" Alternative. With Project Alternative has been analyzed by envisaging the likely benefits of the proposed project. The analysis shows that the proposed project is designed to provide convenient access to reliable, adequate, safe and potable water supply to 12,807 populations as per base year 2018 A.D. This "With Project" Alternative analysis also involves assessment of the most cost-effective, reliable and efficient system that can serve the design population. During this Alternative analysis, it has been identified that there are no other alternatives possible for this proposed project. The alternative analysis shows that the proposed project is a unique system and is the extension of the existing Silingchung water supply system.

Anticipated Environmental Impacts

16. The analysis on the information collected during field study helps to identify and predict the likely environmental impacts that may result from the proposed project. These predicted impacts are then evaluated using Scoring matrix as per National EIA

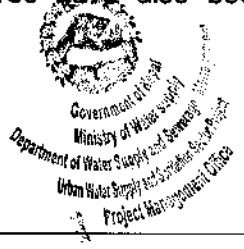
Guidelines, 1993 to determine the nature, extent and magnitude. This evaluation will further help to propose the appropriate mitigation measure for each impact.

17. The anticipated environmental impacts have been mainly categorized into two viz., Beneficial Impacts and Adverse Impacts on the basis of its negative and positive significance. This has been further categorized into four impacts that includes i) Impact on Physical Environment, ii) Impact on Biological Environment, iii) Impact on Chemical Environment and iv) Impact on Socio-economic Environment, based upon the effects on the existing environment. These impacts has been sub divided into three categories based upon the project phase that includes i) Design Phase, ii) Construction Phase and iii) Operation Phase.

18. Here, Beneficial Impacts includes Employment Generation, Skill Enhancement, Local Trade & Business Opportunities, Improved Health & Hygiene, Increased Economic Opportunity and 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, Impact on Water Quality of nearby rivers, Impact of Quality of water stored in the reservoir, Structural Instability, Workers & Community Health & Safety Hazards, and Damage to the existing Utilities, Traffic Congestion, Disruption to Local Vendor's Business, Occupational Health & Safety Hazards, Delivery of Unsafe Water, Impact of Sustainability of Works etc.

Mitigation & Augmentation Measures

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



Information Disclosure,Consultation & Participation

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

Grievance Redress Mechanism

21. The Project-specific grievance redress mechanism (GRM) is also an essential process of the IEE study which is meant for persons seeking satisfactory resolution to their complaints on the social and environmental performance of the projects under UWSSSP. The mechanism, developed in consultation with key stakeholders, will ensure the following mentioned points;

    (i) the basic rights and interests of every person adversely affected by the social and environmental performance of a Project are protected; and

    (ii) their concerns are effectively and timely addressed

    1. 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/environmental expert), (6) a representative of reputable and relevant CBO/SHG/organization working in the project area as invitee, and (7) contractor's representative.

Environmental Management Plan

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

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Project
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

(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.

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

Monitoring & Reporting

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

Conclusion

25. In conclusion, the IEE study shows that the proposed project is not an environmentally critical undertaking. The proposed project, its components, are not within or adjacent to environmentally sensitive areas. The few adverse impacts of high magnitude during construction will be temporary and short-term (i.e., most likely to occur only during peak construction periods). The proposed project will bring about the following mentioned benefits:

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

26. In conclusion, based on the findings of IEE study, it has been observed that 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 साराँश

परिचय

१. यस भोजपुर 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 यहीं प्रयासलाई समर्थन गर्दै एसियाली विकास बैंकले शहरी खानेपानी तथा सरसफाई आयोजनामा लगानी गरेका छन् ।

२. प्रस्तावित आयोजना क्षेत्रको स्थलगत अध्ययनको क्रममा विद्यमान सिलिङ्गचुङ खानेपानी आपूर्ति प्रणालीले त्यहाँका सर्वसाधारणलाई दैनिक चार घण्टाको लागि मात्रै खानेपानी आपूर्ति सेवा प्रदान गर्दै आएको देखिएको छ भने मुख्य सरकारी कार्यालयहरुमा यो आपूर्ति सेवा निरन्तर अर्थात चौबिस घण्टा रहेको देखिएको छ। यस आँशिक खानेपानी आपूर्ति सेवाले त्यहाँका सर्वसाधारणको खानेपानीको बढ्दो मागलाई पूरा गर्न सकेको छैन । वर्तमान खानेपानी आपूर्ति प्रणालीले सेवा क्षेत्रको जम्मा २१९० आवादीमा लगभग ६८.६% आवादीलाई मात्र सेवा प्रदान गर्दै आएको देखिएको छ ।वर्तमान खानेपानी आपूर्ति सेवा आयोजना शहरको ७, ८, ९ र १० वडाका आँशिक क्षेत्रहरुमा मात्र सीमित रहेको पाइएको छ । त्यस्तैगरी, वर्तमान खानेपानी आपूर्ति प्रणालीमा पानी प्रशोधनको प्रावधान नरहेको हाम्रो अध्ययनले देखाएको छ । पानी प्रशोधन तथा निरन्तर खानेपानी आपूर्ति सेवाको प्रावधान मार्फत प्रस्तावित आयोजनाले विद्यमान खानेपानी आपूर्ति प्रणालीको अवस्था सुधार गर्ने अपेक्षा गर्दछ ।

३. एसियाली विकास बैंक तथा नेपाल सरकारको नीति अनुसार सबै परियोजनाहरुको वातावरणीय मूल्याँकन 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 सम्भवतः कुनै उल्लेखनीय वातावरण, स्वास्थ्य वा सुरक्षा सम्बन्धि खतराहरु निम्त्याउने छैन ।

४ 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 ऐन-२०५३, वातावरण संरक्षण नियमावली-२०५४ र २०७३ मा गरिएको नयाँ संशोधनको पालना गरेको हुनुपर्छ । प्रस्तावित आयोजना, वातावरण संरक्षण नियमावलीको अनुसूची १ को प्रारम्भिक वातावरणीय परीक्षण मात्र आवश्यक पर्ने भनेर उल्लेख गरिएको (ऐ) **खानेपानी क्षेत्र** अन्तर्गत पर्दछ । तसर्थ, प्रस्तावित आयोजनाले एसियाली विकास बैंक तथा नेपाल सरकार दुवैका नीति आवश्यकताहरु पूर्ति गर्दछ ।

५. प्रस्तावित भोजपुर आयोजना हाल सञ्चालन भइरहेको सिलिङ्गचुङ खानेपानी प्रणालीको विस्तारित रुप हो । वर्तमान प्रणालीको दायरा भित्र समावेश नभएका भोजपुर नगरपालिका नयाँ क्षेत्रहरु (वडा नं ६ देखि ८ का पुरापुर क्षेत्रहरु र वडा नं ३, ४, ५, ९, १० र ११ का आंशिक क्षेत्रहरु)मा प्रस्तावित आयोजनाले आफ्नो वितरण प्रणाली विस्तार गर्नेछ । त्यस्तैगरी, प्रस्तावित आयोजनामा यस वर्तमान प्रणालीका तीन छहरे इन्टेकहरु पुर्नस्थापना गरि प्रयोगमा ल्याइनेछ भने विद्यमान जोरसाँघु स्ट्रीम इन्टेकको पुननिर्माण गरिनेछ । तसर्थ, प्रस्तावित आयोजना, वर्तमान खानेपानी प्रणालीको पुनर्स्थापना तथा वर्तमान प्रणालीलाई सुधार गर्नको निम्ति आवश्यक खानेपानी संरचनाको निर्माणको संयोजनको रुपमा प्रस्तावित गरिएको छ । विस्तारित नयाँ क्षेत्रहरुलाई समेटेर निरन्तर खानेपानी आपूर्ति सेवाको प्रावधानको साथै उचित पानी प्रशोधनको व्यवस्था सहित प्रस्तावित आयोजनाले वर्तमान सिलिङ्गचुङ प्रणालीको अवस्थालाई सुधार गर्नेछ ।

६. यस प्रस्तावित भोजपुर आयोजना पूर्णरुपमा ग्रेभिटि प्रणालीको रुपमा परिकल्पना गरिएको हो ।यस आयोजनाको वितरण प्रणाली अन्तर्गत थोक वितरण प्रणाली (BDS) र घरायसी वितरण प्रणाली (DS) समावेश छन् । यस आयोजनाको सम्पूर्ण वितरण सञ्जालमा दशवटा रिजर्भोयर (पानी टेंकी) प्रणालीमार्फत खानेपानी आपूर्ति गर्दछ । यस आयोजनाका सबै पानी प्रशोधन 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 ।

आयोजनाको विवरण

७. वर्तमान प्रणालीमा प्रयोग भइरहेको भुल्के, तीनधारे,जोरसाँघु र डडुवा जस्ता चार स्रोतहरु प्रस्तावित आयोजनामा प्रयोग हुनेछन् । यी चार स्रोतहरु मध्ये पहिलो तीन स्रोतहरु छहरे स्रोत हो भने चौथौ स्रोत स्ट्रीम स्रोत रहेको हाम्रो अध्ययनले देखाएको छ । यसको अलावा तीनभंगाले खोलालाई प्रस्तावित आयोजनाको नयाँ श्रोतको रुपमा प्रस्ताव गरिएको छ । समग्रमा यस आयोजनामा छ वटा इन्टेकहरु प्रस्तावित छन् । यी छ वटा इन्टेकहरु मध्ये तीन विद्यमान छहरे इन्टेकहरुको पुर्नस्थापना गरिनेछ भने विद्यमान स्ट्रीम इन्टेकको पुननिर्माण गरिनेछ । तीनभंगाले स्रोतको किनारमा बाँकी रहेका दुई नयाँ इन्टेकहरुको निर्माण हुनेछन् । विस्तृत इञ्जिनियरिङ्ग डिजाइन रिर्पोट अनुसार विद्यमान स्रोतहरुबाट प्रयोग हुने पानीको मात्रा समग्रमा १०.७४ लिटर प्रति सेकेण्ड रहेको छ भने प्रस्तावित स्रोतहरुबाट प्रयोग हुने पानीको मात्रा समग्रमा १२.५० लिटर प्रति सेकेण्ड रहेको छ ।

Engineer

८. यस प्रस्तावित आयोजनामा दुईवटा नयाँ पानी प्रशोधन केन्दहरु तथा दशवटा पानी टैंकीहरु रहनेछन् । यी पानी टैंकीहरुको समग्र क्षमता लगभग ९२५ घ.मि. रहेको छ । इन्टेक,कलेक्सन च्याम्बर, ट्रान्समिसन पाइपहरु, पानी प्रशोधन केन्द्र, पानी टैंकी, वितरण पाइपहरु, निजी धारा, पाले घर आदि यस आयोजनाका मुख्य खानेपानी संरचनाहरुका रुपमा समावेश छन् । त्यस्तैगरी, यस आयोजनाद्वारा जमिन आवश्यकता, उर्जा आवश्यकता, मानव संसाधन आवश्यकता, श्रम शिविर, निर्माण सामाग्री सञ्चय क्षेत्र जस्ता निर्माणाधीन आवश्यकताहरुका विषयलाई पनि जोड दिइएको छ ।

पद्धति

९. वातावरण संरक्षण नियमावली अनुसार यस प्रारम्भिक वातावरणीय परीक्षणका आधारभूत पद्धतिमा आयोजनास्थलबारे जानकारी हासिल प्राप्त गर्न **लेख-रचनाहरुको समीक्षा** र आयोजना क्षेत्रको भौतिक, साँस्कृतिक,रासायनिक, जैविक र सामाविक अवस्थाहरुबारे आधारभूत जानकारी एकत्रित गर्न **स्थलगत अध्ययन** समावेश छन् । यहीं **लेख-रचनाहरुको समीक्षा** र **स्थलगत अध्ययन** को आधारमा प्रस्तावित आयोजना गतिविधिहरुबाट प्रभावित आयोजना क्षेत्र निर्धारण गर्न कोर क्षेत्र वा वरपर क्षेत्र को रुपमा **प्रभावित क्षेत्रको अभिनिर्धारण** गरिनेछ । 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 छलफल कार्यक्रम** सञ्चालन गरिएको छ । यसका साथै प्रत्याशित प्रभावहरुको प्रतिकूलता निर्धारण गर्नको लागि साधारण चेकलिस्ट प्रकियामार्फत **प्रभावहरुको पहिचान, पुर्वानुमान र मूल्याँकन** गरिएको छ । यस प्रारम्भिक वातावरणीय परीक्षणले अनुमोदित सन्दर्भका सर्तहरु (ToR) मा उल्लिखित प्रक्रियाहरुको पालना गरेको छ ।

नीति, कानुनी र प्रशासनिक रुपरेखा

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

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

ख) योजना,नीति तथा रणनीतिहरु : 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 (ड्राफ्ट), वि.सं २०७१ (ई.स. २०१४); x) राष्ट्रिय वन नीति, वि.सं २०७५ (ई.स. २०१९); xi) भु-उपयोग नीति, वि.सं २०७२ (ई.स. २०१५)

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

घ) **नियम तथा 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 मूल्याँकन 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

११. प्रस्तावित आयोजनाका पूर्वानुमानित वातावरणीय प्रभावहरुप्रति यस आयोजना शहरको वातावरणीय पक्षहरुको संवेदनशीलताको पहिचान गर्न यहाँको वर्तमान वातावरणबारे जानकारी लिन आवश्यक पर्दछ । यसै सन्दर्भमा, डेस्क अध्ययनको क्रममा साहित्य समीक्षाको माध्यममार्फत वर्तमान वातावरणको द्वितीयक जानकारी प्राप्त गरिएको छ भने प्रारम्भिक वातावरणीय परीक्षणका

लागि यी दोस्रो तहको जानकारी पर्याप्त छैन । तसर्थ, वर्तमान वातावरणीय अवस्थाबारे प्राथमिक जानकारी एकत्रित गर्न स्थलगत अध्ययन गरियो ।

१२. यसै सन्दर्भमा स्थलगत अध्ययनको समयमा क) भौतिक वातावरणीय पक्ष अर्न्तगत स्थलाकृति, जमिन प्रयोगको वर्गीकरण, भूविज्ञान, जलस्रोतहरु, जलवायु, वायुको गुणस्तर,ध्वनिक वातावरण, भुक्षय संवेदनशीलता; ख) जैविक वातावरण अन्तर्गत वनस्पति, वन्यजन्तु,संरक्षित क्षेत्र, सामुदायिक वन क्षेत्र; जस्ता बारे आवश्यक विवरणहरु साधारण चेकलिस्ट, REA चेकलिस्ट, विशेषज्ञ निर्णय तथा स्थानिय एवं सम्बन्धित निकाय सँगको अर्न्तकिया मार्फत संकलन गरियो । आयोजना क्षेत्रभित्र कुनै पनि संरक्षित क्षेत्र तथा सामुदायिक वन क्षेत्रहरु अवस्थित नरहेको स्थलगत अध्ययनको कममा देखिएको छ ।

१३ त्यस्तैगरी, पानीको गुणस्तरबारे विवरण संकलन गर्न पानीको नमुना संकलन गरी स्वीकृति प्राप्त प्रयोगशालामा परीक्षण गरियो । यस परीक्षणले तीनभंगाले स्रोत र जोरसाँघु, तीनधार र डडुवा जस्ता स्रोतहरुबाट संकलित पानीको नमुनामा सबै आवश्यक प्यारामिटरहरु राष्ट्रिय खानेपानी गुणस्तरको मापदण्ड भित्र रहेको देखाएको छ ।

१४. स्थलगत अध्ययनको कममा, सामाजिक आर्थिक वातावरण अन्तर्गत जनसांख्यिक विशेषताहरु, जाति/जातिय समूह, आर्थिक विशेषताहरु,शिक्षा तथा सीप, सामुदायिक पूर्वाधारहरु इत्यादि सम्बन्धि विवरणहरु साधारण प्रश्नावली प्रकिया हुँदै घरधुरी सर्वेक्षण र स्थानिय सँगको अर्न्तकिया मार्फत संकलन गरियो । यसै सन्दर्भमा पानीको मासिक महसुल तिर्ने सम्बन्धि तत्परता, अग्रिम नगद योगदानका लागि तत्परता र तिर्ने सक्ने क्षमता बारे पनि मुल्याँकन गरियो । घरधुरी सर्वेक्षण अनुसार २१९० घरधुरी मध्य ९०% ले प्रस्तावित आयोजनाको लागि अग्रिम नगद योगदान दिन इच्छा व्यक्त गरेका छन् । यसले विद्यमान पानीको गंभीर समस्याबाट छुटकारा पाउनका लागि यस आयोजना शहरका बासिन्दाहरुको प्रस्तावित आयोजनाको चाहनालाई संकेत गर्दछ । त्यस्तैगरी, सर्वेक्षणले २१९० घरधुरी मध्य १४.७०% (३२१) विपन्न वर्ग अर्न्तगत रहेको देखाएको छ भने २६.७०% (५८४) घरधुरीले प्रति महिना रु.७,५००.०० भन्दा कम खर्चिने गरेको देखाएको छ । तसर्थ, यसले मासिक आय र व्यय स्तरको आधारमा प्रस्तावित आयोजनाका लागि समुदायको सामर्थ्यताको संकेत गर्दछ ।

वैकल्पिक विश्लेषण

१५. प्रस्तावित आयोजनाको वैकल्पिक विश्लेषण, यस प्रारम्भिक वातावरणीय परीक्षणको अर्को मुख्य प्रकिया हो जसले प्राविधिक, वातावरणीय तथा सामाजिक पक्षहरुको सन्दर्भमा यस आयोजनाको सम्भाव्यताको परीक्षण गर्न मद्दत पुर्‍याउँछ । मुख्यतय, यस प्रकिया अर्न्तगत "आयोजना विना" विकल्प र "आयोजना सहित" विकल्प जस्ता दुई विकल्पहरु समीक्षा गरिएका छन् । निरन्तर खानेपानी प्रणाली, प्रशोधन प्रणाली तथा पानीजन्य रोगप्रतिको संवेदनशीलताको सन्दर्भमा "आयोजना विना" विकल्पको सीमिततालै "आयोजना सहित" विकल्पको [illegible] तर्फ उन्मुख

Engineer

गराएको छ । प्रस्तावित आयोजनाका सम्भावित फाइदाहरुको मनन मार्फत "आयोजना सहित" विकल्पको विश्लेषण गरिएको छ । आधार वर्ष २०१८को अनुसार १२,८०७ जनसंख्यामा विश्वसनीय, पर्याप्त, सुरक्षित र पिउन योग्य खानेपानीको सुविधाजनक पहुँच प्रदान गर्न प्रस्तावित आयोजना डिजाइन गरिएको यस वैकल्पिक विश्लेषणले देखाएको छ । "आयोजना सहित" वैकल्पिक विश्लेषण अर्न्तगत डिजाइन जनसंख्यालाई सेवा प्रदान गर्न सक्ने सबैभन्दा लागत प्रभावकारी, विश्वसनीय र प्रभावकारी प्रणालीको मुल्याँकन समावेश छन् । यस वैकल्पिक विश्लेषणको अवधिमा प्रस्तावित आयोजनाका लागि कुनै अन्य विकल्पहरु सम्भव नरहेको पहिचान गरिएको छ । प्रस्तावित आयोजना एक अद्वितीय प्रणाली भएको र विद्यमान सिलिङ्गचुङ प्रणालीको विस्तारित रुप भएको यस वैकल्पिक विश्लेषणले देखाएको छ ।

पूर्वानुमानित वातावरणीय प्रभावहरु

१६. स्थलगत अध्ययनको अवधिमा एकत्रित गरिएको जानकारीहरुको गरिएको विश्लेषणले प्रस्तावित आयोजनाको परिणामस्वरुप देखिने प्रत्याशित वातावरणीय प्रभावहरुको पहिचान तथा पूर्वानुमान गर्न मद्दत पुर्‍याउँछ । राष्ट्रिय वातावरणीय प्रभाव मुल्याँकन निर्देशिका, ई. सं. १९९३ अनुसार तय गरिएको स्कोरिङ्ग म्याट्रिक्स प्रयोग गरी यी अनुमानित प्रभावहरुको प्रकृति, सीमा र परिमाण निर्धारण गर्न यी प्रभावहरुको मुल्याँकन गरियो । यो मुल्याँकनले प्रत्येक प्रभावका लागि उपयुक्त न्यूनिकरण विधि प्रस्ताव गर्न थप मद्दत गर्नेछ ।

१७. यी प्रत्याशित वातावरणीय प्रभावहरुलाई मुख्यतय यिनका नकरात्मक र सकरात्मक महत्वको आधारमा दुई भागमा वर्गीकृत गरिएको छ : क) लाभदायी प्रभाव र ख) प्रतिकूल प्रभाव । यी वर्गीकृत गरिएको प्रभावहरुलाई वर्तमान वातावरणमा पर्ने असरहरुको आधारमा थप चार प्रभावहरुमा वर्गीकृत गरिएको छ: क) भौतिक वातावरणीय प्रभाव ख) जैविक वातावरणीय प्रभाव ग) रासायनिक वातावरणीय प्रभाव र घ) सामाजिक आर्थिक वातावरणीय प्रभाव । यी चार प्रभावहरुलाई आयोजनाको चरण अनुसार पुन तीन भागमा विभाजन गरिएको छ जस अर्न्तगत क) डिजाइन चरण, ख) निर्माण चरण र ग) सञ्चालन चरण समावेश छन् ।

१८. यहाँ लाभदायिक प्रभावहरु अर्न्तगत रोजगार श्रृजना, क्षमता अभिवृद्धि, स्थानीय व्यापार तथा व्यापारिक अवसरहरु, सुधिएको स्वास्थ्य तथा सरसफाई, आर्थिक अवसरहरुमा वृद्धि, महिला सशक्तिकरण जस्ता प्रभावहरु समावेश छन् । त्यस्तैगरी, भूक्षय, ध्वनि प्रदुषण, वायुमा पर्ने प्रभाव, सतही पानीको गुणस्तरमा पर्ने प्रभाव, निर्माण क्षेत्र एवं श्रमिक शिविर बाट फोहोर मैला एवं फोहोर पानीको उत्पन्न, भण्डारण गरिएको ईन्धन/रसायनको आकस्मिक चुहावट, जमिन प्रयोगको वर्गीकरणमा पर्ने प्रभाव, प्राकृतिक ढल निकासमा अवरोध, भत्काइएका अवशेष बाट निस्किएका फोहोरको अनुचित ढँगबाट गरिएको विघटनको प्रभाव, खोला नालामा पर्ने प्रभाव, वनस्पति तथा वन्यजन्तुमा पर्ने प्रभाव, जलचरमा पर्ने प्रभाव, श्रमिक तथा सामुदायिक स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरु, हाल प्रदान भइरहेको सुविधाहरुमा अनपेक्षित क्षति, ट्राफिक जाम, स्थानिय

Engineer

विकेताको व्यवसायमा अवरोध, पेशागत स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरु, असुरक्षित खानेपानीको वितरण, आयोजनाका कार्यहरुको दिगोपनमा पर्ने प्रभाव इत्यादि जस्ता प्रभावहरु प्रतिकूल प्रभाव अन्तर्गत समावेश छन् ।

न्यूनिकरण तथा वृद्धि-विकासका उपायहरु

१९. माथि उल्लिखित प्रत्येक प्रत्याशित प्रतिकूल वातावरणीय प्रभावहरुको न्यूनिकरणका उपायहरुको प्रस्ताव गरिएको छ । यी उपायहरु अर्न्तगत मुख्यतः भिरालो ठाउँहरुको सुरक्षाका उपायहरु, 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 खतराहरु सम्बन्धि चेतनामूलक कार्यक्रमहरुको सञ्चालन, पानी प्रशोधन प्रणालीको अनुगमन, क्लोरिनको उचित व्यवस्थापन इत्यादि जस्ता उपायहरु समावेश छन् । यी उपायहरु अध्याय ८ मा विस्तारमा वर्णन गरिएको छ ।यदि यी प्रस्तावित विधिहरु उचित ढंगले अपनाउने हो भने आयोजनाको निर्माण तथा सञ्चालन चरणमा कुनै उल्लेखनीय वातावरणीय समस्याहरुको सामना गर्नुपर्ने छैन । त्यस्तैगरी, प्रस्तावित आयोजनाका प्रत्याशित लाभदायिक प्रभावहरुलाई अझै माथि उकास्नको निम्ति विभिन्न उपयुक्त वृद्धि-विकासका उपायहरुको पनि प्रस्ताव गरिएको छ ।

सूचना प्रवाह, परामर्श तथा सहभागिता

२०. उपभोक्ताहरु सँगको परामर्श तथा सामुदायिक सहभागिता यस आयोजनाको तयारीको क्रममा अपनाइने महत्वपूर्ण प्रकिया हो। यो सरोकारवाला तथा प्रभावित व्यक्तिहरुलाई संलग्न गराउने प्रकिया हो । यस प्रकियामा प्रमुख सूचनादातासँगको अर्न्तवार्ता, सम्बन्धित उपभोक्ता समितिसँगको स्थलगत छलफल तथा उपभोक्ताहरु सँग गरिने स्थलगत छलफल जस्ता प्रकियाहरु समावेश छन् । उपभोक्ताहरु सँगको परामर्श अघि सम्भावित उपभोक्ताहरु र आयोजना कार्यान्वयनप्रति यिनको भुमिकाको पहिचान गर्नको निम्ति उपभोक्ताहरु विश्लेषण र म्यापिङ्ग (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 उपभोक्ताहरुलाई परामर्शमा संलग्न गराइन्छ । उपभोक्ताहरु सँगको परामर्शका प्रकियाहरु यस आयोजनाको निर्माण तथा सञ्चालनको अवधिभरी जारी रहनेछ । उपभोक्ताहरुको संलग्नतालाई सहज बनाउन आयोजना व्यवस्थापन कार्यालय (PMO)तथा कार्यान्वयन केन्द्रिय समूह (ICG)ले सम्बन्धित उपभोक्ता समिति र नगरपालिकासँग राम्रो सञ्चार तथा सहकार्य कायम् गर्नेछ ।

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project Management Office

Engineer

गुनासो सुनवाई संयन्त्र

२१. यस आयोजनाले निम्ताएका अप्रत्याशित सामाजिक तथा वातावरणीय असरहरुप्रति भएका गुनासाहरुको समाधानको खोजी गरिरहेका सम्बन्धित व्यक्तिमा केन्द्रित रहेको यस आयोजनाको अर्को अत्यावश्यक प्रकियाको रुपमा 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 ढँगले सम्बोधन गर्ने

२२ 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 इञ्जिनियर

ग) क्षेत्रिय आयोजना व्यवस्थापन कार्यालयको सामाजिक/वातावरण अधिकारी

घ) पीडित पक्षका तर्फबाट एक प्रतिनिधि

ङ) क्षेत्रिय डिजाइन, निरीक्षण र व्यवस्थापन परामर्शदाताकोबाट सुरक्षा विद (सामाजिक/वातावरण विद)

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

छ) ठेकेदारको प्रतिनिधि

वातावरणीय व्यवस्थापन योजना

२३. 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 ढँगले 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 न्यूनिकरण, सहयोगका लागि आवश्यक देखिएका विशेष कार्यहरु विस्तार गर्ने, र

घ) सुरक्षा सम्बन्धि दिइएका सिफारिशहरुको अनुपालना गरिएको सुनिश्चित गर्ने ।

यस आयोजनाका लागि तयार पारिएको स्थानिय स्तर निगरानी तथा प्रत्यासित प्रभावको न्यूनिकरणको कूल अनुमानित लागत रु.१,५००,०००.०० रहेको छ ।

अनुगमन तथा रिर्पोटिङ

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

निष्कर्ष

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

क) सुरक्षित र पिउन योग्य पानीको विश्वसनीय आपूर्तिमा पहुँच,

ख) उचित सरसफाई र स्वच्छताको अभ्यासमा उन्नति र स्वास्थ्य एवं सुरक्षा जोखिममा कमी,

ग) वर्षौंदेखि निरन्तर खानेपानी आपूर्तिकालागि भोग्नुपरेको कठिनाई बाट मुक्ति र

घ) परिणामको स्वरुप परिस्कृत सामुदायिक स्वास्थ्य , सुधारिएको जीवन स्तर र सुरक्षित समुदाय

२५. तसर्थ, 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 अनूसुचि-१ लाई अनुपालन गरेको देखिएको छ । २००९ मा लागू गरिएको सुरक्षा नीति विवरण (SPS) तथा वातावरण संरक्षण नियमावली,२०५४ र २०७३ मा गरिएको नयाँ संशोधनको अनुपालन गर्न कुनै विशेष अध्ययन वा वातावरणीय प्रभाव मूल्यांकन (EIA)को आवश्यकता नभएको यस प्रारम्भिक वातावरणीय परीक्षण अध्ययनले निष्कर्ष निकालेको छ ।

1. INTRODUCTION

1.1. Background

1. In 2000, the Government of Nepal (GoN) endorsed the 15-year Development Plan for Small Towns Water Supply and Sanitation to improve health and economic and environmental living conditions of people in small towns in Nepal. The Plan adopts a community managed demand responsive approach, where the community is involved in all aspects of planning and implementation of its town's project. In support of GoN's endeavor, the Asian Development Bank (ADB) funded the Small Towns' Water Supply and Sanitation Sector Project (STWSSSP) in 2001-2008. Twenty-nine (29) small towns of about 570,000 people benefitted from the improved water supply and sanitation services delivered under the Project. The positive impacts of STWSSSP led GoN to embark on the Second Small Towns' Water Supply and Sanitation Sector Project (2ndSTWSSSP), also financed by ADB and which benefitted another twenty-one (21) small towns.

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. Prior to this project, currently, ADB and GoN are working together to provide water supply and sanitation services to selected urban municipalities of Nepal through Urban Water Supply Sanitation (Sector) Project (UWSSSP) in accordance with the updated 15-year Development Plan for Small Towns and the National Urban Development Strategy. The Project will support Nepal in expanding access to community managed water supply & sanitationin 20 project municipalities by drawing on experiences and lessons from three earlier projects funded by ADB. UWSSSP will be implemented over a five-year period (indicative implementation period iSs 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.

Engineer

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 Bhojpur Water Supply and Sanitation Project

Name and Address of the Proponent

5. The Project proponent, Urban Water Supply and Sanitation (Sector) Project (UWSSSP) 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@stwsssp.gov.np
Website: www.sstwsssp.gov.np

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

Engineer

requirement that has to be adhered to is the Environment Protection Act (1997), and Environment Protection Rules (1997) and as amended in 1999 and 2007). Based on EPR Schedule 1, the Project is within the threshold of activities under the water supply and sanitation sector that will require IEE. This IEE fulfills the policy requirements of both ADB and GoN.

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; (ii) identifies and assesses potential impacts arising from the implementation of the Project on these environments and/or resources; (iii) recommends measures to avoid, mitigate, and compensate for the adverse impacts; (iv) presents information on stakeholder consultations and participation during Project preparation (v) recommends a mechanism to address grievances on the environmental performance of the Project; and (vi) provides an environmental management plan.

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 project town is an attraction for internal migration from the remote hilly regions due to which the population growth in future is expected. Because of its strategic location, the city will tend to grow in the future, albeit, in a moderate growth. Hence, the existing water supply system is not able to meet the growing demand of the increasing population of the project town.

11. The existing water supply system is intermittent and is limited to only certain parts of the city area. The supply system is just about 4 hours for the public and for major government offices the supply hours is 24 hours. The current system covers very limited area and our field study shiws that the existing system serve only about 68.6% of total 2190 HHs of the proposed service area.

12. The water from the existing system is hardly treated. People are mostly dependent on piped water supply directly from streams/springs, the quality of which is poor and is prone to bacteriological contamination specially during monsoon season.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

13. The old Bhojpur main bazaar area located in ward no. 7 is densely populated and has higher demand of water in comparison to others. 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 Bhojpur Bazaar Area.

14. Regarding this, as per the detailed design of the proposed project, domestic consumption at ultimate demand i.e., 80 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, governement 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.

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

1.5 Rationale of the Project

16. The rationale of the project is based on the increasing demand of the reliable project, hardship of people for safe drinking water, willingness to pay, affordability, public health impacts, policy committments and various other aspects. This all will be discussed in the following chapters.

17. With regard to IEE study, the proposed project has been studied from the environmental point of view as per EPA 1997 AD and EPR 1997 AD, 2054 BS (Amendments 1999 AD, 2007 AD and 2017 AD). The proposed project is intended to serve drinking water in complete wards 6 & 8 and partial wards 3,4,5,9,10 and 11 of Bhojpur Municipality. The project is expected to benefit a base year population of about 12,807 populations (2018) & design year populations of 19,011 (2038) by providing a reliable and adequate supply of safe & potable water, promotion of good hygiene and sanitation practices.

18. The proposed project shall use surface water sources. The Project will not involve the construction of any tunnels; relocation of people or households, settlement plan above the gravity source and construction of river training works. As per EPR 1997(Amendments 1999, 2007 & 2017 AD), IEE for any project shall be done if the project meets the criteria mentioned in the Schedule 1 (Pertaining to Rule 3) (Clause H) for drinking water projects of EPR 1997(Amendments 1999, 2007 & 2017 AD), 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 category "A" through (Clause H) of Schedule 2. Our study shows that the proposed project does not meet the criteria mentioned in Schedule 2 (Clause H) of EPR while the proposed project features meet the criteria mentioned in Schedule 1 (Clause H) of Environmental Protection Regulations 1997 with amendments 2017. These criteria are given in detail in the table given below:

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

S.N.	Condition described in the Act and Regulations	IEE Required as per the Regulation Schedule 1 (ClauseH)	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 source at Tin Bhangale has safe yield of 12.42 lps which is within 1cusec i.e.,28.32lps)
2	Processing of Water Treatment	More than 25 liters per sec	Within the limit (Total Capacity of all WTPs is 27lps.)
3	Connection of New Source to supply water to existing water supply system for a population of	10,000 – 100,000	About 12,323 populations (2016) & design populations of 19,011 populations (2038).

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

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

2 DESCRIPTION OF THE PROJECT

2.1 Location & Accessibility

19. The Project area of Bhojpur Water Supply and Sanitation Subproject lies in Bhojpur Municipality, Bhojpur District, a hilly district in the Province 1 of Nepal. The proposed project covers complete area of ward no.6 to 8 and partial area of ward number 3, 4, 5 ,9, 10 and 11 of Bhojpur Municipality.

20. Geographically, the project area lies in the hilly region lies between 27°07' 58" N to 27°16' 42" N latitude to 87°02' 40" E to 87° 04' 56" E longitude with altitudes ranging between 560m (Pikhuwa Khola) to 2560 m (Suntale Danda) above mean sea level (amsl) with an average altitude of 1630meters.

21. This *Figure 1* below shows that the project area belongs to Bhojpur Municipality of Bhojpur District of Province 1 of Nepal. Bhojpur Municipality is bounded by Shadananda Municipality in the north, Arun Rural Municipality & Pauwadungma Municipality in the east, Ramprasad Rai Rural Municipality in the south and Tyamkemalyung Rural Municipality in the west.

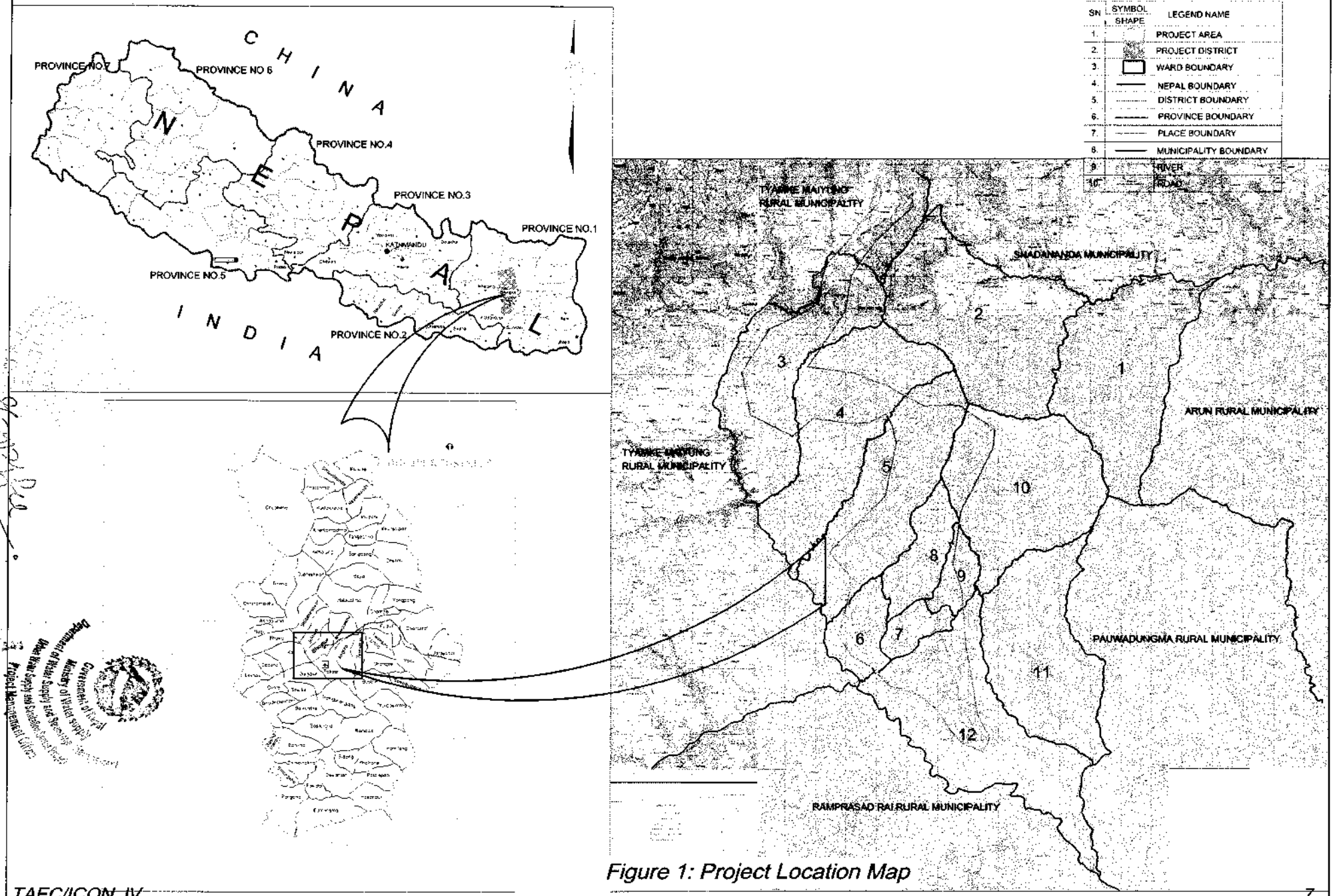


Figure 1: Project Location Map

22. The project town was declared as Municipality by the Government of Nepal, Ministry of Federal Affairs and Local Development from Council of Ministers on March 05,2017 after merging neighbouring four VDCs i.e., Aamtek,Gupteshwore, Helauchha and Siddheshwore with former Bhojpur Municipality. The former Bhojpur Municipality was established on 18 May,2014 merging the former Bhainsipankha, Bokhim, Bhojpur, Taksar VDCs.

Table 2: Bhojpur Municipality Ward Profile

Present Ward Municipality	Former VDC/Municipality	Former Ward No.
1	Helauchha VDC	WN 6 to 9
2	Helauchha VDC	WN 1 to 5
3	Gupteshwore VDC	WN 1 to 9
4	Siddheshwore VDC	WN 1 to 9
5	Bhojpur Municipality	WN 3 & 4
6	Bhojpur Municipality	WN 8
7	Bhojpur Municipality	WN 7
8	Bhojpur Municipality	WN 6
9	Bhojpur Municipality	WN 5
10	Bhojpur Municipality	WN 1 & 2
11	Aamtek VDC	WN 1 to 9
12	Bhojpur Municipality	WN 9 to 11

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

23. The Table 2 shows that the reformed Bhojpur municipality has been divided into 12 wards. The current wards 1 & 2 belongs to ward 6 to 9 and ward 1 to 5 of former Helauchha VDC respectively. The current ward 3 belongs to ward 1 to 9 of former Gupteshwore VDC, ward 4 belongs to ward 1 to 9 of former Siddheshwore VDC and ward 5,6,7,8,9 & 10 belongs to wards 3 & 4, 8, 7, 6, 5 and 1 & 2 of former Bhojpur Municipality respectively. Similarly, the current ward 11 belongs to ward 1 to 9 of former Aamtek VDC and ward 12 belongs to ward 9 to 11 of former Bhojpur Municipality.

24. There is a road linked to Bhojpur Bazaar with Hile which in the North-South Koshi highway joins the project area to Dhanukta, Dharan and Itahari. The distance from Bhojpur Bazaar to Hile, Dhankuta and Dharan is approximately 92km, 118km and 167km, respectively. Regular local and express bus services are available from Kathmandu. The nearest airstrip, Taksar is within the municipality, from where the flights connect to Biratnagar and Kathmandu. The other nearest airport with regular flight is Biratnagar Airport, which si about 202km.

Engineer

25. The Municipality has a subtropical to a temperate climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of more than 1700 mm.

2.2 The Proposed Project

26. The proposed project is the extension of the existing water supply system. Hence, this project is the combination of rehabilitation of old system and amalgamation of proposed water supply components required for upgrading the system.This Project has been conceptualized as a totally gravity surface water system. The total duration for the construction of the proposed project is 2 years.

27. The overall concept has been developed with distribution system comprising of Bulk Distribution System (BDS) and Household Disribution System (DS). In this concept, the whole service area will be divided in number of service area with dedicated storage reservoir for that particular service area. Therefore, the main system comprises of number of sub-system. The service area will be divided on the basis of elevation difference and proximity. At the same time, it will reduce pipe cost considerably, provides flexibility to operate the system, avoid excessive large number of break pressure tanks and follow principles of DMA.

28. As the service area is very scattered and stretched in 7 to 10 km with very high elevation difference within the service area (in the range of 1500 m), the concept of BDS has been conceptualized in order to reduce inequality of pressure in HHs connection within the service area so that the household at high elevation and at tail end of the service area will get equal service level.Each service reservoir will have control mechanism with bulk meter so that it will support the principles of DMA.

29. The entire distribution network is to be supplied from multiple (ten) reservoir system. All the water treatment plants will act as main distributors. However, scattered elevated service area of former ward number 5 and 6 will be served by the existing RVT located at higher elevation than the proposed main water treatment area (WTP-2). As the exisitng system is distributing water in transmission route with 40 m3 capapcity RVT, a separate water treatment plant (WTP-2) with onl SSF has been proposed for the isolated sub system (SS-A).The demand of 2018 and 2038 of every sub-system has been calculated and shown below.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Table 3: Proposed Sub-system and demand

Sub-System	Populatio			Demand (Liters)		
	2016	2018	2038	20	2018	2038
Existing RVT Hattigauda (A)-40m3	141	146	209	14,269	14,788	21,128
New RVT at WTP Area (B)-150m3	1,121	1,153	1,531	113,445	116,697	154,958
Existing RVT at Kafle Danda (C)-60m3	1,094	1,134	1,620	110,713	114,734	163,926
Existing RVT at Panitanki West (D)-200m3	1,585	1,661	2,665	160,402	168,047	269,712
New RVT CTEVT Area (K)-50m3	1,025	1,062	1,518	103,730	107,498	153,587
New RVT Buspark Area (J)-50m3	725	769	1,387	73,370	77,826	140,364
Existing RVT at Panitanki East (F)-150m3	2,147	2,268	3,947	217,276	229,544	399,427
New RVT at Upper Taxar Ward no. 10 (G) -50m3	2,259	2,318	3,001	228,611	234,593	303,742
New RVT at Lower Taxar (I)-50m3	664	681	882	67,197	68,955	89,280
Existing RVT at Welfare-Gadi Danda (T)-75m3	1,562	1,615	2,251	158,074	163,397	227,776
TOTAL	**12,323**	**12,607**	**19,011**	**1,247,088**	**1,296,078**	**1,923,901**

Source: DEDR, Bhojpur,2018

30. All sub-systems can be operated independently. The ten distribution sub systems are also inter linked, at possible extent, and water from neighboring sub system can be supplied to another adjacent sub system in case of maintenance and other unforeseen events. Appropriate Valve Chambers have been proposed to regulate this. This option considers integration of existing system. However, water audit provision has not been provided in this interconnection.

31. The schematic diagram of the proposed project is presented in the *Figure 2* given below:

Government of Nepal
Ministry of Water Supply and Sanitation
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

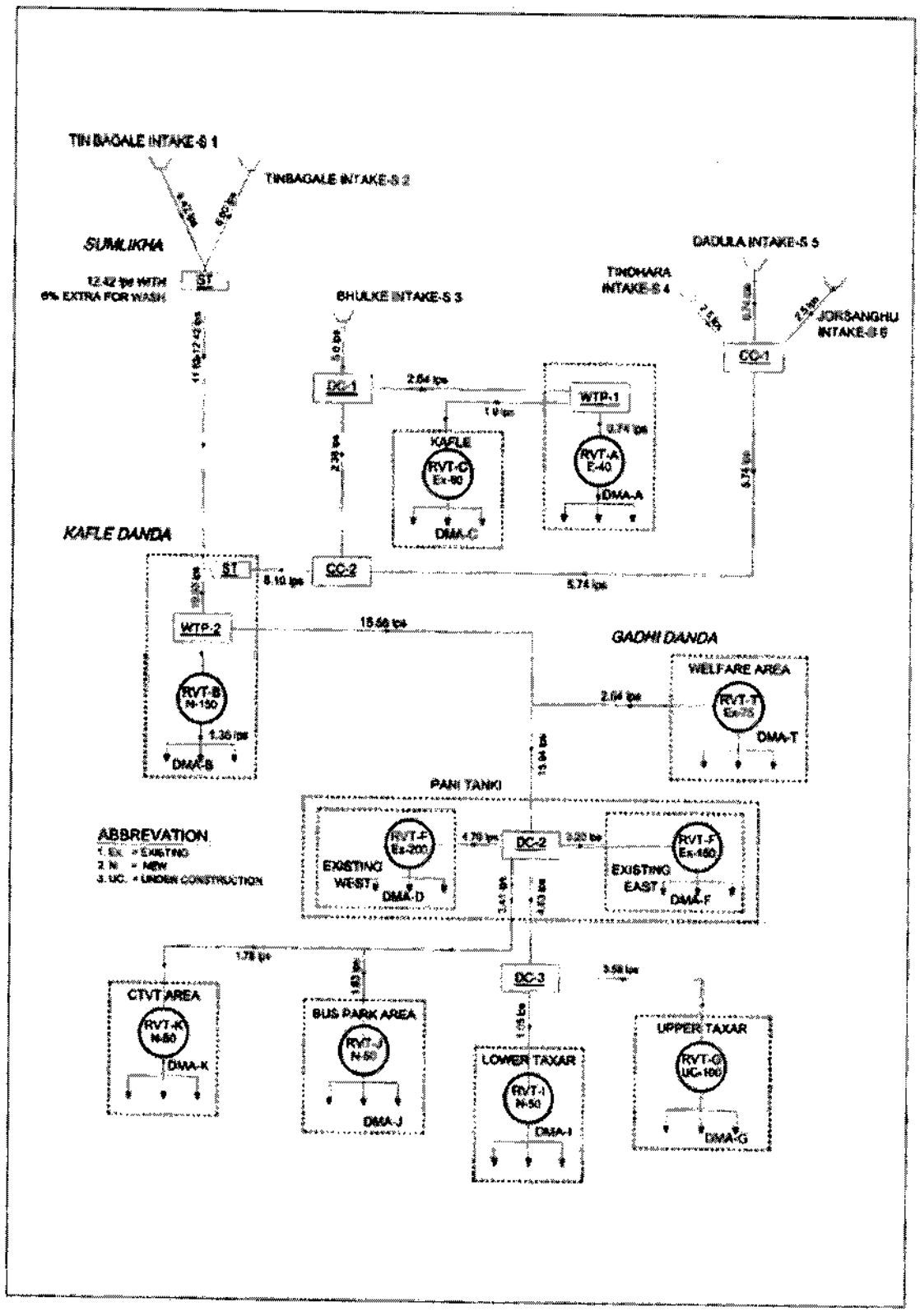


Figure 2: The Schematic Layout of the Project

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

2.3 Salient Features of the Project

32. The salient feature of the project is given in Table 4.

Table 4:Salient features of the project

SN.	Items	Description
1	Name of Project	Bhojpur Water Supply and Sanitation Project
2	Type	Gravity
3	Study Level	Detailed Engineering Design
4	Location Area	
	Province	1
	District	Bhojpur
	Rural Municipality/Municipality	Bhojpur Municipality
	Ward	Complete area of Ward No. 6 to 8 and partial area of ward No. 3,4,5,9,10 and 11
5	Available Facilities	
	Road	Hile-Bhojpur Road (92 Km)
	Supply Water System	WUSCs
	Electricity	Available
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
6	Social Status	
	Present HHs Numbers (2016)	2,190
	Present Population (2016)	12,323
	Base Year Population (2018)	12,807
	Design Year Population (2038)	19,011
	Weighted Growth Rate % (WGR)	~2.00
	Projected HHs in Design Year (based on WGR)	~ 3,378
7	Water Demand (MLD)	
	Base Year (2018)	1.296
	Design Year (2038)	1.924
8	Source Characteristics	
	Source Name	**Existing Source:** Bhulke, Daduwa,Jorsangu & Tindhare **Proposed Source:** Tin Bhangale
	Source Type	Bhulke ,Daduwa & Tindhare-Spring Jorsanghu-Stream Tin Bhangale-Stream
	Source Location	***Existing Sources:*** Bhulke-WN- 5 at Bokhim of Bhojpur Municipality Daduwa, Jorsanghu & Tindhare : WN 10 of Bhojpur Municipality ***Proposed Source:*** Tinbhangale: WN 1 of Tyamkemaiyung Rural Municipality

SN.	Items	Description
	Safe Yield & Measured Flow	**Safe Yield:** *Exisitng Sources:*-Bhulke: 5lps, Daduwa: 0.74lps, Tindhare:2.5lps and Jorsanghu:2.5lps *Proposed Sources:*- Tin Bhangale:13lps **Measured Flow:** *Exisitng Sources:*-Bhulke:6lps, Daduwa:1lps, Tindhare:3lps & Jorsanghu:4lps *Proposed Sources:*- Tinbhangale:39.61 lps
9	Type of Structures	
	Proposed intakes	6 Nos with rehabilitation of 4 Nos Existing
	Water Treatment Plant	WTP-1 –Slow Sand Filter- 3 lps capacity Primary Treatment: Sedimentation Tank for Tinbhangale Source-13 lps WTP-2 –Sedimentation Tank for three existing sources-13 lps HRF-24 lps capacity SSF – 21 lps capacity Each WTP has dosing sytem
	Ground Reservoir (No and Capacity in M3)	Total 10 numbers, (RVT A (E)-40 m3 + RVT B (N)-150 m3 + RVT C (E)-60 m3 + RVT T (E)-75 m3 + RVT F (E)-200 m3 + RVT F (E)-150 m3 + RVT-G (UC)-100 + RVT I, J & K (N)-150)
	Valve Chamber (Bricks/RCC)	50
	Guard House & Dosing Pump House	Small Guard House (G-1): 3 nos, 1 Storey Building of RRM Dosing Pump House: 7 nos,
	Protection Works	Miscellaneous Works viz; Retaining Walls, Gabion Walls and Rip Rap Protection
	River Crossings	20nos.
	Construction of Approach Road of Gravel	Width: 5m & Length : 500m
	Construction of RCC Stretches Road to access	Width: 4m & Length : 200m
	Reinstatement of PCC/RCC pavements	2000 m^2
	Re-sealing of Blacktopped Roads	2000 m^2
	Re-sealing of Gravel Roads	4000 m^2
	Household Connection	2,280
	Fire Hydrant	10
	Total Length of pipe in transmission and BDS	Transmission line of about 36.236km and BDS of 10.9254km
	Distribution	76,578m
10	Total Cost of WS Component (Inclusive of all) NRs.	**685,260,194.10**
11	Cost Sharing Arrangement	
	GON Component (75 %)	**479,682,135.87**
	TDF Loan (25 %)	**171,315,048.53**
12	WUSC's Commitment for O&M as upfront (Cash)	**34,263,009.71**
13	Tariff	
	Up to 6 m^3/monthly (NRs)	
	7 to 10 m^3/monthly (NRs)	
	11 to 20 m^3/monthly (NRs)	

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

SN.	Items	Description
14	FIRR (Base case) %	7.65
15	EIRR (Base case) %	34.58
17	Per Capita Cost for W/S component	
	Per Capita Cost (for base year pop.)	53,507
	Per Capita Cost (for design year pop.)	36,045
18	Environment	
	ADB Category	B, Only IEE necessary
	IEE finding	No significant adverse impacts

Source: DEDR,Bhojpur 2018

2.4 Project Components/Features

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

2.4.1 Sources/Intakes

34. Altogether, five sources will be used for the proposed project. Among these five sources, four sources that includes Bhulke, Daduwa, Tindhare & Jorsanghu are the existing sources. Out of these four existing sources, the first three mentioned sources are Spring while the last one is Stream. Similarly, the proposed new source is Tinbhangale source and this is perennial stream type source. The proposed project will tap the water from this new source at two locations. Hence, altogether six intakes are proposed for the project.

35. Out of these six intakes, four are the existing intakes.The old sub-system comprise of four intakes. As the water from these existing sources is being drawn with a cumulative safe yield of 10.74lps, the cumulative safe yield for these sources of Cluster-1 with Bhulke source has been adopted as 10.74lps. These sources are located in the range of 1958 to 2052 amsl. The existing Bhulke spring source is very safe source in terms of source protection and animal & human intrusion.

36. Two new stream intakes have been proposed at Tin Bhangale stream located in Sumlikha Village in ward no. 1 of Tyamkemaiyung Rural Municipality(Former Teema VDC) of the Bhojpur District. As the location of these intakes are beyond the boundary of the project town, there is requirement of approval letter from the concerend local body to use the proposed source. Accordingly, the consent/approval letter from the Tyamkemaiyung Rural Municipality Office has been provided. This has been included in **Annex 3**. Water from these two stream intakes will be collected at the proposed collection chamber. The cumulative discharge of these sources (Cluster-3) is proposed to be 12.42 lps. However, in

Engineer

transmission system, high discharge has been proposed for diversion than the actual required assuming of about 5% leakage. The relative level (RL) of these intakes is around 2150 amsl.

2.4.2 Transmission Mains

37. Three transmission systems have been proposed. Re-alignment of existing transmission from Bhulke source is necessary with re-arrangement of Bhulke transmission line along with the treatment of water at water treatment plant (WTP-1). WTP-1 is located at Hattigauda to distribute water for settlement located at higher elevation.

38. As the pipe used in existing transmission line from Cluster-1 sources are of sub standard in terms of pressure rating, it is not recommended to incorporate in the proposed transmission system. A new transmission pipes has been proposed for water transmission from Cluster-1 sources (existing sources other than Bhulke). The total cumulative length of transmission mains for existing sources are about 11.299 km. The PE pipe of 50 to 90 outside diameter have been proposed.

39. The transmission length of the Tin-Bhangale to main WTP is about 24.937 km. This is the length of pipe between Tin Bhangale Intakes and proposed WTP-2. The required capacity of this transmission line is 11.83lps. However, in order to manage transmission losses (about 5%) slightly higher discharge of 12.42 lps has been adopted. The transmission comprises combination of 150 ND DI and 140 to 180 OD PE pipes. Still the valley crossing and pipeline in steep terrain are the main reason to adopt DI pipe. However, large elevation differences in pipe static head valley has been decreased insignificantly after the presentation of feasibility study by adopting two numbers of water treatment plants.

2.4.3 Thrust Blocks, Saddle Blocks and Thrust Beam

40. 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, tee has been designed for the pressure of 37.5 kg/sq. cm and 24 kg/sq. cm for transmission and distribution line, respectively.

41. Similarly, Thrust Beam and Saddle Blocks are proposed for DI Pipes laid up in the sloppy area and unburied portion. All saddle blocks are proposed to be anchored with concrete at the center of each pipe to prevent movement.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

Provision of RCC Support for the stretches of buried and unburied DI pipeline, which are laid-up in the sloppy area, has been made to prevent pipe movement.

2.4.4 River & Stream Crossings

42. There are number of small river crossing in the proposed transmission system. A simple crossing by providing SP-4 type concrete Saddle Blocks are recommended for small type of crossing for DI pipes. These types of crossing are used only when span of crossing is less than 5 m. There are about fifteen numbers of these type of crossings in the all transmission system. In case of crossing near the existing bridge and culvert, provision of pipe clamps has been made.

2.4.5 Water Treatment Plant

43. The study shows that the existing water supply system does not have any kind of treatment facilities. This indicates the need of provision of water treatment system for the proposed project. To ensure this requirement, water sampling from the sources to be used for the proposed project has been conducted. The water quality test reports (refer **Annex 7**) of the proposed sources for physical & chemical parameters show that the sample from Tinbhangale Source has 1.2 NTU turbidity value and iron content is < 0.12 which falls below the prescribed NDWQS (Turbidity: 5-10 NTU and Iron: 0.30-3 mg/L . Similarly, the test result also shows that the water sample taken from the existing sources has also 1.2 NTU turbidity value and minimal iron content i.e., less than 0.05 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. This does not constrain the provision of water treatment plant. However, there is no surety that these sources' quality will remain same in the future as the project town is leading towards urbanization. Similarly, the on site bacteriological test carried out during field study shows that the proposed water source is contaminated with bacteria. In regard to this, two water treatment plants have been proposed for this project.

44. The Bhojpur Bazaar water supply system will have two water treatment plants. As the SS-A or DMA-A is drawing water from the Bhulke spring source, a small WTP-1 comprising only slow sand filter (SSF) has been proposed for SS-A at Hattigauda. This area is at higher elevation than the proposed main WTP-2 located at Kafle. As this area is presently served by the existing system, separate WTP has been proposed for this SS-1. The required capacity of the SSF is 2.64

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

lps. However, in order to filter more water during wet season, a design discharge is adopted alightly higher as 3.0 lps.

45. The filtration rate of 0.2 m3/sq.m/hr has been adopted for the design of slow sand filter (SSF) of WTP-1. SSF will have a depth of 2.8 m including free board of 50 cm. One unit comprising of two chambers in a unit has been proposed. The bed size of 3m x 9m has been proposed for each chamber.

46. One sedimentation tank required for new stream sources for primary treatment have been proposed at Tin Bhangale intake site. This has been adopted in order to control entering sediment even in transmission line. This will increase life of pipe and pipe lining of long transmission mains. The settling process of coarse and heavy suspended particles such as sand, silt etc will settle through the force of gravity. The tank has been designed for retention period of more than 4 hours. After sedimentation tank, water will be transported to WTP-2 located at kafle for other treatment.

47. The other sedimentation tank has been provided at Kafle before HRF for the existing three sources (Daduwa,Jor-sanghu and Tindhare) as there are no sedimentation facilities earlier. The tank is rectangular settling basin with a longitudinal flow. A settling basin with two identical chamber of tentative size of 2.8mx12m has been adopted for 9 to 13 lps with design load of 0.8 m3/sqm/hour. The retention time for 13lps discharge is about 4.4 hours and for other it is 6.4 hours.

48. The other components of WTP-2, Horizontal Flow Roughening Filter (HRF) and Slow Sand Filter (SSF) are proposed at Kafle Danda. The proposed roughening filter (HRF) of WTP-2 has been designed for a flow capacity of 24 lps (including sources of cluster 2) with a filtration rate of 2 m3/sqm/hr. Two numbers of identical units have been proposed. Each unit comprises of four chambers. The size of each chamber has been calculated as 5mx1.7m. 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.A slow sand filter (SSF) of WTP-2 has been designed for the filtration rate of 0.2 m3/sqm/hr. It will have depth of 2.8m including a free board of 50cm. Three chambers (each 6mx12m) have been proposed.

49. 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

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
(Water Supply and Sanitation Sector Project)
Project Management Office

device. As the pump is automatic dosing pump of the electonic type, close housing is recommended.

2.4.6 Service Reservoir

50. The cumulative capacity of ten service reservoir provided in the proposed Bhojpur Water Supply & Sanitation Project is about 925 m3. The minimum reservoir capacity (existing or proposed) is 40 m3. All the existing service reservoir having 40 m3 or more capacities have been incorporated in the proposed system. Altogether five reservoirs have been incorporated into the proposed system from the existing system. The details of capacities of each reservoir are mentioned below:

Table 5: Details of Service Reservoirs

S. No.	Name	Size of RVT (m3)
1	Existing RVT HATIGAUDA (A)	40
2	New RVT at WTP AREA (B)	150
3	Existing RVT at KAFLE DNANDA (C)	60
4	Existing RVT at PANITANKI WEST (D)	200
5	New RVT CTEVT AREA (K)	50
6	New RVT BUSPARK AREA (J)	50
7	Existing RVT at PANITANKI EAST (F)	150
8	New RVT at UPPER TAXAR WN 10 (G)	50
9	New RVT at LOWER TAXAR (I)	50
10	Existing RVT at Welfare - Gadhi Danda (T)	75

Source: DEDR, Bhojpur,2018

2.4.7 Bulk Distribution Mains

51. All of the service reservoirs of each sub-system will get required water from the corresponding water treatment plants. The total cumulative length of BDS mains is about 10.925 km. The BDS comprises of PE pipe from 50 OD to 125 OD of three ratings (6 PN, 10 PN and 16 PN).

2.4.8 Distribution Mains

52. 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. The size of DI pipes is 150 mm and above.

53. The minimum diameter of distribution pipe has been adopted as 50mm for the proper saddle arrangement at the household connection in distribution pipe. Only one type of pipes has been used in the distribution network, PE pipes. However,

the uses of GI pipes have been limited in rivers/rivulets crossings and at reticulation line at household distribution chamber. The total pipe length of the proposed distribution system works out to 76.578 km. The details are briefly given below:

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

PE Pipes	Length of each pressure ratings		
	6 kg/sq cm	10 kg/sq cm	16 kg/sq cm
50 OD PE Pipe	19,723	38,310	0
63 OD PE Pipe	534	6,402	0
75 OD PE Pipe	1,616	2,774	3,771
90 OD PE Pipe		252	1,842
110 OD PE Pipe		825	273
125 OD PE Pipe			256
Sub Total	**21,873**	**48,563**	**6,142**
Total	**76,578**		

Source: DEDR, Bhojpur,2018

2.4.9 House Connections

54. The system has ben 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 is about 2,190 during 2016. It has been estimated that household connections in the project area will be 2,280 during 2018 AD with the adopted population growth rate. Almost all the connections will be private.

55. The house connection shall comprise about 12 m pipe PE Pipe and water meter. The house connection pipe shall be PE- 100 (20 mm OD diameter pipe rating PN-16). Tapping of household connection in PE nad GI pipes have been proposed from PE saddle 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.

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

2.4.10 Appurtenances

58. These shall primarily comprise of Line or Sectional Valves, Air (Release) Valves, Washout Valves, Flow Meters, Fire Hydrant and Valve Chambers. The proposed

project comprise of valve chambers to house flow control valves etc. Altogether 50 numbers of valve chambers (RCC+RRM+BW) are expected in the system. The RCC valve chamber has been expected less in numbers since the road is wider and some of the chamber will be in non-traffic area. In case of smaller diameter or in very congested urban area, surface valve box has been proposed.

2.4.11 Guard House, Dosing House and Boundary Wall

59. In order to safeguard storage tanks and RVT from vandalism as well as contamination, Chain-link boundary (CLBW) wall and Barbed Wire Fencing (BWF) has been proposed. A galvanized chain link fencing over 450 mm high parapet wall has been proposed from aesthetic and economic consideration for boundary wall. Barbed wire with concrete post has been proposed for fencing in fringe area of town and rural area of the municipality.

60. Three numbers of single storey Guard House (GH-1) has been proposed for this project at RVT and WTP location. The Guard House building comprises of residence facilities for guard and a room for tools for repair and maintenance.

61. To add bleaching solution in distribution, each RVT sub-system has its dosing system. The Dosing Pump House (DPH) with two compartments has been proposed. The one compartment house dosing pump and other compartment is recommended for the chemical store. Altogether seven numbers of Dosing Pump House have been proposed.

2.4.12 Miscellaneous Works

62. There is also provison of miscellaneous works for this proposed project that includes protection works for Site development, Drainage, Landscaping etc. for the protection of Intake, WTP, RVT, Guard House and Distribution system.

2.4.13 DMA Establishment

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

64. An important factor in lowering and subsequently maintaining a low level of leakage in a water network is pressure control. The division of the network into DMAs facilitates the creation of a permanent pressure control system, thus enabling pressure reduction in DMAs which reduces the level of background leakage, the rate of flow of individual bursts and the rate of the annual burst frequency. In order to manage NRW in the proposed system, the total system has been divided into 10 DMAs according to the serving reservoir.

2.4.14 Construction Planning

65. 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

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

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Table 7: Land Requirement & Ownership Details for the project components

A. Intake Details

S. No.	Project Components	Land Requirement (m^2)	Land Availability (m^2)	Type of Source	Requirement	Ownership
1.	Temkemaiyung **Rural Municipality Bhojpur**, Ward no 1 Tin Bhanghale Intake –s1	50 m^2	50 m^2	Perennial Stream	Permanent	GoN
2.	Temkemaiyung **Rural Municipality Bhojpur,** Ward no 1 Tin Bhanghale Intake –s2	50 m^2	50 m^2	Perennial Stream	Permanent	GoN
3.	Bhojpur Municipality ward no 5, Bhulke Intake S3	25m^2	25m^2	Spring	Permanent	GoN
4.	Bhojpur Municipality ward no. 10 Tindhara Intake S4	4182.613 m^2	4182.613 m^2	Perennial Stream	Permanent	WUSC
5.	Bhojpur Municipality, Daduwa Intake S5			Perennial Stream	Permanent	WUSC
6.	Bhojpur Municipality Ward no 10, Jorsanghu Intake S6			Perennial Stream	Permanent	WUSC

Source:Due Diligence Report, Bhojpur , 2018

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

B. WTP & RVT Details

S. No.	Project Components	Land Requirement (m^2)	Land Availability (m^2)	Type of Land	Requirement	Ownership
1.	WTP-1,SSF at Bhojpur Municipality ward no. 9, Hattigauda	105	1407	Barren	Permanent	WUSC
2.	RVT-A ex-40, RVT- c Ex- 80 at Bhojpur Municipality ward no. 9, Hattigauda	241		Barren	Permanent	WUSC
3.	WTP-2, One HRF and SSF1(4m×8.8m)at Bhojpur Municipality ward no. 9, Kafle Danda	4600	5157.62	Barren	Permanent	WUSC
4.	RVT-B,N150(N=New Bhojpur Municipality ward no. 9, Kafle Danda					
5.	RVT-T Ex-75 m3 at Bhojpur Municipality ward no. 9, Welfare Area, Gadi Danda	218	218	Barren	Permanent	GoN
6.	RVT- F,Ex-200, Ex-150 at Bhojpur Municipality ward no. 9, Pani Tanki	3052	3052	Barren	Permanent	WUSC
	RVT-K-N50 at Bhojpur Municipality ward no. 6 CTEVT Area	63	63	Barren	Permanent	GoN
	RVT-J N-50 at Bhojpur Municipality ward no. 7 Buspark Area	205	205	Barren	Permanent	GoN
	RVT-IN-50 at Bhojpur Municipality ward no. 12 lower Taxer Area	112	112	Barren	Permanent	GoN
	RVT-G UC-100(Under construction) at Bhojpur Municipality ward no. 12 Upper Taxer Area	112	112	Barren	Permanent	GoN

Source:DueDiligenceReport,2018

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

C. Guard House & DPH Details

S. No.	Project Components	Land Requirement (m^2)	Ownership
1.	Guard House (GRH1) Medium at Kafle Danda (within the compound of existing WTP/RVT)	29.29	WUSC
2.	Guard House (GRH1) Medium at Panitanki (Existig RVT area) (within the compound of existing WTP/RVT)	29.29	WUSC
3.	Guard House (GRH1) Medium at Hattigauda (Existig RVT area) (within the compound of existing WTP/RVT)	29.29	WUSC
4.	Guard House Small at Settling basin area Sumlikha (within the compound of existing WTP/RVT)	13.50	WUSC
5.	Guard House Small at Jorsanghu -,Tindhara Intake site (within the compound of existing WTP/RVT)	13.50	WUSC
6.	Guard House Small at Bhulke Intake area (within the compound of existing WTP/RVT)	13.50	WUSC
7.	Guard House Small at CTEVT RVT- 50 Area (within the compound of existing WTP/RVT)	13.50	WUSC
8.	Guard House Small at Lower Taxar Area (within the compound of existing WTP/RVT)	13.50	WUSC
9.	Guard House Small at Upper Taxar Area (within the compound of existing WTP/RVT	13.50	WUSC
10.	Guard House Small at Gadidanda, Welfare area (within the compound of existing WTP/RVT	13.50	WUSC
11.	Dosing House (DPH) at WTP -2, WTP compound, Kafledanda	7.935	WUSC

Source: Due Diligence Report, 2018

D. WTP & RVT Details

S. No.	Project Components	Total Length (km)	Ownership
1.	Transmission pipeline for intake to WTP and RVT	46km	Public Road
2.	Distribution pipelines:	77.33km	Public Road

Source: Due Diligence Report, 2018

Government of Nepal
Ministry of Water supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

b) Energy Requirement

67. There will be requirement of energy use either for any construction activities or for wokers 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

68. 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 72,680 and 315,581 respectively. Similarly, during operation phase, human resources for operation & maintenance should be mobilized by the concerned WUSC.

d) Construction Materials

69. 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.

70. The material other than Stone, Aggregate and sand have been envisaged to import from the Itahari which included Bricks, Cement, Iron bar and Iron sections. Other miscellaneous construction materials like pipe materials, fittings, sanitary items etc. will be purchased from the available and nearest market areas.

71. As per the detailed design estimate, the total quantity of these major construction materials required for the overall project construction activities will be found as follows:

Stone: 2553 m^3

Sand: 2731 m^3

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Aggregate: 4098 m^3

Cement: 1691 tonnes

Bricks: 7277 nos.

Reinforcement Bars: 304 tonnes

72. 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 4929m, b) PE pipes is 124,616m and c) GI pipes is 1124m.

e) Camp Site

73. The proposed project has provision of worker's camp site to ensure worker's safety & rights during constrcution 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 tentative five locations that includes i) Tinbhangale Source Area (WN 1 of Tyamkemaiyung Rural Municipality); ii) Tindhare, Daduwa, Jirsanghu & Bhulke Source Area (Dhapkharka,WN- 10 of Bhojpur Municipality); iii) Nagi , WN 3 of Bhojpur Municipality (Along transmission mains from Tinbhangale source to WTP-2); iv) Near Kafle Existing RVT area and New RVT Treatment Area (WN 8 of Bhojpur Municipality) and v) In between Lower & Upper Taxar Areas (Raikar, WN 12 of Bhojpur Municipality). This is clearly depicted in the *Figure 3* 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.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Project Management Office

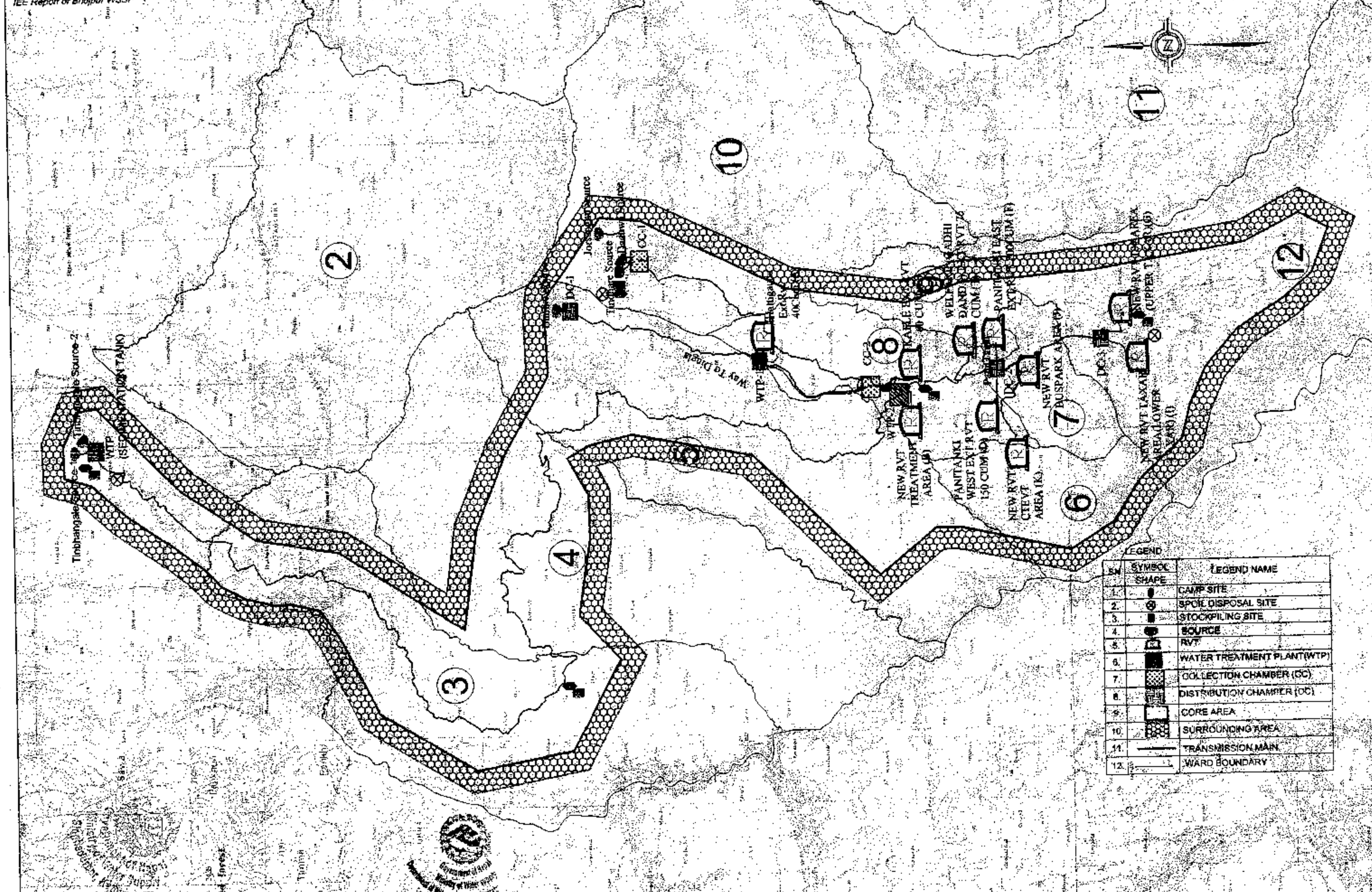


Figure 3: Project Area Delineation

Engineer

f) Stockpiling Site

74. There is also a provision of the stockpiling site which will be located nearby the construction site so that the stockpiled construction materials would be readily available. Tentative five locations for this stockpiling site have been proposed that includes; i) Tinbhangale Source Area (WN 1 of Tyamkemaiyung Rural Municipality); ii) Tindhare, Daduwa, Jirsanghu & Bhulke Source Area (Dhapkharka,WN- 10 of Bhojpur Municipality); iii) Nagi , WN 3 of Bhojpur Municipality (Along transmission mains from Tinbhangale source to WTP-2); iv) Near Kafle Existing RVT area and New RVT Treatment Area (WN 8 of Bhojpur Municipality) and v) In between Lower & Upper Taxar Areas (Raikar, WN 12 of Bhojpur Municipality). This is depicted clearly in the *Figure 3* above. 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

75. 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 80,598.00 m3 and of fill volume of muck is 72,522.00 m3. Hence, the remaining volume of muck after backfilling will be 8,076.00 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

76. There will be also provision of Spoil Disposal Site at tentative three locations that includes; i) Tinbhangale Source Area (WN 1 of Tyamkemaiyung Rural Municipality); ii) Tindhare, Daduwa, Jorsanghu & Bhulke Source Area (Dhapkharka,WN- 10 of Bhojpur Municipality) and iii) In between Lower & Upper Taxar Areas (Raikar, WN 12 of Bhojpur Municipality). The location of each Spoil Disposal Site is depicted in the *Figure 3* above. Each location of this Spoil Disposal Site ensure environmental safety.Each of this location is nearby the

Engineer

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.

2.4.15 Project Impact Area Delineation

77. 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.

78. Here, the Core Project Area indicates the area required permanently as well as temporarily for the proposed project. This area refers to the service area as well the area where the construction of the project components will be carried out. Hence, here, regarding this proposed project, this core area includes the service area of the proposed project which comprises complete area of ward no. 6 to 8 and partial area of ward number 3, 4, 5 ,9, 10 and 11 of Bhojpur Municipality. This also includes the construction area where the proposed project components will be constructed. Hence, this also covers the following areas:

Intake Areas:Tinbhangale Sources (WN 1 of Tyamkemaiyung Rural Municipality)

Bhulke Source (WN 5, Bokhim); Jorsanghu, Daduwa & Tindhare Sources (WN10)

WTP-1: Ward 8 (Hattigauda)

WTP-2: Ward 8 (Kafle Danda)

RVT Areas: RVTs A, B, C, D & K – WN 8; RVT J-WN 7; RVT F & T – WN 9 and RVT G & I – WN 12

Transmission Mains: Partial Areas of WN 3, 4, 5 , 6 , 7, 8, 10 & 12

79. The Surrounding Project Area indicates the area within the immediate surroundings of the core area of proposed project. It includes the area of the project town which is closely associated with the core area of the project. Hence, here in this proposed project, the surrounding area covers partial areas of ward 1 of Tyamke Maiyung Rural Municipality and partial areas of wards 3, 4, 5, 6, 9, 10 & 12.

80. The Core Area & Surrounding Area of the proposed project is depicted in the *Figure 3 above.*

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

2.5 Project Activities

81. 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

82. 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 Soild 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

83. 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 bootom of the reservoir tank
h) Operation & Maintenance of the project components whenever required

2.6 Financial & Economical Aspects

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

2.6.1 Water Tariff Band

85. Financial viability is assessed with the proposed tariff structure, with the sensitivity analysis in the scenario: (i) Cost increase by 10% (ii) Revenue decrease by 10% and (iii) Cost increase and revenue decrease both by 10%. The determination of water tariff is based on consumption-based system. The tariff structure is designed on the basis of affordability and willingness to pay; and tariff has also been set to ensure benefit to sustain the project after the design period.

86. The tariff structure has been set out for the households consuming 65 lpcd or average 10.01 cum per month for yard tap connection and 80 lpcd or 13.60 cum for fully plumbed tap connection depending upon the household size. The water tariff has been set at NRs. 240 for first band HH consuming water up to 6 cum, NRs. 60 per cum for 7 to 10 cum per month and NRs. 90 per cum per HH consuming water more than 11 cum of water. The tariff structure is based on the weighted average of all the categories; which is considered to be less than the AIFC. The tariff structure is based on household income and consumer's ability and willingness to pay.

87. Although households may have the ability to pay, willingness to pay (WtP) is usually related to the quality of service. Urban household in Nepal, have generally access to less than adequate water supply. Thus among the urban

Engineer

dwellers, there is a willingness to pay (WtP) a higher price for improved WS services.

88. Focusing on ATP rather than WtP, households should be expected to be able to pay at least 3-5% of their household incomes for good quality WS services. That is, they should pay up to the accepted levels of ATP or affordability. The reasoning behind this is that consumers receive a service that is not only convenient, but also results in clear health related benefits, when coupled with a sanitation and hygiene education program designed to maximize the health benefits of the improved WS services.

89. According to the detailed engineering design report, the tariff rate per month of the household is within the affordability limit of the household income under different strata, which is less than 5 percent of the household income of low and middle-income groups.

2.6.2 Capital Cost Recovery

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

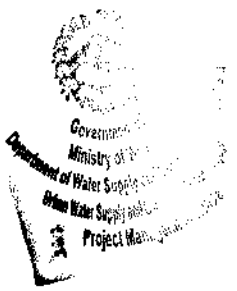


Table 8: Cash Flow & Financial Position together with WUSC tariff structure

Bhojpur water supply project										
Year	3	5	7	9	11	13	15	17	19	21
B.S.	2076	2079	2082	2085	2088	2091	2094	2097	2100	2103
Water Sale	21,499,226	22,720,038	24,682,457	26,814,379	29,130,443	31,646,554	34,379,992	34,447,232	34,447,232	34,447,232
New connection	714,000	737,800	809,200	856,800	952,000	1,023,400	1,094,800	-	-	-
Total Income	22,213,226	23,457,838	25,491,657	27,671,179	30,082,443	32,669,954	35,474,792	34,447,232	34,447,232	34,447,232
Personnel	2,879,500	3,174,649	3,675,053	4,254,333	4,924,922	5,701,213	6,599,867	7,640,171	8,844,453	9,286,675
Energy	5,000	5,253	5,657	6,092	6,560	7,065	7,608	8,193	8,823	9,044
Spare & Other	3,328,138	3,461,580	3,671,880	3,895,004	4,131,736	4,382,907	4,382,907	4,383,482	4,385,241	4,385,839
Chemicals	50,000	55,125	63,814	73,873	85,517	98,997	98,997	98,997	98,997	98,997
Total Cost	**6,262,638**	**6,696,607**	**7,416,404**	**8,229,302**	**9,148,735**	**10,190,182**	**11,089,378**	**12,130,842**	**13,337,513**	**13,780,554**
Tariff Band										
0-6	**180**	**198**	**218**	**240**	**264**	**290**	**319**	**351**	**386**	**386**
10-Jul	**45**	**50**	**54**	**60**	**66**	**72**	**80**	**88**	**96**	**96**
20-Nov	**68**	**74**	**82**	**90**	**99**	**109**	**120**	**132**	**145**	**145**
21-30	**101**	**111**	**123**	**135**	**148**	**163**	**179**	**197**	**217**	**217**
>30	**152**	**167**	**184**	**202**	**222**	**245**	**269**	**296**	**326**	**326**
Cash In Hand with Users	**14,161,627**	**43,569,899**	**73,384,422**	**67,792,563**	**70,314,765**	**76,783,702**	**89,721,162**	**105,456,535**	**121,141,407**	**126,533,409**
Installement	17,121,776	17,121,776	17,121,776	17,121,776	17,121,776	17,121,776	17,121,776	17,121,776	17,121,776	17,121,776
Number of Taps 85 %	2,304	2,430	2,562	2,702	2,850	3,006	3,170	3,344	3,536	3,536
Tariff Increase 10% every 3 Years										

Source: DEDR, Volume II, 2018

Government of Nepal, Ministry of Water Supply, Department of Water Supply and Sewerage Management, Urban Water Supply and Sanitation Sector Project, Project Management Office

2.6.3 Social Benefit Cost

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

Table 9: Social Benefit Cost

Years of Operation	1	5	10	15	20	25
Direct Benefit						
- Full Plumbing	21,580,961	24,101,454	27,669,978	31,766,867	34,578,192	34,578,192
-Yard Taps	11,191,261	12,498,316	14,348,849	16,473,377	17,931,249	17,931,249
Institutional	10,226,229	11,420,576	13,111,536	15,052,864	16,385,022	16,385,022
In Direct Impect	42,998,452	48,020,345	55,130,363	63,293,108	68,894,463	68,894,463
Economic income	107,496,129	120,050,863	137,825,907	158,232,770	172,236,158	172,236,158
Connection Charge	1,785,000	761,600	904,400	1,023,400	-	-
Incremental value	118,245,742	132,055,949	151,608,497	174,056,047	189,459,774	189,459,774
Total Economic Return	268,375,400	46,380,928	53,278,245	61,151,853	65,449,740	65,449,740
Expenses						
O&M	6,262,638	7,166,737	8,523,223	10,190,182	10,191,110	10,195,092
- Fixed O&M	6,207,638	7,100,442	8,439,412	10,084,120	10,084,120	10,087,052
- Variable O&M	55,000	66,294	83,811	106,061	106,990	108,040
- Variable O&M/m3	0	0	0	0	0	0
- Variable O&M/m3 - Ad	0	0	0	0	0	0
Total O&M - Adjusted fo	6,213,749	7,174,103	8,532,535	10,201,966	10,202,998	10,207,097
Net Operating Income	262,112,763	39,214,191	44,755,022	50,961,671	55,258,630	55,254,648
Additional Connections		761,600	904,400	1,023,400	-	-
Meter Replacement	-	-	128,000	144,000	168,000	16,000
Debt						
Principal Balance	-	-	185,561,864	142,220,565	86,904,863	16,306,453
Principal Paid	-	-	7,843,683	10,010,748	12,776,533	16,306,453
Cumulative of Principal	-	-	35,656,994	81,165,359	139,246,845	213,375,176
Interest Paid	-	-	9,278,093	7,111,028	4,345,243	815,323
Total Debt Service	-	-	17,121,776	17,121,776	17,121,776	17,121,776
Annual Payment						
Annual Cash Flow	262,112,763	38,452,591	26,600,846	32,672,495	37,968,8[illegible]	38,116,872
Cumulative Cash Flow						

Years of Operation	1	5	10	15	20	25
Opening Balance	-	371,551,045	501,128,639	645,986,655	824,912,069	1,014,704,485
Surplus /Deficit	262,112,763	38,452,591	26,600,846	32,672,495	37,968,854	38,116,872
Closing Balance	262,112,763	410,003,636	527,729,484	678,659,150	862,880,923	1,052,821,357
NPV of Loan	262,112,763	39,214,191	44,755,022	50,961,671	55,258,630	55,254,648
NPV of Project	**670,938,501**	**115,952,319**	**133,195,611**	**152,879,632**	**163,624,350**	**163,624,350**

Source: DEDR, Volume II, 2018

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

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

3. METHODOLOGY

93. 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 Bhojpur Water Supply and Sanitation Project. The IEE study has followed basically the procedures outlined in the approved ToR.

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

95. 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

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

3.2 Impact Area Delineation

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

delineated on the basis of proximity of the construction site to the nearby surrounding areas. The impact areas 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.

98. Core Area: Here, the Core Area indicates the area required permanently as well as temporarily for the proposed project. This area refers to the service area as well the area where the construction of the project components will be carried out.

99. Surrounding Area: Here, the Surrounding Area indicates the area within the immediate surroundings of the core area of proposed project. It includes the area of the project town which is closely associated with the core area of the project.

3.3 Field Study

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

3.3.1 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 stakheholder 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. This

involved collection of three water samples; each from the proposed sources Tinbhangale, Bhulke & Jorsanghu. These water samples were taken to the certified laboratory i.e., Aastha Scientific Research Service Pvt. Ltd. located at Dillibazar, Kathmandu for further analysis. The laboratory analysis primarily measures the value of important parameters that includes pH, Color, Taste & Odor, Total Hardness,Calcium and Iron. Besides this, other parameters were also measured. The values of these parameters were then compared to the value prescribed as per NDWQS to measure the equivalence of the water quality of the proposed sources with NDWQS. This has been presented in a tabular form and has been attached in **Annex 6.**

103. Similarly, 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 4** is duly followed and filled up during field study.The consultations with the local communities and interviews with a few government officials, schools and representatives of the local bodies also provided aid to assess the physico-chemical aspects.

3.3.2 Biological Environment

104. 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.

3.3.3 Socio-economic and Cultural Environment

105. Household surveys were conducted through interviews by simple questionnaire method to obtain information on the socio-economic & cultural environment that primarily includes demography, ethnicity, education, health & sanitation, drinking water condition of the project area, irrigation facility, local

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

traditions, 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 collected. Information on the people residing within the core area of the proposed project town was collected through socio-economic survey. The sample of Household Survey Questionnaire that was filled up during household survey has been included in **Annex 4**.

106. For primary data collection, census survey has been conducted for the entire households within the town projects for which 100% of the total HHs have been surveyed whereas, 10% of sampling households have been surveyed for detailed information and systematic stratified sampling method has been adopted while selecting this 10% of total households. The census survey was carried out for primary socioeconomic features that includes Household Occupation, Household Education Status, Caste & Ethnicity, Rental Population, Existing Use of Sources, Monthly Income & Expenditure, Land Holding Pattern,Household Latrine Status, Willingness to contribute for 5% upfront cash and Incidence of Waterborne & Communicable Diseases. This has been briefly discussed below:

I. CENSUS SURVEY

107. Census survey was carried out in all delineated project area for collection of brief information from all household.The basic information was collected through the brief checklists/questionnaire from each household. The data obtained from the survey are required for design and social activities as well as OBA implementation, training and GESI perspectives in the course of project implementation.

II. SAMPLING SURVEY

108. About 10% of total households were selected through stratified random sampling method for collection of detailed information. The household was selected based on the assessment of existing socio-economic status, caste/ethnic status, poverty situation, rural and urban setting, caste/ethnic composition, settlement and house pattern within the town project. It was assumed that the entire household of various statuses should be represented in sampling survey.

109. This 10% sampling survey confirms reliability and authencity of the proposed study as the Stratified Random Sampling method has been adopted for the sampling survey of the proposed project. This method ensures each subgroup

within the population receives proper representation within the sample. As a result, stratified random sampling provides better coverage of the population.

110. Focussed Group discussions (FGD) were also conducted to obtain suggestions and comments from all the potential stakeholders. The checklist followed for FGD and its findings have been included in **Annex 4**. Direct observation (Transect Walk Method) was also conducted to ascertain the existence of the cultural sites, and public institutions such as temples, cremation grounds, historical 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.

3.4 Public Notice

111. A public notice of 15 days was published in Arthik Abhiyan Dainik, a national daily newspaper on 2075/08/23. 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, District Administration Office, District Coordination Office and WSSDO-Field Office (Bhojpur).

3.5 Public Consultation

112. The public consultation program was conducted in the Bhojpur Municipality. There is no disssatisfaction regarding the proposed project.

3.6 Collection of Muchulkas (Deed of Inquiry)

113. Deed of Inquiry (Muchulka) from the concerned local stakeholders was collected within the 15 days from the date of public notice publication. Each of them have been included in **Annex 3**.

3.7 Impact Identification, Prediction & Evaluation Methods

114. The information regarding Physico-chemical, Biological and Socio-economic & Cultural aspects as mentioned above has been collected to identify the susceptibility of these aspects to be affected by the proposed project activities. This helped to identify the anticipated environmental impacts of the proposed project. For this, Simple Checklist method has been adopted for the impact identification. This has been carried out by using Rapid Environmental Assessment (REA) Checklist prepared by ADB (refer **Annex 2A**) and by using simple household survey questionnaire (refer **Annex 4**) prepared during the desk

Engineer

study. These checklists explains the environmental features or factors that need to be addressed when identifying the impacts of projects and activities.

115. Once all the important impacts had been identified, their potential characteristic were predicted. The baseline data on physical, biological, socio-economic and cultural aspects were used to estimate the likely characteristics and parameters of impacts that includes Nature, Magnitude, Extent and Duration.

116. The nature of each predicted impact has been classified into Direct (D) and Indirect (ID). The magnitude of the impact has been classified into High (H), Medium (M) and Low (L). The extent has been classified into Site-Specific (SS), Local (L), and Regional (R). Similarly, the duration of impact has been classified into Short Term (ST), Medium term (MT), and Long term (LT).

117. Impact predictions are generally made against a baseline established by the existing environment. Hence, during our field study, the baseline data were used as reference point against which the characteristics and parameters of impact related changes were analysed. Impact predictions were also made by considering the future state of the environment. This also requires professional judgement for accuracy.

118. After the impact identification and prediction method, these impacts need evaluation to assess the adversity of adverse impacts and efficiency of beneficial impacts within the project core & surrounding areas.The impacts were evaluated regarding the significance of the predicted impacts. This was done by following the National EIA Guidelines 1993 according to which scoring for each likely parameters of the impacts was carried out and the level of significance was assessed as recommended by this guidelines.

119. The scoring of impacts as per National EIA Guidelines 1993 is tabulated below:

Table 10: Scoring of Impacts

S. No.	Likely Parameters of Impacts	Type	Scoring as per National EIA Guidelines,1993
1.	Nature	Direct	No Scoring Required
		Indirect	
2.	Magnitude	High (H)	60
		Medium/Moderate (M)	20
		Low (L)	10
3.	Extent	Regional (R)	60

S. No.	Likely Parameters of Impacts	Type	Scoring as per National EIA Guidelines,1993
		Local (L)	20
		Site Specisifc (SS)	10
4.	Duration	Long Term (LT)	20
		Medium Term (MT)	10
		Short Term (ST)	5

Source: National EIA Guidelines 1993

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

Table 11: Significance of Impacts

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

Source: National EIA Guidelines 1993

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

4 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Nepal's Environmental Policy and Legal Framework

Constitution of Nepal

122. 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.

123. 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.)

124. 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

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

(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.)

125. 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.

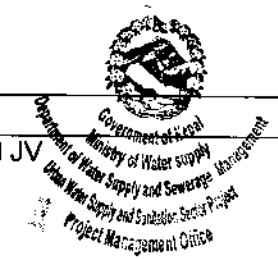
126. Other environmental policies, laws, rules, conventions & standards that provide general context in the environmental assessment of water supply & sanitation works are presented in Table 12.

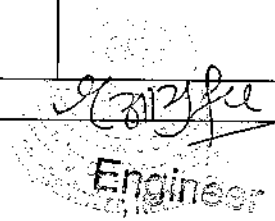
Engineer

Government of
Ministry of
Department of Water Supply
Urban Water Supply
Project

Table 12: 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)	2050B.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 (Unoffical 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 includesEnvironment Management Plan, a strategic document for the implementation of environmental protection measures (including	This has been considered in IEE study.





Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
		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.	
National Urban Policy	2063 B.S. (2007 A.D.)	The policy gives importance to environment conservation while carrying out urban development works and natural resource use; thus, supporting the required environmental conservation and protection in donor-assisted development projects.	The IEE study will meet the provisions of this policy.
National Urban Water Supply & Sanitation Sector Policy (Final Draft)	2065 B.S. (2009 A.D.)	The Policy requires the IEE or EIA of proposed WSS projects by the EPA/EPR to (i) incorporate consultations with key stakeholders, including endpoint users; & (ii) specify measures to mitigate environmental impacts before, during construction & operation, as well as corrective measures.	The IEE study will meet the provisions of this policy.
Updated 15-yr Development Plan for Small Towns Water Supply and Sanitation Sector	2066 B.S. (2009 A.D. and Amendments in 2015A.D.)	The Plan emphasizes monitoring and evaluation as an important component of a project to determine the overall impact of a project.	EMP prescribes performance monitoring & evaluation to minimize the anticipated environmental impacts.
National Water Supply & Sanitation Policy (Draft)	2071 B.S. (2014 A.D.)	The goal of this Policy is to reduce urban and rural poverty by ensuring equitable socio-economic development, improving health and the quality of life of the people and protection of environment through the provision of sustainable water supply and sanitation services.	• The proposed project is solely for provision of sustainable water supply service to Bhojpur town residents. • The IEE study ensures the protection of the environment from the construction activities of the proposed project.

Engineer

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.
National Forest Policy	2075 B.S. (2019 A.D.)	• It ensures sustainability and participatory management of forests, protected areas, watershed, biodiversity, flora & fauna. It also guides the methodology of the management of national forests and protected areas.It also covers periodic assessment and updating of information on forest resources of the country.	The proposed project does not have to deal with forest related adverse issues as there is no requirement of occupying forest areas for the proposed project construction.
2.Laws & Acts			
Esssential 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.

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
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 Bhojpur town.
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 prevents 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 thst will prevent pollution of

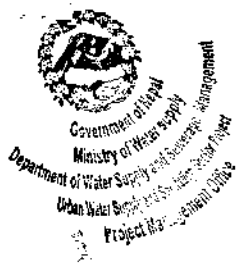
Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
			water.
Solid Waste Management Act	2068 B.S. (2011 A.D.)	Article 4 provides that the management of hazardous, medical, chemical or industrial waste rests upon the generators of such wastes. Management should be as prescribed in the Act. Article 5 provides that individuals and entities must reduce the amount of solid waste generated while carrying out work or business.	EMP prescribes eco-friendly management of solid and hazardous wastes.
Labour Act	2074 B.S. (2017 A.D.)	• The 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 acm3ulated 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. (1988 A.D.)	• This act focusses on the management of solid waste and mobilization of resources related.	• This act needs to be reviewed during

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
	Amendments 2049 B.S. (1992A.D.)	• These also ensure the health convenience of the common people by controlling the adverse impact on pollution from solid waste.	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. • 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.	The proposed project has followed these provisions.
Drinking Water Regulations	2055 B.S. (1998 A.D.)	• 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	This has been followed for evaluation of the anticipated environmental impacts.

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
		initiation, so as to make the economic benefits from development projects sustainable.	
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 Quality, Fourth Edition	2073 B.S. (2017 A.D.	It provides the recommendation of WHO for managing the risk from hazards that may compromise the safety of drinking water.	During water quality 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

Engineer



4.2 Environmental Agreements

4.2.1 International Environmental Agreements (Conventions & Treaties)

127. Nepal is a signatory to many international agreements and conventions related to environmental conservation. However, all of those coventions are not interrelated to the proposed project. The conventions related to he 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

128. 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.

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

4.3 Environmental Standards

130. 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 13 and their details on the acceptable level criteria of these standards are featured in **Annex 2B**.

Table 13: 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

131. As shown in the above Table 13, 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, PM2.5, 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:

Table 14: Standards for Ambient Air Quality

Parameter	Averaging Period	Nepal's Ambient Air Quality Standard ($\mu g/m^3$) *	WHO Air Quality Guidelines ($\mu g/m^3$) **	
			Global Update 2005	Second Edition ^ 2000
TSP	Annual	-	-	-
	24-hour	230	-	-
PM_{10}	Annual	-	20	-
	24-hour	120	50	-
$PM_{2.5}$	1-year	-	10	-
	24-hour	-	25	-
SO_2	Annual	50	-	-
	24-hour	70	20	-
	10-minute	-	500	-
NO_2	1-year	40	40	-
	24-hour	80	-	-
	1-hour	-	200	-
CO	8-hour	10,000	-	10,000
	15-minute	100,000	-	100,000
Pb	1-year	0.5	-	0.5
Benzene	1-year	20	-	-

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 more stringent than that specified in the national standards.

Engineer

Government of Nepal, Ministry of Water Supply, Department of Water Supply and Sewerage Management, Urban Water Supply and Sanitation Sector Project, Project Management Office

132. Similarly, National Noise Standard Guidelines, 2012 has set the standard noise levels measured in dBA for Inustrial 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 15: 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.

133. 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:

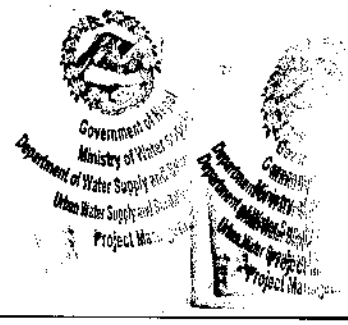


Table 16: Standards for Drinking Water Quality

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	0.006
	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.

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

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

Government of Nepal, Ministry of Water Supply, Department of Water Supply and Sewerage Management, Urban Water Supply and Sanitation Sector Project, Project Management Office

Engineer

Table 17: 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

135. 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

136. 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.

137. ADB's Environmental Safeguards policy principles are defined in SPS (2009), Safeguard Requirements as per Table 18 and the IEE is intended to meet these requirements.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

[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

Table 18: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 views & concerns are made known to & understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to EA. Establish a GRM to receive & facilitate resolution of affected people's concerns & grievances on project's environmental performance.	Key informant and random interviews have been conducted. A grievance redress mechanism for the resolution of valid Project-related social and environmental issues/concerns is presented in Section VIII.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

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

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

138. 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 19 given below.

Table 19:The GoN IEE Report Preparation, Review, Approval and Implementation Process

Steps in the Process	Remarks
Source: EPR, 1997 with amendments in 1999, 2007 and 2017 and IEE Study,2018/019	
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 thereview reveals project implementation to have no substantial adverse impact on the environment, CSA approves within 21 days from receipt of thereport.	
➢ 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: IEE Study 2018/019

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

5 EXISTING ENVIRONMENT

5.1 Existing Physical Environment

5.1.1 Landforms and Topography

139. The project area is located in Bhojpur Municipality, which is situated in Bhojpur district of the Province 1 of Nepal. It lies between 27°07' 58" N to 27°16' 42" N latitude to 87°02' 40" E to 87°04' 56" E longitude. The municipality is in a hilly region with an altitude ranging between 560 to 2560 m above mean sea level with an average altitude of 1630 meters.

5.1.2 Geology & Soil

140. The proposed project lies in the middle/lesser himalayan zone. The geology of this area indicates the existence of slate, phytllite,schist, quartzite, limestone,dolomite etc. The soil types observed in the project area belongs to alluvial soil.

5.1.3 Land use pattern

141. 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 area is an amalgamation of residential, business, and agricultural localities.

5.1.4 Water Resources

142. The project district, Bhojpur is rich in water resources, as there are various sources of water. The project area has potentiality of surface water only. The major river of the municipality is Akhuwa Khola which is used as a source of drinking water, irrigation and electricity production. The other rivers bordering the project municipality are Pikhuwa Khola and Shera Khola. Hence, this area has been used by various hydropower development projects like Taksar-Pikhuwa River Hydropower Project, Pikhuwa Khola Small Hydropower Project and other small hydro projects.The two proposed stream sources clustered in former Teema VDC at Tin Bhangale are draining to Sangentuwa Khola, which ultimately drain out in Pikhuwa Khola.

5.1.5 Climate

143. The climate in Bhojpur is warm and temperate. When compared with winter, the summers have much more rainfall. The Köppen-Geiger climate classification is Cwb. The average temperature in Bhojpur is 17.6 °C. The average annual rainfall is 1602 mm. The driest month is December, with 11 mm of rain. In July, the precipitation reaches its peak, with an average of 382 mm. June is the warmest month of the year. The temperature in June averages 21.8 °C. At 10.4 °C on average, January is the coldest month of the year. There is a difference of 371 mm of precipitation between the driest and wettest months. The variation in annual temperature is around 11.4 °C.

5.1.6 Water Quality

144. During the survey, respondents were asked in term of existing water quality in the project area. The survey revealed that about 4% (86) of respondent feel as good quality where as large numbers 96% (2103) feel satisfactory or moderate in term of water quality. Their response is categorized as good or satisafactory in terms of their sensitivity to the taste, colour , visibility (turbidity) and incidence of water borne diseases.

145. The field study shows that some of the existing systems carry out occasional disinfection (use of 3-5 kg bleaching powder once in a month during rainy season). 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 Tinbhangale Source and Other Sources that includes Jor Sanghu,Tindhare & Daduwa sources within the permitted value of NDWQS. These water quality test reports are included in **Annex 6**.

146. 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 H2S 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

147. 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

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

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 Bhojpur is not that severe.

5.1.8 Acoustic Environment

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

5.1.9 Landslide Susceptibility

149. 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

150. Bhojpur District is blessed with natural beauty of floral diversity. The site specific vegetation types are decribed below.The major plant life forms available in the project area are given in Table 20.

Table 20: Major Plant Life Forms Found in the Project Area

S.No.	Scientific Name	Local Name	Family	Life Forms
1	*Rubus ellipticus*	Ainselu	Rosaceae	Shrubs
2	*Emblica offficinalis*	Amala (Indian Gooseberry)	Euphorbiaceae	Trees
3	*Pieris ovalifolia*	Angeri	Ericaceae	Shrubs
4	*Adhatoda vasica*	Asuro	Acanthaceae	Shrubs
5	*Melia azedarach*	Bakena/Bakaino	Meliaceae	Trees
6	*Ficus bengalensis*	Bar	Moraceae	Trees
7	*Terminalia bellirica*	Barro	Combretaceae	Trees
8	*Aegle marmelos*	Bel (Wood Apple)	Rutaceae	Trees
9	*Rhus succedanea*	Bhalayo	Anacardiaceae	Trees
10	*Populus ciliata*	Bhote Pipal	Salicaceae	Trees
11	*Lagerstroemia Parviflora*	Bot Dhayaro	Lythraceae	Trees
12	*Schima wallichii*	Chilaune	Theaceae	Trees
13	*Bassia butyracea*	Chiuri	Sapotaceae	Trees
14	*Berberis aristata*	Chutro	Berberidaceae	Trees
15	*Debregeasia orientalis*	Daar	Urticaceae	Shrubs
16	*Garuga pinnata*	Dabdabe	Burseraceae	Trees
17	*Mussaenda macrophylla*	Dhobini	Rubiaceae	Shrubs
18	*Colebrookea oppositifolia*	Dhusure	Lamiaceae	Shrubs
19	*Callicarpa macrophylla*	Guenlo	Verbenaceae	Shrubs
20	*Lannea coromandelica*	Hallunde	Anarcardiaceae	Trees

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

S.No.	Scientific Name	Local Name	Family	Life Forms
21	*Terminalia chebula* Retz	Harro	Combretaceae	Trees
22	*Eugenia jambolana Lam.*	Jamun	Myrtaceae	Trees
23	*Phoebe cathia*	Jhankri syaula	Lauraceae	Trees
24	*Ficus lacor Buch.*	Kabro (Seto)	Moraceae	Trees
25	*Anthocephalus chinensis*	Kadam	Rubiaceae	Trees
26	*Myrica esculenta*	Kafal	Myricaceae	Shrubs
27	*Adina cordifolia/Haldina cordifolia*	Karam/Karma	Rubiaceae	Trees
28	*Acacia catechu*	Khair	Leguminosae	Trees
29	*Ficus cunia Buch.-Ham. ex. Roxb.*	Khanayo	Moraceae	Trees
30	*Sapium insigne*	Khirro	Euphorbiaceae	Trees
31	*Morus alba L.*	Kimbu	Moraceae	Trees
32	*Litsea polyantha Juss.*	Kutmiro	Lauraceae	Trees
33	*Duabanga grandiflora*	Lampate	Lythraceae	Trees
34	*Engelhardia spicata*	Mauwa	Juglandaceae	Trees
35	*Erythrina stricta*	Phaledo	Fabaceae	Trees
36	*Ficus religiosa*	Pipal	Moraceae	Trees
37	*Pinus roxiburghii*	Sallo	Pinaceae	Trees
38	*Terminalia tomentosa*	Sajh	Combretaceae	Trees
39	*Bombax malabarim3 D.C.*	Simal	Bombacacea	Trees
40	*Vitex negundo*	Simali	Verbenaceae	Trees
41	*Mallotus philippinensis Muell. Arg.*	Sindure	Euphorbiaceae	Trees
42	*Albizia stipulata Boiv.*	Siris	Leguminosae	Trees
43	*Dalbergia sissoo*	Sisam	Fabaceae	Trees
44	*Bauhinia purpurea L.*	Tanki	Leguminosae	Trees
45	*Toona sureni*	Tuni	Meliaceae	Trees
46	*Alnus nepalensis*	Uttis	Betulaceae	Trees

Source: Source: IEE Field Visit Survey, 2015/16

5.2.2 Fauna

151. 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 21:Mammals in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	*Felis Chaus/Prionailurus Bengalensis*	Jungle cat	Ban Dhade	LC
2	*Canis lupus*	Wolf	Bwanso	LC
3	*Panthera pardus*	Common Leopard	Chituwa	VU*
4	*Semnopithecus entellus*	Northern Plains Gray Langur	Dhedu	LC
5	*Hystrix hodgsoni (Brachyura)*	Malayan Porcupine	Dumsi	LC
6	*Vulpes bengalensis*	Bengal Fox	Fyauro	LC
7	*Taphozous longimanus*	Long Winged Tomb Bat	Lampakhete Chamero	LC
8	*Martes flavigula*	Yellow Throated Marten	Malsapro	LC
9	*Mus musculus*	Hill Mouse	Musa	LC

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

S. No.	Scientific Name	English Name	Local Name	Status
10	*Funambulus Pennantii*	Five Stripped Palm Squirrel	Paanch Dharke Lokharke	LC
11	*Macaca mulatta*	Rhesus Monkey	Rato Bandar	LC
12	*Gangetica Canis Aureus*	Golden Jackal	Syaal	LC

Source: IEE Field Visit Survey, 2015/16

152. Some of the birds reported in the forest areas are listed in Table 22. The status of these birds are as per IUCN & IBAT reports.

Table 22:List of Birds in the Project Area

S.No.	Scientific Names	English Name	Local Name	Status
1	*Eudynamys scolopaceus*	Common Koel/Western Koel	Koili	LC
2	*Tyto alba*	Common Barn owl	Gothe Latokosero	LC
3	*Coturnix coturnix*	Common Quail	Battai	LC
4	*Passer domesticus*	House Sparrow	Ghar Bhangera	LC
5	*Pellorneum ruficeps*	Puff -Throated Babbler	Thople Bhyakur	LC
6	*Psilopogon cyanotis*	Blue-eared Barbet	Basanta	LC
7	*Ictinaetus malaiensis*	Black Eagle	Dronak Chil	LC
8	*Arborophila torqueola*	Common Hill Partridge	Piura	LC
9	*Acridotheres tristis*	Common Myna	Dangre Rupi	LC
10	*Streptopelia orientalis*	Oriental Turtle- Dove	Taame Dhukur	LC
11	*Bubo nipalensis*	Spot Bellied Eagle Owl	Mahakaushik	LC
12	*Cuculus micropterus*	Indian Cuckoo	Kafal Pakyo	LC
13	*Pycnonotus cafer*	Red Vented Bulbul	Jureli	LC
14	*Corvus macrorhynchos*	Large Billed Crow	Kaalo Kag	LC
15	*Lophura leucomelanos*	Kalij Pheasant	Kalij	LC
16	*Caprimulgus indicus (Caprimulgus jotaka)*	Grey Night Jar	Phusro Chaite Chara	LC
17	*Megalaima virens (Psilopogon virens)*	Great Barbet	Nyauli	LC
18	*Psittacula himalayan*	Slaty- headed Parakeet	Madana Suga	LC

Source: IEE Field Visit Survey, 2015/16

153. The commonly found reptiles and amphibians observed in the project area are presented in Table 23.

Table 23: List of Reptiles and Amphibians Found in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	*T. albolabris*	Green Pit Viper	Haryau	LC
2	*Boiga trigonata*	Indian Gamma Snake	Adhoo Sarpa,Tirishe, Batasa	LC
3	Ovophis monticola	Chinese Mountain pit viper	Chhirbire Sarpa	LC
4	*Japalura tricarinata*	Three Keeled Mountain Lizard	Chheparo	LC
5	*Bufo melanostictus/Duttaphrynus Himalayanus*	Common toad	Bhyaguto	LC
6	*Rana cyanophylectis*	Stream Frog	Bhyaguto	LC*

Source: IEE Field Visit Survey, 2015/16

154. Similarly, common fishes found in the project area are given in Table 24. These species are found in the nearby water bodies of the project area that includes Bhulke Spring Source, Jorsanghu Source, Daduwa Stream Tindhare Source & Tin Bhangale Stream.

Table 24: List of Fishes Found in the Project Area

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

Source: IEE Field Visit Survey, 2015/016

5.2.3 Protected Area

155. No national parks and protected areas exist within the project area.

5.2.4 Forest Area

156. No land of the forest areas will be acquired for the project construction.

5.3 Socio-economic and Cultural Environment

5.3.1 Demographic Features

5.3.1.1 Settlement pattern

157. The settlement pattern of project area is mixed type. The core bazaar area which is located in ward no. 7 is dense and populated. Similarly, settlement patern of the other wards are scattered type due to semi urban and rural in character. The settlement pattern is gradually changing and rural cluster are developing as market.

5.3.1.2 Population Distribution

158. As the area of present day municipality is complete ward area of four former VDCs, total populations of historic time has been estimated by summing population of these four VDC. The ward-wise populations of the project town according to census, 2001 and 2011 has been presented below:

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

Table 25: Population of the Concerned Wards 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	981.55	275	1,415	1.4	257	1,123	1.1	-2.28
2	842.64	299	1,604	1.9	278	1,301	1.5	-2.07
3	252.56	345	1,688	6.7	350	1,534	6.1	-0.95
4	843.70	308	1,459	1.7	314	1,348	1.6	-0.79
5	189.25	362	1,527	8.1	489	1,771	9.4	1.49
6	221.29	217	1,002	4.5	311	1,160	5.2	1.47
7	244.57	506	1,859	7.6	862	2,805	11.5	4.2
8	686.17	343	1,493	2.2	408	1,710	2.5	1.37
9	693.01	302	1,442	2.1	271	1,112	1.6	-2.57
10	612.66	299	1,419	2.3	291	1,182	1.9	-1.81
11	761.55	279	1,403	1.8	262	1,056	1.4	-2.8
Total	3,110	3,535	16,311	5.3	4,093	16,102	5.2	-0.13

Source: National Population & Housing Census,2011

159. The total population of Bhojpur Municipality as per census of 2011 is 16,102. The populations of this municipality during 2001 were 16,311. The analysis of census population shows that the overall annual growth rate of the municipality is declining with 0.13%. Most of the wards have declining population growth rate in last decade. The declining population growth rate attributed to Maoist insurgency during early 2000 AD. The former Bhojpur VDC along with other neighboring VDCs were badly affected from the insurgency.

160. The average HHs size of the area has decreased from 4.61 in 2001 to 3.93 in 2011. Ward 5, 6, 7 and 8 of the municipality, area of former Bhojpur VDC, are only ward having growth rate in the municipality. Ward no 7 is old Bhojpur main bazaar area, is the only comparatively densely populated ward. The population density of this ward is slightly high. The overall population density of the project area increased from 3.77 (2001 AD) to 3.87 (2011 AD) person per hectare.The consultants conducted a socio economic survey in 2016 of the proposed service area. It shows that the total population of the service area is 12,323. The wardwise household number and population of the service area is given in the table given below.

Table 26: Population of the Concerned Wards of the Project Town

Ward	HHS	Population
3	29	148
4	142	698
5	284	1,458
6	232	1,515
7	456	3,239
8	332	1,864
9	260	1,300
10	248	1,091
11	207	1,010
Total	**2190**	**12,323**

Source: DEDR,Bhojpur,2018

Engineer

5.3.2 Caste/Ethnic Groups

5.3.2.1 Ethnicity and caste

161. The composition of community by caste/ethnic is heterogeneous in nature. Therefore, diversity of culture, custom, tradition, norms and values exist in the project area. The household survey of the sub project area has also reflected the cross section of major ethnic groups of the country.

162. The survey revealed that among the total 2190 households, Janajati/ethnic (Newar, Rai, Magar, Tamang etc.) are the main ethnic groups of the project area comprising of 63.7% (1395) of total household whereas Brahmin/Chhetri, Dalit and other castes (Madeshi, Musalman etc.) comprises 26.5% (580), 8.4% (184) and 1.4% (31) respectively.

5.3.3 Economic Features

5.3.3.1 Economic Activities

163. 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 course of household survey of project area, detail information data has been collected about the major occupation and economic activities of all household head. The survey shows that, among the total 2190 households, the highest number of population ie 46.30%(1013) engaged in Agriculture, whereas 23.20% (508) populations depend on business, 10.80% of (237) populations are engaged in service. Similarly,about 9.4% (205) and 4.6% (100) of household head are dependent upon remittance and labour respectively. However, only 1.1% (23) households has industry as the source of income and 4.7% (104) households depend upon other various activities.

164. There are more than 42 hotels/lodges with 524 bed capacities and managed by 109 staff in the project area. The existing financial institutions are Tourism Development Bank, Citizen Bank, Bank of Kathmandu, Agricultural Development Bank, Banijya Bank, Prabhu Bank, Century Bank etc. Similarly, some cooperatives are also in operation in the area.

165. Likewise, about 73 governmental (including CDO office, LDO office, Education office etc), non governmental and financial institutions are existing in the area and providing services to the community.

5.3.3.2 Monthly Income Details

166. As it has already been mentioned that the survey revealed that the main sources of household income of the service area are agriculture, service,

Engineer

Government of Nepal, Ministry of Water Supply, Department of Water Supply and Sewerage Management, Urban Water Supply and Sanitation Sector Project, Project Management Office

remittance and wage labour, respectively. Among the total 2190 households, 15.20% (332) HHs have monthly income that ranges from Rs. 7,501 to Rs.10,876. Likewise, majority of households i.e., 54.10% (1184) HHs have monthly income in the range of Rs. (10,876-20,000) whereas the monthly income of 13.30% (291) HHs falls in the range Rs. (20,001-35,000). Likewise, 1.9% (42) households are earning from Rs. 35,001 to Rs.50,000 per month and only 0.9% (20) HHs have earnngs more than Rs. 50,000. Lastly, 14.7% (321) households fall under poor category as they have earnings less than Rs 7,500 per month only.

167. Hence, the survey shows that about 14.70% (321) households are living below the poverty level as their earning is less than Rs 7,500 per month only.The table given below gives details on the distribution of mean monthly household income.

Table 27: Distribution of mean monthly household income

Income Range	Ward									Total	%
	3	4	5	6	7	8	9	10	11		
<7500	4	25	52	19	15	66	7	61	72	321	14.7
7501-10875	8	30	40	40	43	74	28	41	28	332	15.2
10876-20000	8	74	146	124	310	162	172	133	55	1184	54.1
20001-35000	6	7	40	36	77	23	49	11	42	291	13.3
35001-50000	3	5	3	8	7	4	2	2	8	42	1.9
> 50001	0	1	3	5	4	3	2	0	2	20	0.9
Grand Total	29	142	284	232	456	332	260	248	207	2190	100.0

Source: Socio-economic survey 2016

5.3.3.3 Monthly Expenditure Details

168. The socioeconomic survey has also assessed the details on the monthly expenditure of each households of the service area. The survey revealed that among 2190 households, 26.70% (584) HHs expend less than Rs. 7500 per month. Similarly, Similarly, 35.4% of households have expenditure level of Rs. 7,500-10,775% (776) where as 30.7% of household's expenses are in the range of Rs. 10,876 to 20,000 monthly. Likewise, about 5.4% (119) of households expend above Rs 20,001-35,000 per month. Similarly 1.7% (39) of household's expenses are more than Rs. 35,000. Hence, it is found that expenditure level is less than income level of households within the service area. So, it can be assumed that capacity for upfront cash contribution and affordability of community for regular tariff collection after implementation seems high. Details of monthly expenditure level are presented in the table below.

Table 28: Expenditure Level of Households by Ward

Expenses	Ward									Total	%
	3	4	5	6	7	8	9	10	11		
<7500	15	57	96	42	25	153	16	94	86	584	26.7
7501-10875	7	61	99	89	145	118	105	102	50	776	35.4
10876-20000	6	22	76	78	241	53	91	47	58	672	30.7
20001-35000	1	1	12	17	36	4	33	4	11	119	5.4
35001-50000	0	1	1	4	2	1	1	0	2	12	0.5
Above 50000	0	0	0	2	7	3	14	1	0	27	1.2
Grand Total	29	142	284	232	456	332	260	248	207	2190	100.0

Source: Socio-economic survey 2016

5.3.3.4 Willingness to Pay

a) Monthly Water Tariff

169. 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, out of total 123 sampled HHs, 56.10% (69) households prefer to pay monthly water tariff from Rs. 401 to 450 whereas about 17.1% (21) of households prefer to pay tariff from Rs. 251-300. Similarly, another 17.1%(21) of households are willing to pay between Rs. 151-200 per month. Likewise, the survey also shows that only 2.4% (3) of HHs are willing to pay from Rs. 451 to Rs.500 while only 7.3% (9) of households are willing to pay more than Rs 500. Details information about willingness to pay monthly water Tariff is presented in the table below.

Table 29:Willingness to pay for monthly tariff by Ward

Willingness Range	Ward									Total	%
	3	4	5	6	7	8	9	10	11		
Rs. >500	0	2	0	2	0	0	3	0	2	9	7.3
Rs. 451-500	0	2	0	0	0	0	0	0	1	3	2.4
Rs.401-450	2	2	6	4	12	4	25	5	9	69	56.1
Rs.351-400	2	0	0	2	0	0	0	1	1	6	4.9
Rs.301-350	0	0	10	0	0	0	0	1	1	12	9.8
Rs.251-300	0	0	12	4	0	0	3	1	1	21	17.1
Rs.201-250	0	0	3	0	0	0	0	0	0	3	2.4
Rs.1 51-200	0	0	12	4	0	0	3	1	1	21	17.1
Grand Total	4	6	31	12	12	4	31	8	15	123	100.0

Source: Socio-economic survey 2016

b) Up-front Cash Contribution

170. As per the survey, 90% (1965) of total 2190 HHs have shown willingness to pay 5% up-front cash contribution for the proposed project. That means only 10% (225) of total HHs seemed unwilling for upfront cash contribution. It shows that

most of the HHs are ready to contribute required upfront cash so far. Similarly, most of the poor HHs has also shown interest towards this project and willingness for cash contribution even there is provision of free tap connection to poor household. This indicates the longing, the people of the project town have for the proposed project.

5.3.3.5 Affordability

171. The study has also assessed affordability of community in terms of monthly income level for expense on water supply & sanitation service. Hence, while assessing the income level of households, it has been observed that about 14.7% (321) of 2190 households falls below poverty level as per the implementation guidelines (Income< 7500 per month).This means more than 85% of households can afford monthly water tariff and contribute for up front cash. Hence, afffordability of the community has been obseved as encouraging and positive towards the program.

172. The WUSC can manage provision of subsidy to poor households for regular monthly tariff assessing the economic condition and affordability

5.3.4 Education & Skills

5.3.4.1 Education

173. According to the institutional data obtained from the survey, there are 18 educational institutions including campus for higher education, higher secondary schools, secondary schools as well as primary schools in service area with 7588 people including students, staffs and teachers. Similarly, almost all of the educational institutions are relying on tap water provided by the exisitng Silichung Water Supply System. Likewise, the survey also shows that all the educational institutions have water-sealed latrines.

174. The socioeconomic survey also assessed on the education status of teach household head. This survey revealed that about 13.4% (294) of total 2190 household head are illiterate within the project area. Similarly, the literate ratio is just 68% (1491) and more than SLC to above MA are 12%. Details of education status of household head are presented in the table below.

Table 30:Education Status of Household Head by Ward

Education	Ward									Grand Total	%
	3	4	5	6	7	8	9	10	11		
Illiterate	7	15	92	36	24	13	23	40	44	294	13.4
Literate	18	116	48	141	423	248	237	144	116	1491	68.1
Primary	0	1	44	12	0	14	0	3	1	75	3.4
Secondary	0	4	3	10	0	27	0	9	5	58	2.6
SLC	4	1	25	25	2	19	0	27	25	128	5.8
Intermediate	0	5	11	3	2	5	0	16	13	55	2.5
Bachelor	0	0	61	4	3	2	0	7	3	80	3.7
MA	0	0	0	1	2	1	0	2	0	6	0.3
Other	0	0	0	0	0	3	0	0	0	3	0.1
Grand Total	**29**	**142**	**284**	**232**	**456**	**332**	**260**	**248**	**207**	**2190**	**100.0**

Source: Socio-economic survey 2016

5.3.5 Health and sanitation

175. The survey also shows that medical facilities for diagnosis and treatments are available in the service area. Twelve numbers of hospitals, health posts and polyclinics with 67-bed capacities were recorded in service area. Similarly, some pharmaceutical stores and medical shops are also available in Bhojpur Bazaar area.

176. 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. The information realted to water borne and communicable disease was crossed checked by visiting hospital and health posts within the service area. According to the socioeconomic survey, about 4.27% (526) HHs suffered from diarrhea whereas 3.17% (391) suffered from dysentery. Similarly, about 2.73% (337) suffered from other diseases such as skin diseases, stomach pains, fever etc.

5.3.6 Community Infrastructure

5.3.6.1 Existing Drinking Water Condition

a) Existing Water Supply

177. Sillichung Water Supply system in Bhojpur Bazaar is the only existing pipe water system in the project area. The system served partly areas of ward no. 7, 8, 9 and 10 of the municipality.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

b) Source Description

178. There are four water sources supplying existing Sillichung water supply system. All these sources are registered in District Water resources committee. There is no dispute in water sources, two sources Bhulke and Jor-sangu are in public land and other sources Daduwa and Tindhare are in private land, which are owned by Sillichung WUSC. The sources were well protected by stone masonry wall and barbed wire fencing and covered with vegetated forest.

179. The source Daduwa, Jor-sanghu and Tindhare are clustered in east side of the municipality in Khurila area. The source Bhulke is located in western area of the municipality. The details of existing sources are illustrated in the table below.

Table 31:Existing Source Details

Name of the Source	Bhulke	Daduwa	Jor-sanghu	Tindhare
WN of the Municipality	WN 4 of BM	WN 1 of BM	WN 1 of BM	WN 1 BM, Khurila
Type (Spring/Stream)	Spring	Spring	Stream	Spring
Measured flow (lps)	6lps	1lps	4lps	3lps
Safe Yield (lps)	5 lps	0.74lps	2.5lps	2.5lps

Source: DEDR, Bhojpur,2018

c) Transmission Lines, Distribution Lines and Storage Capacity

180. The cumulative length of transmission line is about 32 km. Entire length of transmission line comprises of PE pipe. There is less chances of landslide in transmission pipeline route unless other development activities like road and other construction works are commenced. Similarly, the distribution pipe line of about 45km comprises of PE pipe networks are serving water to town. The pipe was not properly laid and distribution system was not properly maintained.

181. The cumulative storage capacity of the existing system is 555 m^3. The storage capacity is very high as compared to drawing discharge. The storage capacity is more than 50% of the daily supply.

Table 32:Existing Storage Reservoir Details

Former Ward No.	Location	Capacity (m^3)	Condition
5	Hattigaunda	40	Good
5	Hattigaunda	10	
5	Hattigaunda	10	
5	School Danda	10	
5	Kafle	60	Good
5	Welfare	75	Good
5	Panitanki	200	Good
5	Panitanki	150	Very Good
	Total	**555**	

Source: DEDR, Bhojpur,2018

182. It has already been mentioned that small storage reservoirs having less than 40m3 capacity and the entire distribution mains are not incorporated in the proposed system.

d) Coverage

183. Existing system has been serving about 1329 households with approximate population of more than 10,000 in Bhojpur Bazaar town area. More than 750 household have already applied for tap connection but due to insufficient discharges available for tapping in the available local sources, the tapped discharge are not sufficient to meet the water demand of the Bhojpur Bazaar area.

e) Service Level and Consumption

184. The existing system has very good operating system. Supply hours for general public is about 4 hours and for district administrative office, district development committee, district hospital, district police office, district jail, army barracks, armed police force barracks supply is 24 hours.

f) Tariff

185. Bhojpur Bazaar water supply systyem has adopted progressive tariff system with water tariff increasing with increase in consumption. However, the adopted progressive tariff is not proper progressive .The minimum monthly charge for private connection is NRs. 80 for consumption up to 10 m^3. The additional consumption of one unit is charged at a rate as shown in the table below depending on the level of consumption. The connection charge for new private connection has been fixed at NRs. 8,085. The table given below shows the present prevailing water tariff rate in Bhojpur.

Table 33:Existing Tariff Structure

S. No.	Volume Used	Monthly Tariff
1	Up to 10 unit	NRs. 80
2	11 to 20 Unit	NRs. 13 per unit
3	21 to 30 unit	NRs. 14 per unit
4	31 to 40 unit	NRs. 15 per unit
5	41 to 50 unit	NRs. 16 per unit
6	51 to 60 unit	NRs. 17 per unit
7	61 to 70 unit	NRs. 18 per unit
8	Above 71 unit	NRs. 20 per unit

Source: DEDR, Bhojpur,2018

Engineer

Government of Nepal
Ministry of Water supply
Department of Water Supply and Sewerage Management
Water Supply and Sanitation Sector Project
Project Management Office

g) Operation Costs & Current Tariff

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

h) Problems of the existing system

187. The problems of existing water supply systems and service in Bhojpur Municipality are as follows:

- The water source is not sufficient to meet present water demand of the service area. The water shortage is more acute during the dry season;
- The supply hour for general public is about 4 hours only while for DCC, DAO,District Hospital, District Police Office, District Jail, Army Barracks, APF Barracks is 24 hours.
- The system is intermittent to the public. The present system capacity is not sufficient to meet water demand of the increasing population;
- The WUSC is not able to meet demand for private connections from the consumers in the service area;
- The existing system has no provision of treatment facility therefore the existing system has not been able to deliver water quality conforming to NDWQS standards;
- The WUSC has not been able to extend distribution system to new areas where the demand of water exist and most of existing systems need improvements in terms of its design and construction.

5.3.6.2 Existing Sanitation Situation

a) Sanitation Facilities

188. The overall sanitary condition of the Municipality is found to be reasonably satisfactory. The socio-economic survey (2016) reported that about 97.12% (2127) among total 2190 HHs have their own latrines. Among this 2127 HHs having latrines, about 70% (1507) households have ventilated pit latrine whereas 25% (546) households have pit latrines, which seems to be temporary and needs to be replaced or opted for new construction. Only, 3.3% (73) of household are using cistern flush type of pit latrine. The table given below shows the detail information on latrine facility exisitng within the project area.

Table 34:Type of Toilets in use in Project Area

Type of Toilet	Ward									Total	%
	3	4	5	6	7	8	9	10	11		
No Toilet	0	2	17	3	6	13		11	11	63	2.9
Pit Latrine	0	8	20	78	154	75	20	78	113	546	24.9
Ventilated Pit Latrine	26	132	247	140	254	232	237	159	80	1507	68.8
Cistern Flush	3	0	0	10	42	12	3	0	3	73	3.3
Grand Total	29	142	284	232	456	332	260	248	207	2190	100

Source: Socio-economic Survey ,2016

189. 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 periphery of the core area.

b) Drainage Facilities

190. 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 concern about storm water drain. .

c) Wastewater Management Practices

191. During socioeconomic survey, information regarding the practice adopted by the people for wastewater management has also been collected through the sample survey method. The sampled survey shows that out of total 123 sample households, 80.5% (99) HHs has been disposing wastewater into the soak pit while about 17.1% (21) HHs are disposing wastewater in the kitchen garden. Similarly, only 2.4% (3) HHs are throwing waste water into the public drain.

192. There is no wastewater treatment plant in the Municipality to treat domestic sewage/septage. However, the survey shows that 63.40% (78) of the sampled HHs showed an interest in improving the septage management system and are interested to pay for it.

d) Solid Waste

193. The major sources of waste generation in Bhojpur Municipality are households, hotels, hospitals, vegetable and fruits market, meat stores, groceries, clothing/ fancy stores/tailors etc. There has been no study about types and volume of solid wastes. However, assessment of the practice on the appropriate site for solid waste disposal has been carried out during the survey through the sampled survey. The details regarding this has been tabulated below:

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

Table 35: Practice on Appropriate Site for Solid Waste Disposal

Waste Management Practice	Total	%
Pit Near to House	70	65
Private Collector	0	0
Others-Use in Kitchen garden etc,	37	35
Grand Total	**123**	**100**

Source: Socio-economic survey, 2016

e) ODF Situation In Service Area

194. Bhojpur Municipality has not been declared as Open Defecation Free (ODF) area. This proposed project is expected to bring awareness among the people regarding the sanitation improvement of the project area and this may encourage them to proceed for declaring their area ODF in the near future.

5.3.6.3 Local Institutions

a) Existing Institutional Situation

195. The main institutions involved in water supply and sanitation sector in the project area are Silichung Water Supply and Sanitation Committee, Bhojpur and WSSDO,Bhojpur.WSSDO(Field Office),Bhojpur 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

196. The existing Bhojpur Bazaar Water Supply and Sanitation Committee consist of nine members representing from various clusters within the service area. The executive committee consists of 6 male and 3 female members and two female members have been working as position of vice chairman and treasurer in key executive post of WUSC. According to the caste/ethnicity status of WUSC body, Brahman/Chhetri and Janajati groups occupy 2 and 7 positions respectively.

197. The WUSC was registered in Water Resource Committee, Udaypur in 2072 B.S. as per the Water Resource Act-2049 & Water Resource Rule 2050 and involved in management and improvement of the water supply system in Bhojpur Bazaar. Similarly, the renewal process of WUSC and the annual general meeting is regulary carried out. The name list and position of the existing WUSC are given in the table given below:

Engineer

Table 36: Members of Silingchung Water Supply Users and Sanitation Committee

S. N.	Name	Position
1	Mr. Navin Pradhan	Chairperson
2	Ms. Bishnu Kumari Rai	Vice Chairman
3	Mr. Shailendra Karki	Secretary
4	Mr. Bhirkha Bahadur Tamang	Assistant Secretary
5	Ms. Krishna Kumari Tamang	Treasurer
6	Mr. Jagat Bahadur Tamang	Member
7	Mr. Dambar Bahadur Shrestha	Member
8	Mr. Jeevan Pradhan	Member
9	Ms. Laxmi Kumari Khatri	Member

Source: Socio-economic survey, 2016

c) Organization Structure of operators of Existing System

198. The existing Silingchung WUSC has been involved in the operation & maintenance of the existing water supply system since 2060 BS. The WUSC has deployed 13 staffs (Male -10 and Female-3) for the management of the existing water supply system.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

6. ANALYSIS OF ALTERNATIVES

6.1 With- and Without-Project Alternatives

199. 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

200. "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.

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

202. The existing water supply system in the project area is intermittent for the public while for major government offices, the supply is continous. Hence, this kind of partiality regarding water supply service 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, Dysentry etc. This may in turn result in the environmental problems.

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

Engineer

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector
Project Management Office

204. As mentioned in section 5.3.3.4, it is observed that almost all HHs showed willingness to pay for the monthly tariff of the proposed project as per their economic status. The socioeconomic survey also shows that even the poor HHs showed willingness to pay for not only tariffs but also for upfront cash contribution of the project. This indicates the desire of the people of the project town for the proposed project. Thus, in this regard, 'Do-Nothing' alternative will hurt the emotion of the people and the hope within them for the reliable water supply system will be despaired.

205. 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.

206. 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

207. 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 12,807 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

Engineer

government offices, it is continous system. This partiality makes the exisitng 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.

208. 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.

209. 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

210. As per Feasibility Study Report 2016, the proposed system is unique and dose not have any alternative source to carry out comparative study. There is no requirement of considering system layout, alternative technology, alternative materials and alternative sources in terms of technical, social and environmental aspects for the proposed project. Hence, no alternative system analysis has been carried out.

Engineer

7. ANTICIPATED ENVIRONMENTAL IMPACTS

211. The anticipated environmental impacts are mainly categorized into two viz., Beneficial Impacts and Adverse Impacts on tha 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

212. 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

213. 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 skilled or non-skilled workers in terms of their proficiency. The main target group for this benefit is People relying on daily wages. The socioeconomic survey shows that only 4.60% (100) of 2190 total households have to rely on daily wages. Hence, this project will be beneficial to this 4.60% of total households. Though the quantity of the target group is minimal , the amount of money earned by the local people will somehow increase the local economy thereby reducing the chances of seasonal migration of the local people depending upon daily wages works to survive.

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

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

b) Skill Enhancement

214. 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. 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

215. The proposed project will directly add in building business opportunity within the area. As construction work involves a lot of human resources, some grocery stores and, agriculture and livestock product will gain a momentum in the vicinity of the construction site. This will boost the local trade and business sector. Similarly, procurement of locally available construction materials will also help to improve the local trade and business opportunity.The main target group for this beneficial impact is local people involved in local business sector. The socioeconomic survey shows that about 23.20% (508) and only 1.1% (23) of total 2190 households are involved in business and industry respectively. Though the target group quantity is not so significant, 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

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

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

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

b) Increased economic opportunity

217. 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. 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

218. 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.

219. As per the sampled household survey carried out in 2016, 91.10% 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.

220. 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 32* given above, three female members are found to be included in the WUSC among which two has been appointed at the decision making level i.e., one as Vice Chairman & other as Treasurer of Bhojpur Water Users and Sanitation Committee while another female member is included as a general member.This will provide them opportunity to involve in decision making process regarding the proposed project as well as in various other project related activities.

221. 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.

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

223. 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 37 given below.

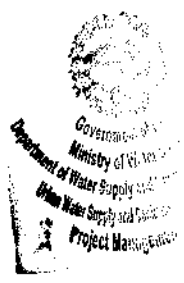


Table 37: Summary of Impact Matrix of Beneficial Issues of the project

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 Opportunity	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)
Social empowerment	ID	L (10)	L (20)	LT (20)	Significant (50)

Note: Scoring is done based on following:

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

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

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

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

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

Significance of Impact

Total Score: More than 75 : Very Significant

50-75 : Significant

Less than 50 : Insignificant

7.2 Adverse Impacts

7.2.1 Impact on Physical Environment

7.2.1.1 Design Phase

a) Soil Erosion & Slope Instability

224. 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) Soil Erosion & Land Surface Disturbance

225. 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.

225. Similarly, the proposed project involves the construction of Internal Access Road that includes 500m of gravel road and 200m of RCC stretches. The cosntrcution activities for this may result in Slope Instability and Landslides due to site clearance and earthwork excavation works.

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

b) Spoil Disposal

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

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

c) Air Pollution

227. 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.

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

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

Engineer

d) Noise Pollution

229. Noise-emitting construction activities include earthworks, rock crushing, concrete mixing, demolition works, movement and operation of construction vehicles and equipment, and loading and unloading of coarse aggregates. The significance of noise impact will be high in areas where noise-sensitive institutions such as healthcare and educational facilities are situated. This will affect the construction workers, people residing in this area and the passers by.

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

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

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

The 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

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

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

g) Impact on Land Use Pattern

232. 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

Government of Nepal, Ministry of Water Supply and Sewerage, Department of Water Supply and Sewerage, Urban Water Supply and Sanitation Sector Project, Project Management Office

Engineer

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.

233. 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.

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

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

h) Disruption to Natural Drainage

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

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

i) Haphazard Disposal of Dismantled Debris

236. 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.

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

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Project Management Office

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

238. 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.

239. The construction of Internal Access Road will also have impact on flora through certain loss of vegetation due to clearing activities.

240. 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

241. The construction works of the two proposed Intakes for Tin Bhangale Stream may contaminate the quality of this stream affecting aquatic habitat as this stream may be used used by the workers for their daily activities like waste disposal, sanitation activities which may pollute the quality of stream leading the habitat of aquatic life towards risk.

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

7.2.2.2 Operation Phase

a) Impacts on Aquatic Life

242. 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.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

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

243. During construction phase, there is high possibility of nearby rivers that includes all the proposed river sources, Sangetuwal 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 the river. 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.

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

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

7.2.3.2 Operation Phase

a) Impacts on Quality of Water Stored in Reservoir

245. 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 people 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

246. 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.

7.2.4.2 Construction Phase

a) Community health and safety hazards

250. 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

251. 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

252. The core Bhojpur bazaar area may be susceptible to traffic congestion during pipeline laying works that may provide discomfort to the passer-by 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

253. 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.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

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

247. Cracking of structure leads to facility failure and public discomfort due to construction of water supplycomponents 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 isindirect in nature, local in extent, medium in magnitude and long-term in duration.

b) Health & Safety of Community & Workers

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

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

c) Damage to the existing facilities

249. During construction phase, if the proposed pipelines interfere any of the existing utilities, there is greater possibility of those utilites 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.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

e) Mobilization of Child Labor

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

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

f) Impacts on the Sustainability of Works

255. 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. Bhojpur, 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.

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

g) Damage to the existing utilities

256. 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.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

7.2.4.3 Operation Phase

a) Occupational Health and Safety Hazards

257. 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

258. 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

259. 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 criticisms that may lead to protests also.

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

d) Non-sustainability of Services or Completed Works

260. 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 38.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector
Project Management Directorate

Engineer

Table 38: 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 Pollution	D	H (60)	L (20)	ST (5)	Very Significant (85)
Generation of Solid Waste & Wastewater from the construction site & worker's camp	D	M (20)	L (20)	LT (20)	Significant (60)
Accidental Leakage or Spillage of Stored Fuel/Chemicals	D	M (20)	L (20)	LT (20)	Significant (60)
Impact on Land Use Pattern	D & ID	M (20)	L (20)	LT (20)	Significant (60)
Disruption to Natural Drainage	D	M (20)	L (20)	LT (20)	Significant (60)
Haphazard Disposal of Dismantled Debris	D	M (20)	L (20)	LT (20)	Significant (60)
B) Impacts on Biological Environment					
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)
Health & Safety of Community & Workers	ID	M (20)	L (20)	LT (20)	Significant (60)
Damage to the existing facilities	D	M (20)	L (20)	ST (5)	Insignificant (45)
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	D	M (20)	L (20)	ST (5)	Insignificant (45)

Engineer

Adverse Issues	Impact Rating				
	Nature	Magnitude	Extent	Duration	Rating
business					
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)

Note: Scoring is done based on following;

Nature of Impact: D = Direct; ID = 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

261. 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 38 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 along with the enhancement measures of the anticipated beneficial impacts.

8. MITIGATION & AUGMENTATION MEASURES

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

8.1 Mitigation Measures

8.1.1 Impact on Physical Environment

8.1.1.1 Design Phase

a) Soil Erosion & Slope Instability

261. The mitigation measures can be as follows;

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

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

8.1.1.2 Construction Phase

a) 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 Structues.

Engineer

Government of Nepal Ministry of Water Supply Department of Water Supply and Sewerage Management Urban Water Supply and Sanitation Sector Project Project Management Office

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 Spoil Disposal Site as described in section 2.4.14.
- 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 & dusty exposed surfaces of excavation sites & access road 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, (x) Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking by the concerned contractor and xi) Regular Inspection & Maintenance of construction/transportation vehicles.

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; (viii) Use of Diesel Generators complying with National Diesel Generator Emission Standard,2012; (ix) Prohibit use of pressure horn by transportation vehicles and (x) Regular Inspection & Maintenance of construction/transportation vehicles.

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

Engineer

Government of Nepal Ministry of Water Supply Department of Water Supply and Sewerage Management Urban Water Supply and Sanitation Sector Project Project Management Office

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 during transportation as well as storage.
- Use of spill kit materials to block flow and prevent discharge to nearby water bodies
- Scatter the Sawdust, sand or dry soil over the area of spill and leave for few minutes to soak up the fuel/chemical to avoid water as well as soil contamination. 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

8.1.2 Impact on Biological Environment

8.1.2.1 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

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

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.

8.1.2.2 Operation Phase

a) Impacts on Aquatic Life

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

- Strict monitoring to the operators involved to discourage direct discharge of the effluent to the water bodies.
- Proper Implementation of Water Safety Plan (WSP).

8.1.3 Impact on Chemical Environment

8.1.3.1 Construction Phase

a) Impacts on Water Quality of the nearby rivers

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.

276. In additional to this, other mitigation measures include

- disposing of spoils or excess soils as free filling materials as soon as possible;
- locating temporary storage areas on flat grounds and away from main surface drainage routes;

- shielding temporary storage areas with sandbags
- 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.

8.1.3.2 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).

8.1.4 Impact on Socio-economic Environment

8.1.4.1 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.

Engineer

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.

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

c) Damage to the existing facilities

284. 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.

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

8.1.4.2 Construction Phase

a) Community Health & Safety Hazards

286. 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

(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

287. 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, if required, the sample of which has been attached in **Annex 2D**.

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

d) Disruption to Local Vendor's Business

289. The mitigation measures for this impact includes;

- Avoid delay in construction works and Prompt Backfilling accompanied by compaction right after completion of pipe laying works without delay .
- Provision of temporary access to the shops through provision of planks.
- Pre-notify the vendors regarding the construction works that may hinder their daily activities and Coordinate with them properly.

e) Mobilization of Child Labor

290. The mitigation measures for this impact includes;

Government of Nepal, Ministry of Water Supply, Department of Water Supply and Sewerage, Urban Water Supply and Sanitation Sector Project, Project Management Office

Engineer

- 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

291. 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

292. 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.

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

8.1.4.3 Operation Phase

a) Occupational Health and Safety Hazards

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. The mitigation measures for this impact will be as follows:

- 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 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
- Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs
- Carrying out regular O & M with effectiveness through proper management of WUSC.

8.2 Augmentation Measures

8.2.1 Impact on Socio-economic Environment

8.2.1.1 Construction Phase

a) Employment Generation

298. The augmentation measures can be as follows;

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

b) Skill Enhancement

299. The augmentation measures can be as follows:

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

c) Local trade and business opportunity.

300. The augmentation measures can be as follows;

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

8.2.1.2 Operation Phase

a) Improved health and hygiene

301. The augmentation measures can be as follows;

- Regular maintenance of the water supply components should be done so that the project operates smoothly and the benefits are intact.

b) Increased economic opportunity

302. The augmentation measures can be as follows;

- Ensuring regular maintenance of the water supply components
- Promoting land development activities in the area.

c) Social Empowerment

303. The augmentation measures can be as follows;

- Priority will also be given to vulnerable groups in WUSC along with female groups.
- Involving underprivileged group of people especially women and poor people in various capacity building programs and project related community meetings

Engineer

Government of Nepal
Ministry of Water Supply and Sanitation
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

9. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

9.1 Stakeholder Consultation & Participation

304. Stakeholder consultation and participation is an essential process in project preparation. It is also a part of information disclsoure. It will disseminate as well as collect information regarding the proposed project by involving various stakeholders that includes Key Informant Interviews, Stakeholders Meetings, Focus Group Discussions (FGD), On-site discussions with WUSC and Random Field Interviews. The checklists & findings of FGD has been included in **Annex 4** and the minutes of various meetings undertaken during field visits are also included in **Annex 3**.

305. 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 39:Stakeholder Analysis & Mapping

S.N.	Stakeholders	Primary[3]	Secondary[4]	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 SewerageManagement		✓	It is the lead implementing agency and works under MoWS with the responsibility of planning, implementation,operation, repair & maintenance of the proposed project.	High

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

[4] Secondary Stakeholders: people, groups and institutions that are important as intermediaries in the program delivery process

Engineer

S.N.	Stakeholders	Primary[3]	Secondary[4]	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.	WUSC		✓	It is responsible for O & M of the proposed water supply system. It will also facilitate the concerned authorities during planning as well as construction	High
10.	Households (Families & Individuals)	✓		They are the main beneficiaries and are benefitted by the provision of enhanced & improved continuous water suppy	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 opportunitiesrelated to construction works of the proposed project.	Low
13.	Unemployed Locals	✓		This group will be benefitted through the increased work opportunitiesrelated to construction works of the proposed	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 suppy 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

S.N.	Stakeholders	Primary[3]	Secondary[4]	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

306. The consultations were carried out on various dates at varous locations within the project town for the discussion of the anticipated environmental impacts that may result from the construction of the proposed project. The consultations were undertaken with key stakeholders that includes Local Bodies, Beneficiaries Households, 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

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

i. The project town is in need of safe, reliable and potable water.
ii. Water shortage problem is acute in Bhojpur Bazaar area especially during dry season.
iii. People of the project town are relying on untreated but occasionally disinfected water.
iv. 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.
v. The project should give priority to local people while hiring for the construction actvities.
vi. The project must consider solid waste management issues during construction period.
vii. The proposed project must address the socioeconomic problems that may be observed during the construction period at Bhojpur Bazaar area like Traffic

Congestion, Disruption to Local Vendors, Discomfort to the passerby,Noise Pollution, Air Pollution, Damage to the existing facilities etc.

308. 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.

309. The assurance made by the study team regarding the issues raised by the stakeholders are as follows:

i. The proposed project has included Bhojpur Bazaar area as the main service area. Hence, it will address the water shortage problem faced by Bhojpur 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 Bhojpur town 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.

310. 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.

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

Table 40:Summary of Major Public Consultations carried out by Study Team

SN	Meeting Date	Facilitator/stakeholders	Venue	Participants		Topic of discussion
				Male	Female	
1	27 May ,2017	Safeguard and GESI Expert	Taxsar Area	11	10	About the TSTWSSSP, Different tole and ward level discussion about project
2	May 25, 2017	Technical team, Safeguard Expert , GESI expert and PMO, ERDSMC DRTAEC team	WUSC Office	13	5	Discussion about project and providing land for project.
3	May 24, 2017	Technical team, Safeguard Expert , GESI expert and PMO, ERDSMC DRTAEC team	WUSC Office	31	20	Feasibility Study Report presentation.
4	31 April, 2017	WUSC members, ERDSMC team, GESI expert and Safeguard specialist	WUSC office	15	10	Discussion about the project.

Source: Due Diligence Report,2018

312. 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.

Engineer

10. GRIEVANCE REDRESS MECHANISM

10.1 Purpose of the Grievance Redress Mechanism

313. 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.

314. 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.

315. 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

316. 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

Engineer

relevant), (6) a representative of reputable and relevant CBO/SHG/organization working in the project area as invitee[5] , 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.

317. 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.

318. The GRM procedure is depicted in *Figure 4*, 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 UWSSSP to file a complaint. The municipal-level field office of the RPMO, in WUA's building, will document the complaint within 24 hours of receipt of complaint in the field, and WUA or local bodies will immediately address and resolve the issue at field-level with the contractor, supervision personnel of RPMO and RDSMC field engineers within 5 days of receipt of a complaint/grievance. The assigned RDSMC's Social Mobilizer will be responsible to fully document: (i) name of the person, (ii) date of complaint received, (iii) nature of complaint, (iv) location and (v) how the complaint was resolved. If the complaint remains unresolved at the local level within 5 days, the WUA will forward the complaint to the municipality level GRM.

[5] 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.

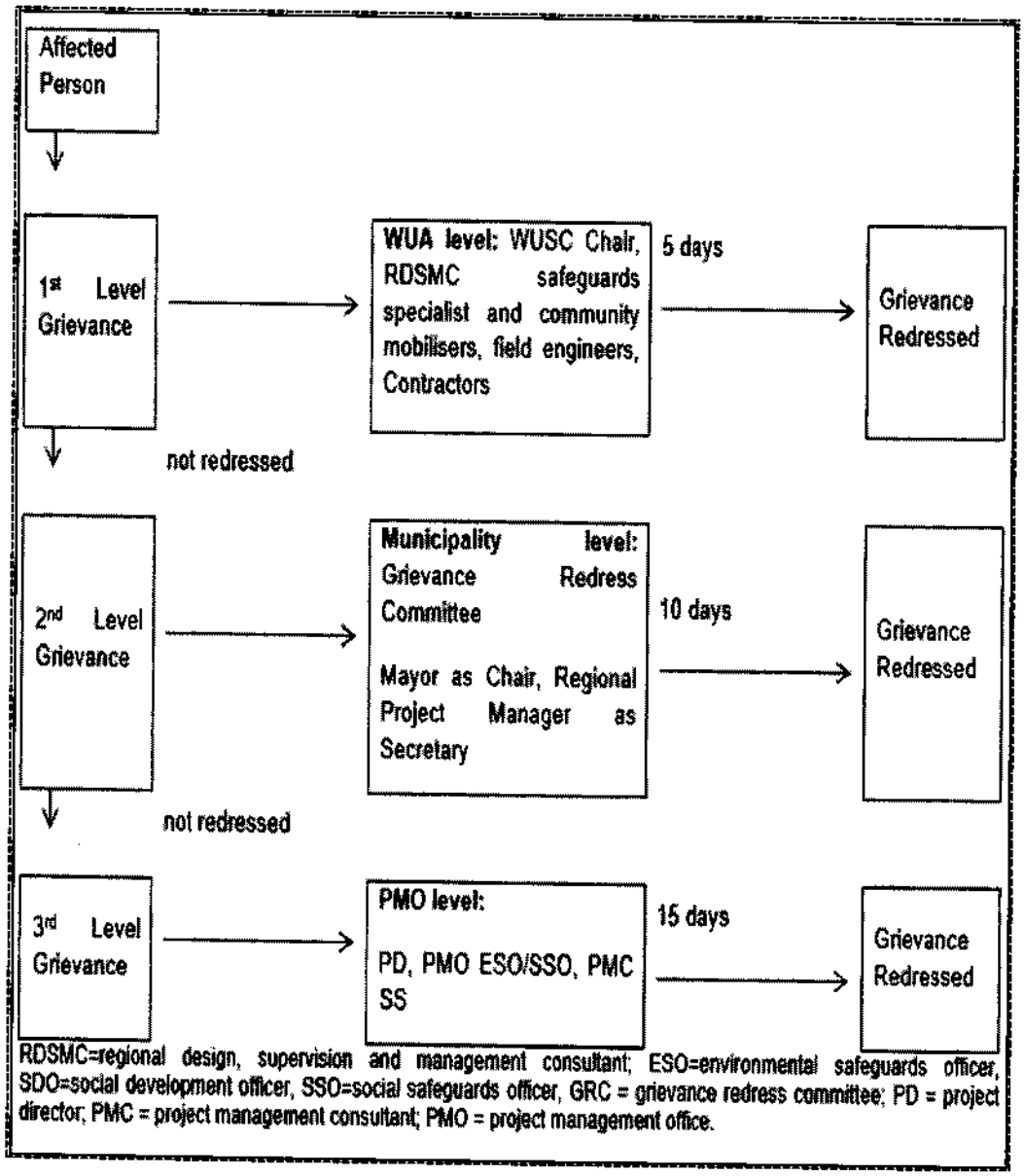


Figure 4: Grievance Redress Mechanism (Formal Approach)

(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.

319. The complainant will have to fill up Grievance Redress Form, the sample of which is 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, DWSSM, 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.

320. 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.

321. 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 UWSSSP Information Datasheet (PID), to be published in web and distributed to the affected communities, as part of the project GRM.

11. ENVIRONMENTAL MANAGEMENT PLAN

11.1 Introduction

322. 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 adverse impacts of the project and in enhancing beneficial impacts; and (iv) ensuring that safety recommendations are complied with.

323. 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

324. The Ministry of Water Supply (MoWS) will be the executing agency with the responsibility of project execution delegated to the Department of Water Supply and Sewerage Management (DWSSM). Water User's and Sanitation Committees of the proposed towns are the implementing agencies.

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 ConsultantTeam'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.

11.2.2 Safeguard Implementation Arrangement

325. 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.

326. **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.

327. **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.

328. **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.

329. **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.

330. **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.

331. 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.

332. 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)

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

Table 41: Environmental Management Plan Matrix

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
A. Adverse Impacts					
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	• Spoil Management Plan • Final Design Documents	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 Structues	Contractor	• Contractor's Log Book of construction works • Field Photographs	Weekly Basis During Construction Phase
Spoil Management	Inappropriate disposal of spoils from the construction activities may result in gullying and erosion of spoil 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 • Number of Spoil Disposal Site • Location of Spoil Disposal Site	During Construction Phase

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		• Provision of proper drainage, vegetation and adequate protection against erosion at the Spoil Disposal Site.			
Air Quality	Air Pollution	• Strict Prohibition of open burning of solid waste	Contractor	Written Notice/Code of Conduct	During award of contract
				Visible Emission	Weekly Basis During Construction
				Number of complaints from the sensitive receptors	
		• Watering of dry & dusty exposed surfaces of excavation sites & access road and stockpiles of aggregates at least twice daily, as necessary;	Contractor	Number of water Tank/s	Weekly Basis During Construction
				Capacity of Water Tank/s	
				Daily/Weekly Frequency/Timing of water spraying	
				Locations of water spraying	
		• If re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces;	Contractor	• Contractors Log Book of Materials to ensure the use of crushed gravel • Photographs	Weekly Basis During Construction
		• Use of Construction/ Transportation Vehicles complying with NVMES,2069	Contractor	Number and types of vehicles in use	During Construction
				Certified documents for each vehicle	
		• Regular inspection & maintenance of construction/transportation vehicles	Consultant & Contractor	Contractor's/Consultant's log book of vehicle inspection & maintenance	Daily Basis/During Construction
		• Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking.	Contractor	Written Notice/Code of Conduct	Prior to construction
				Type of fuel supplied to camps	Weekly Basis during construction
				Quantity of fuel supplied to camps	Weekly Basis during construction
Acoustic Environment	Noise Pollution	• Using equipment that emits the least noise, well-maintained and with efficient mufflers.	Contractor	Written Notice/Code of Conduct	Daily Basis

Engineer

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Acoustic Environment	Noise Pollution			Contractor's/Consultant's log book of equipment/machinery	Daily Basis
		• Restricting noisy activities to daytime and overtime work to avoid using noisy equipment;	Contractor	Written Notice	Prior to construction
		• limit engine idling to a maximum of 5 minutes	Contractor	Written Notice/Code of Conduct	Daily Basis
				Contractor's/Consultant's log book of equipment/machinery	Daily Basis
		• Spread out the schedule of material, spoil and waste transport	Contractor	Spoil Management Plan	Weekly Basis
		• Minimizing drop heights when loading and unloading coarse aggregates	Contracto	Written Notice/Code of Conduct	Daily Basis
		• Use of Construction/ Transportation Vehicles complying with NVMES,2069	Contractor	Number and types of vehicles in use	Daily Basis
				Certifying documents for each vehicle	Weekly Basis
		• 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
		• Use of Diesel Generators complying with National Diesel Generator Emission Standard,2012	Contractor	Contractor's/Consultant's log book of equipment/machinery inspection & maintenance	
		• Prohibit the use of pressure horn by transportation vehiles	Contractor	Written Notice/Code of Conduct	Daily Basis
				Number of vehicles fitted with pressure horns	
				Maximum Sound Level of Pressure Horn	
		• Regular inspection & maintenance of construction/transportation vehicles	Contractor	Contractor's/Consultant's log book of vehicle inspection & maintenance	Daily Basis

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Solid Waste	Haphazard Disposal of Construction Wastes	**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 soild 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 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.	Contractor	• Contractor's log book of construction materials	Daily basis
		• Construct garland drains to reduce the runoff from the stockpiles.	Contractor	• Photographs of location of construction sites	Daily basis
Solid Waste	Haphazard Disposal of Other Solid 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.	Contractor	• Number of Colored Bins to segregate wastes into biodegradable & non biodegradable wastes	Daily basis during construction

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Solid Waste	Haphazard Disposal of Other Solid Wastes	• 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.	Contractor	• Daily/Weekly quantity/Volume of Biodegradable solid waste collected • Site Photographs • Contractor' Log Book	Daily basis during construction
		• 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	Contractor	• Daily/Weekly quantity/volume of such wastes sold to or given to scrap vendors • Frequency of sale to scrap vendors/dealers	Daily basis during construction
		• Strict Prohibition on open incineration of solid wastes & use of plastic materials to minimize the quantity of plastic wastes.	Contractor	• Written Notice	Prior to Constuction & During Constrcution
		• Construction of the temporary latrines with temporary soak pits & septic tanks within the camp site for proper disposal of sewage.	Contractor	• Field Photographs • Contractor's Monthly Progress Report	Daily basis
		• Provide temporary but proper drainage system for proper outlet of waste water generated from cooking practices adopted by the workers	Contractor	• Field Photographs • Contractor's Monthly Progress Report	Daily basis
		• 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	• Contractor's Workers 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	Priorot the construction

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		• Supervise workers to handle fuel/chemicals properly during transportation as well as storage	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 to avoid water as well as soil contamination. 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	• Number of Site Visits • Complaints of Leakgae	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. • Monitoring on the haphazard land use & planning by the concerned authority.	PMO & DSMC	• Details of land ownership • Monitoring Reports on Hapazard Land Use	During Detailed Design Phase
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	Photoghraphs of before and after restoration	Daily Basis During Construction
Dismantled Debris	Haphazard Disposal of Dismantled Debris	• Immediate Response on handling of Dismantled debris	Contractor	Number of complaints from the sensitive receptors	Daily Basis After Construction and Prior to Operation
		• Segregation of Dismantled Debris	Contractor	• Number of Colored Bins • Contractor's Work Log	Daily Basis

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		• Adopt 3R (Reduce,Reuse& Recycle) concept		Book ber of Colored Bins	
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	Contractor	• Photographs of before and after the replacement of top soil • Contractor's Work Log Book	Daily Basis During Construction
		• Re-vegetating disturbed slopes and grounds, as applicable;	Contractor	• Photographs of revegetation of disturbed slopes and grounds • Contractor's Work Log Book	Weekly Basis During Construction
Flora & Fauna	Loss of vegetation, Loss of habitat of faunas	• Awareness programs regarding conservation of existing flora & fauna, to the workers and the community	PMO,DSMC & Contractor	Minutes & Photographs of Programs	Prior to Construction
		• Regular Monitoring	DSMC & RPMO	• Contractor's Log Book Number of Monitoring Visits	Daily Basis During Construction
Aquatic Life	Loss of habitat of aquatic life	• Strict Monitoring on the daily activities of workers	Contractor & DSMC	• Location of Labor Camp Site • Photographs • Number of Complaints from the sensitive receptors • Number of Monitoring Visits Monitoring Reports	Weekly Basis
		• Provision of temporary but well equipped toilets	Contractor & DSMC	• Location of these temporary facilities	Weekly Basis

Engineer

Department of Water Supply and Sewerage
Ministry of Water Supply and Sewerage Development
Urban Water Supply and Sanitation Sector Project
Project Management Office

Field	Impacts	Mitigations/Enhancement Measures	Responsible for implementation	Monitoring Indicator	Frequency of Monitoring
				• Photographs of toilets constructed	
		• Restriction to workers from fishing	Contractor & DSMC	• Written Notice • Number of complaints from the sensitive receptor	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.	WUSC	Number of complaints from the sensitive receptors	Weekly Basis
		• Proper Implementation of Water Safety Plan (WSP)	WUSC, DSMC & PMO	• WUSC Monitoring Reports • Water Safety Plan	Monthly Basis
3. Impacts on Chemical Environment					
a)Construction Stage					
Water Quality	Pollution on surface water sources by crossing of pipelines over water bodies, poorly managed construction sediments and other wastes, poor sanitation practices by workers	• Appropriate Design of Septage Disposal through design of toilets with septic tanks	Contractor, DSMC	• Semi Annual Environmental Monitoring Report • Photographs of toilets constructed	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 ground and away from main surface drainage routes • Shielding temporary storage areas with sandbags	Contractor	Photographs of temporary storage areas	Monthly Basis
		• Adopt measures mentioned above for the solid waste management	Contractor	• Number of Colored Bins to segregate wastes • Daily/Weekly	Daily Basis

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
				quantity/Volume of Biodegradable solid waste collected	
		• providing adequate water supply and sanitation facilities at work sites.	Contractor	• State of camp site with r Number of Complaints received from the workers • Number of Water Supplies to the workers equired temporary facilities	Weekly Basis
		• 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	• Number of supervisions • Reports on Supervision	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	Water Safety Plan of WUSC	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	• Photographs • WUSCMonthlyReports	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	• Proper Design of each & every component as per standard and code of practice.	PMO, RPMO & DSMC	Detailed Design Documents	During detailed design phase

Engineer

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	discomfort due to construction of water supply components in high earthquake zones				
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	Photographs & Minutes	During detailed design phase
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; • Pipeline Layout Plan • Bid document • Photographs before and after the construction sites	During detailed design phase
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	• Contractor's implementation of EMP	Contractor, RPMO, DSMC	EMP	During Construction Phase, Weekly Basis
		• Adequate lighting, temporary fence, reflecting barriers and signage at active work sites;	Contractor	• Photographs depicting lighting, temporary fencing, reflecting barriers and signage facilities. • Quantity of lighting, temporary fence, reflecting barriers and signage	During Construction Phase, Monthly Basis
		• Contractor's preparedness in emergency response;	Contractor	Emergency Response Plan	During Construction, Weekly Basis

Engineer

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	the community by construction workers.	• Adequate dissemination of GRM and Contractor's observance/implementation of GRM.	Contractor	• Monthly Reports of GRC • Number of Grievance Redress Form received	During Construction, Monthly Basis
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.	• Comply Labor Act (1992) of GoN • Train all site personnel on environmental health and safety • Provide **Personal Protective Equipment (PPEs)**to workersthat 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	Contractor	• Site –Specific H&S 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
		• Exclude public from worksites	Contractor	Contractor's Visitors' Log Book	Weekly Basis during construction
		• Maintain accident reports and records.	Contractor	Number of accidents as per site records	Weekly Basis during construction
		• Make first aid kits readily available	Contractor	Contractor's Health & Safety Log Book	Weekly Basis during construction
Workers Health &Safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards, which can arise from working at height and excavation works.	• 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	Contractor	• Location of Worker's Camp Site • Number of Monitoring Visits • Number of Complaints from the workers	Monthly Basis during construction
		• Adequate supply of potable water to the camps and good sanitation within camps	Contractor	• Number of water supplies • Number of complaints from the workers	Weekly Basis during construction
		• Provide medical insurance coverage for workers	Contractor	Medical Insurance Documents	Prior to the construction
		• Provide orientation for guest visitors • Ensure that visitors do not enter hazard areas	Contractor	• Record of Orientation training (Photographs	Monthly Basis during construction

Engineer

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		unescorted;		& Minutes) • Contractor's Visitor's Log Book	
		• Ensure moving equipment is outfitted with audible backup alarms; • Hearing protection equipment enforced in noisy environment	Contractor	Contractor's Log Book of Machinery & Equipment	Weekly Basis during construction
		• Chemical and Material storage areas need to be marked clearly	Contractor	Signage Board to make aware regarding Chemical Storage and Material Storage Area	Monthly Basis during construction
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 walkways. • Follow Traffic Management Plan	Contractor	• Number of Site Visit and Photographs of Sites • Traffic Management Plan	Daily Basis
Local Vendor's Business	Provide discomfort to the customers to get access to the shops	• Avoid delay in construction works and Prompt Backfilling rifght after completion of pipe laying works.	Contractor	• Field Visits • Contractor's Work Schedule	Weekly Basis
		• 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(Verbal Notice)	Prior to the construction
Deployment of Child Labor	Deprivation of Children's right to education,health, safety and moral development is deprived	• 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	Contractor & PMO	Citizenship Certificate of the workers	Prior to Construction

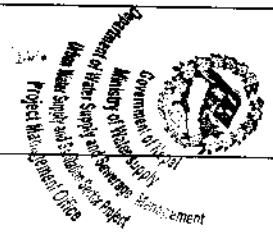
Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		each labor,should be made.			
		• During contract agreement, the agreement by the contractor to follow Child Labor Prohibition Act, 2000 and Child Labour Prohibition Rules & Regulations,2006, should be made.	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 • 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.	Contratcor, RPMO,DSMC	• Number of Complaints received at GRC • Pipeline Layout Plan • Contarctor's Bill of Quantities • Photographs	During Construction Phase on Daily Basis
		• Reinstatement of damaged paved roads if any	Contratcor,	• Contractor's Work Log Book • Photographs • On site reports	Weekly During Construction
c) Operation Phase					
Occupational Health & Safety	Worker's exposure to, and/or mishandling of chemicals and other hazardous substances pose health and safety hazards.	• Installation of clear, visible signage in premises on safety measures	WUSC	• Number of Site Visits • Site Visit Reports • Photographs of location where signage are installed	Weekly Basis
		• 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

Government of Nepal
Ministry of Water supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Drinking water supply	• 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 Cl & other chemicals	• Ensure the correct operation of water treatment plant to meet satisfactory water quality	PMO, RPMO& DSMC	WUSC Monitoring Reports	Monthly Basis during operation
		• Provide Safe Storage for chemicals	Contractor	Location of Chemical Storage	Monthly Basis during operation
		• Ventilation of "Housed" dosing unit for chlorine	Contractor,PMO & DSMC	• Detailed Design Drawings • Contractor' Working drawings • Photographs of Dosing Unit Constructed	During Construction
		• Train operators for handling chlorine	RPMO,PMO & WUSC	Minutes & Photographs of Training	Prior to operation right after completion of construction
Consumer's Health	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.	• Regular Monitoring by the WUSC	WUSC	WUSC Monitoring Reports	Monthly Basis
		• Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC.	WUSC	Frequency of Algae Removal	Monthly Basis
		• Monitoring & Proper Implementation of WSP.	WUSC	WUSC Monitoring Reports	Monthly Basis
Non Sustainability of Services or Completed Works	Disruption to the water supply service by sudden seismic events or climate change droughts	• Monitoring of source yield closely by WUSC, especially in the dry season and during a climate-change-induced drought.	WUSC & the local body	• Number of Human Resources Mobilized for monitoring • Yield Monitoring Reports	During Dry Season and Immediate action after seismic event if any
		• After every seismic event, WUSC will conduct engineering investigations of completed works and implement the necessary corrective actions without delay.	WUSC	WUSC Monitoring Report	Immediate after any seismic event
		• Preparation of Emergency Response Plan and Immediate Implementation of this plan after any seismic event	WUSC	• WUSC Monitoring Report • Emergency Response Plan	Immediate after any seismic event

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		• Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs	WUSC	• Photographs of capacity building programs • Minutes of such programs • WUSC Monitoring Report	During project cosntruction and During initial stage of operation phase
		• Carrying out regular O & M with effectiveness through proper management of WUSC.	WUSC	• WUSC Monitoring Report	Right after the completion of project construction period
B. Beneficial Impacts					
1.Impact on Socioeconomic Environment					
a) Construction Phase					
Income	Employment Generation	• Recommend contractor to employ local people by giving high priority to women and under privileged group as far as possible. • Ensure equity in provision of wages to both male as well as female labors.	DSMC, Contractor & WUSC	• Contractors Log Book • Number of local labours employed in project • Consultant Monitoring Report	During Project Construction
Personal Skills	Skill Enhancement	• Making a proper work plan and code of conduct during the construction period. • Provision of regular hands on training to the workers during the project construction period	DSMC, Contractor & WUSC	• Contractors Log Book • Hands on training Photgraphs • WUSC monitoring report	During Project Construction
Local trade & business opportunity	Enhanced Local trade & business opportunity	• Recommend contractor to give priority to the local products during procurement of construction of materials. • Priority also will be given to local services like grocery stores, tea shops, hotel & restaurants etc. during the entire construction period.	DSMC, Contractor & WUSC	• Contractors Materials Log Book • WUSC monitoring report	During Project Construction
b) Operation Phase					



Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Health & Hygiene	Improved health & hygiene	• Regular maintenance of the water supply components should be done so that the project operates smoothly and the benefits are intact	WUSC	• Number of Site Inspection Visits • Photographs of Inspection Visits • WUSC monitoring report	During O & M
Economy	Increase Economic Opportunity	• Ensuring regular maintenance of the water supply components • Promoting urbanization through proper land development activities in the area.	• WUSC • Local Authority	• Number of Site Inspection Visits • Number of complaints of component failure • State of properly & legally planned land use	During O & M
Social Status	Social Empowerment	• Priority will also be given to vulnerable groups in WUSC along with female groups. • Involving underprivileged group of people especially women and poor people in various capacity building programs and project related community meetings	• WUSC	• Number of members of WUSC • Photographs of capacity building programs • Minutes of meetings	O & M phase

Source: IEE Study 2018/019

Engineer

11.4 Environmental Monitoring Program

334. 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.

335. 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 42 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. This will be updated during detailed design to ensure EMP and monitoring program is commensurate with the impacts of the project.

Table 42: Environmental Monitoring Program

	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 Standard Guidelines, 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 landsca	• O&M phase	• Survival rate	• In the areas where re-plantation/	• Twice a year for 2 years	• None	• WUSC

Engineer

Government of Nepal
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

	Field	Stage	Parameters	Location	Frequency	Standards	Responsibility
	ping, tree plantation			landscaping proposed			

Source: IEE Study 2018/019

11.5 Institutional Capacity Development Program

336. 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.

337. 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 NPR 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.

338. 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 43. The Environmental Safeguard specialist & EMP Field Monitoring Staff are responsible for organizing different training programs for Environmental Management.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

Table 43: Training Program for Environmental Management

Items	Pre-construction/prior to construction	Construction	
Training Title	Orientation workshop	Orientation program/ workshop for contractors and supervisory staff	Experiences and best practices sharing
Purpose	To make the participants aware of the environmental safeguard requirements of ADB and GON and how the project will meet these requirements	To build the capacity of the staff for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and GON	To share the experiences and best practices aimed at learning lessons and improving implementation of EMP
Contents	**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

Source: IEE Study 2018/019

11.6 Staffing Requirement and Budget

339. Staffing requirement will include the: (i) deputizing 2 DWSSM or PMO staff as the PMO environmental safeguards officer; (ii) deputizing WSSDO staff as

Engineer

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.

340. The costs required for implementing the EMP will cover the following activities:

(i) Updating IEE, preparing and submitting reports and public consultation and disclosure;
(ii) Application for environmental clearances; and
(iii) Implementation of EMP, environmental monitoring program, and long-term surveys.

341. 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.

342. 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.

343. 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, observation tours, other institutional strengthening activities & WSP during the contract period is NPR 600,000.00 under provisional sum. Out of this total cost, NPR 200,000.00 has been allocated for capacity building programs.

344. The indicative costs of EMP implementation are shown in Table 44.

Government of Nepal
Ministry of Water Supply and Sanitation
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

Table 44:Indicative Cost of EMP Implementation

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
A.	**Local Level Monitoring Measures**	
a)	Air quality Monitoring	150,000.00
b)	Noise levels Monitoring	50,000.00
c)	Water Quality Monitoring	50,000.00
B.	**Mitigation Measures**	
a)	**Impacts on Physical Environment**	
I.	**During Design Phase**	
i.	Soil Erosion and Slope Instability	
	Incorporate measures and sites for handling excessive spoil materials	No Additional Cost Required
	Incorporate drainage plan in final design	No Additional Cost Required
II.	**During Construction Phase**	
i.	Soil Erosion and Land Surface Disturbance	
	Proper Backfilling	No additional cost required, Separately included under Miscellaneous Items
	Slope Protection Measures (Gabion Wall Construction, Retaining Wall etc.)	No additional cost required, Separately included in Detailed Cost Estimate
ii.	Spoil Disposal	20,000.00
iii.	Air Pollution	
	Excavation Segmentation Plan	No additional cost required
	Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily	100,000.00
	Other mitigation measures as mentioned in section 8.1.1.2 c)	No additional cost required
iv.	Noise Pollution	No additional cost required
v.	Generation of Construction Wastes & Solid Wastes	
	Waste Management	160,000.00
vi.	Accidental Leakage or Spillage of Stored Fuel/Chemicals	50,000.00
vii.	Impact on Land Use Pattern	No additional cost required
viii.	Disruption to Natural Drainage	No additional cost required
ix.	Haphazard Disposal of Dismantled Debris	
	Segregation, 3R Concept, Sale to Scrap Dealers	No additional cost required as it has already been mentioned in v
b)	**Impacts on Biological Environment**	
I.	Construction Phase	
i.	Impacts on Flora & Fauna	
	Awareness programs to the construction workers	No additional cost required
	Revegetating disturbed slopes & grounds	20,000.00
	Others as mentioned in Sub Section 8.1.2.1 a)	No additional cost required
ii.	Impacts on Aquatic Life	
	Strict Monitoring on the daily activities of workers	No additional cost required
	Provision of temporary but well equipped toilets at worker's camp	200,000.00
	Solid Waste Management	No additional cost required as it has already been mentioned above in v.
II.	Operation Phase	
i.	Impacts on Aquatic Life	
	Strict monitoring to the operators involved to discourage direct discharge of the effluent to the water bodies.	No additional cost required, It will be managed by WUSC itself
	Proper Implementation of Water Safety Plan (WSP).	No additional cost required, It will be covered by cost of Water Safety Plan
c)	**Impacts on Chemical Environment**	
I.	Construction Phase	
i.	Impacts on Water Quality of nearby rivers	

Engineer

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
	Appropriate design of Septage Disposal with well-equipped temporary toilets	No Additional Cost Required as it has already been mentioned in
	Disposing of spoils or excess soils as free filling materials as soon as possible	No Additional Cost Required
	Locating temporary storage areas on flat grounds and away from main surface drainage routes	50,000.00
	Shielding temporary storage areas with sandbags	No Additional Cost Required
	Implementing eco-friendly solid and hazardous waste management, disposing them promptly	No Additional Cost Required as it has already been mentioned above in v.
	Providing adequate water supply and sanitation facilities at work sites.	No Additional Cost Required. It has to be managed by the contractor itself.
	Strict supervision on the behaviour of workers for the waste management as well as sanitation behaviour and monitoring the workers to manage the wastes properly	No Additional Cost Required
	Strict & Regular Monitoring during pipe laying works	No Additional Cost Required
II.	Operation Phase	
i.	Impacts on Quality of Water Stored in Reservoir	
	Proper Implementation of Water Safety Plan (WSP)	No Additional Cost Required
	Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC.	No Additional Cost Required
ii.	Impact on Water Bodies	
	Disposal of raw sludge to the appropriate landfill sites of the proposed project town	No Additional Cost Required
	Use of raw sludge for agricultural land	No Additional Cost Required
	Avoid direct discharge of the raw sludge to the water bodies through strict monitoring to the operators involved.	No Additional Cost Required
	Proper Implementation of Water Safety Plan (WSP)	No Additional Cost Required
d)	**Impacts on Socioeconomic Environment**	
I.	Design Phase	
i.	Structural Instability	
	Proper design of earthquake resistant structures as per standard and code of practice.	No additional cost required
ii.	Health & Safety of Community & Workers	
	Training on Community Health & Safety Hazards by DSMC by disseminating information in regard to this through training manuals, photographs & documents related to safety	No additional cost required
iii.	Damage to the existing facilities	No additional cost required
II.	Construction Phase	
i.	Community Health & Safety Hazards	
	Contractor's implementation of EMP	No additional cost required
	Adequate lighting, temporary fence, reflecting barriers and signage at active work sites	100,000.00
	Contractor's preparedness in emergency response	225,000.00
	Adequate dissemination of GRM and Contractor's observance/implementation of GRM	No additional cost required
ii.	Worker's Health & Safety Hazards	
	Provision of PPE to workers	150,000.00
	Other Mitigation measures	No Additional Cost Required
iii.	Traffic Congestion	No Additional Cost Required
iv.	Disruption to Local Vendor's Business	
	Prompt Backfilling	No Additional Cost Required
	Provision of Planks to provide access to shops & homes	25,000
v.	Mobilization of Child Labor	No Additional Cost Required
vi.	Impact on Sustainability of Works	
	Engineering Investigations after any seismic event, if any	150,000.00
	Emergency Preparedness Response	No additional cost required as it has already

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
		been mentioned above in xii)
vii.	Damage to the existing facilities	
	Monitor construction workers to adopt carefulness and to strictly follow the layout drawings.	No Additional Cost Required
	Reinstatement Works of the damaged existing paved roads if any	No Additional Cost Required. Its cost is separately included in Cost Estimate.
III.	Operation Phase	
i.	Occupational Health & Safety Hazards	
	Installation of clear, visible signage	No additional cost required, It will be managed by WUSC itself
	Setting up of mechanism for quick response to spills of chemical and hazardous substances.	No additional cost required, It will be managed by WUSC itself
ii.	Delivery of Unsafe Water	No additional cost required, It will be managed by WUSC itself
iii.	Impact on Consumer's Health	No additional cost required, It will be managed by WUSC itself
iv.	Non-sustainability of Services or Completed works	
	Yield Monitoring	No additional cost required, It will be managed by WUSC itself
	Engineering Investigations after every seismic event if any	No additional cost required, It will be managed by WUSC itself
	Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs	No additional cost required, It will be managed by WUSC itself
	Carrying out regular O & M with effectiveness through proper management of WUSC.	No additional cost required, It will be managed by WUSC itself
Total Cost of Local Level Monitoring & Mitigation Measures		**1,500,000.00**

Source: IEE Study 2018/019

Note: The breakdown cost is based on similar project experience however independent cost may later without altering the total cost.
Similarly, there is no requirement of additional cost for the proposed augmentation measures as this will be managed by either Contractor or WUSC or DSMC itself.

345. The above given table shows that the total indicative cost for EMP implementation in NRs. 1,500,000.00. This has been included under provisional sum in BoQ and this total cost includes local level monitoring cost and mitigation costs that also includes necessary environmental mitigation measures for the anticipated impacts during the entire construction period.

346. The environmental management will be implemented during the detailed design phase that will continue through the procurement, construction, and operation phases. Table 45 & 46 presents the indicative timeframe of key EMP activities about project implementation schedule & the proposed topics for Capacity Building/Training respectively.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector
Project Management Directorate

Table 45: 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	- 8th day after effective month
		- Semi-Annual EMR during construction for submission to ADB	- 8th day after effective 6-mo. period
		- Annual EMR for submission to ADB	- 8th day after 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	5th day of the month following the effective month
		- Quarterly, by Contractor or by Licensed Laboratory	3rd day of the month following the effective quarter
	Operation Period (potentially could start even before DLP is over)		
	1.	Implementation of mitigation measures & monitoring activities as specified in the EMP	Starting anytime between Q3 Y3 & Q1 Y4
	2.	Submission of EMR	anytime between Q3 Y3 & Q1 Y4
		- Monthly, by Operator	5thday of the month following the effective month
		- Quarterly, by Operator or (if applicable) by Licensed Laboratory	3rd day of the month following the effective quarter

Source: IEE Study 2018/019

Engineer

Table 46: 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	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	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
		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)	RMSO, DSMC(30)	CapacityDevt. 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		

Source: IEE Study 2018/019

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

12. MONITORING AND REPORTING

347. RPMO is the main monitoring agency of the proposed project that will monitor and measure the progress of EMP implementation with assistance from DMSC. The monitoring activities will correspond with the project's risks and impacts, and will be identified in the IEEs for the subprojects. In addition to recording information on the work and deviation of work components from original scope, PMO, RPMOs & DSMC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. Along with this, Ministry of Water Supply (MoWS) as well as Ministry of Forests & Environment (MoFS) under Government of Nepal will also undertake monitoring process through random field visits to review the project performance.

348. 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 Environmnetal Site Inspection Report given in **Annex 2G**. The subproject budgets will reflect the costs of monitoring and reporting requirements.

349. 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.

350. 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

351. 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 Bhojpur town area regarding the reliable & continous 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 Bhojpur Bazaar Area for ages.
- 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

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

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 as per GoN. 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 Bhojpur Water Supply & Sanitation Project.
- According to the detailed engineering design report,the overall exercise for financial and economic returns for the sub-project indicates that the FIRR is positive and the EIRR is higher than EOCC. It also shows that the cumulative cash flow is positive after repaying the debt. The tariff rate per month of the household is within the affordability limit of the household income under different strata, which is less than 5 percent of the household income of low and middle-income groups.
- The project is considered as risk free in response to sensitivity analysis as the results of FIRR are positive in all the cases. This indicates the viability in terms of financial and economical aspects and it is worthy of investment by the concerned agencies.
- The IEE study shows that project benefits outweigh the risks and these potential risks can be overcome through proper planning and management.

352. Based on the above findings, the classification of the Bhojpur Water Supply and Sanitation Project as "Category B" is confirmed, no further special study or detailed EIA needs to be undertaken and people of Bhojpur municipality will get rid of the hardship of safe, reliable & potable water they have been experiencing for decades. The proposed project is technically, environmentally and financially feasible.

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer

14. LITERATURE REVIEWED

ADB, 2003. Environmental Assessment Guidelines.

Aquatic Animal Protection Act,1961 with amendments. www.lawcommission.gov.np

Constitution of Nepal (2015). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu

Diesel Power Genration (2014).Inventories and Black Carbon Emissions in Kathmandu Valley, Nepal, The World Bank

District Development profile of Nepal 2010/11 with VDC Profile. A Socio-Economic Development

District Health Profile, Bhojpur 2074/75

Environmental, Health and Safety (EHS) Guidelines (2007). International Finance Corporation, World Bank Group

Environment Protection Act, (1997). Ministry of Science, Technology and Environment Kathmandu

Environment Protection Rules, (1997), Ministry of Science, Technology, and Environment, Kathmandu and Latest Amendments

Environmental Standards and Collection of Concerned Informations, (2018). Ministry of Forests & Environment, Governement of Nepal,Singhadurbar, Kathmandu

Environment Statistics of Nepal, CBS, 2011

Environmental Impact Assessment Guidelines, (1993). National Conservation Strategy Implementation Project, National Planning Commission, His Majesty's Government, Nepal

Final Feasibility Study of Bhojpur Water Supply and Sanitation Project, 2016

Detailed Engineering Design Report of Bhojpur Water Supply & Sanitation Project (Updated),Volume I ,2018

Detailed Engineering Design Report of Bhojpur Water Supply & Sanitation Project (Updated),Volume II ,2018

Due Diligence Report of Bhojpur Water Supply & Sanitation Project, 2017

Environmental Assessment and Review Framework, (2017).Regional Urban Development Project (RUDP),Ministry of Urban Development(MoUD), Government of Nepal for ADB

Environmental Assessment and Review Framework, (2018).Urban Water Supply & Sanitation (Sector) Project,Ministry of Water Supply, Government of Nepal for ADB

Final Socio-Economic Profile of Bhojpur Water Supply & Sanitation Project, 2016

Labor Act (1991), Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu

Land Acquisition Act, 1977 and latest amendments. www.lawcommission.gov.np

Local Government Operation Act, (2017). www.lawcommission.gov.np

National Drinking Water Quality Standards and Implementation Directives for National Drinking Water Quality Standards (2005), Ministry of Physical Planning and Works,Government of Nepal

Municipality profile and baseline information of Bhojpur Municipality, and National Population and Housing 2011, CBS, 2012

National Drinking Water Quality Standards and Implementation Directives for National Drinking Water Quality Standards (2005), Ministry of Physical Planning and Works,Government of Nepal

National Transport Policy, (2001). Ministry of Physical Infrastructure and Transport, Government of Nepal, Nepal

National Urban Policy (2007). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu

National Water Supply & Sanitation Policy (Draft) (2014). Ministry of Urban Development, Government of Nepal, Kathmandu

Nepal Disaster Management Reference Handbook (2017).Center for Excellence in Disaster Management and Humanitarian Assistance,http://www.cfe-dmha.org

Proximity Report Generated by the Integrated Biodiversity Assessment Tool (Bhojpur Town), (2018), ADB

Rural Water Supply and Sanitation National Policy,(2005) and Rural Water Supply and Sanitation National Strategy,(2005.Ministry of Physical Planning and Works, His Majesty's Government, Singhadurbar, Kathmandu, Nepal

Shrestha K 1998. Dictionary of Nepalese Plant names. Mandala Book Point, Kathmandu, Nepal.

Solid Waste Management Act (2011). Ministry of Science and Technology and Environment, Kathmandu

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

Town Development Act (1998),www.lawcommission.gov.np

Uprety, B.K (2003). Safeguard the Resources Environmental Impact Assessment Process and Practice Kathmandu

Urban Water Supply & Sanitation Policy (2009)

Water Resource Act (1992). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu

https://cites.org/eng/disc/what.php

https://www.cbd.int/

www.mofald.gov.np

Engineer

ANNEXES

ANNEX 1
APPROVED TERMS OF REFERENCE (ToR)

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

TERMS OF REFERENCE (ToR)

for

INITIAL ENVIRONMENTAL EXAMINATION

of

BHOJPUR BAZAAR TOWN WATER SUPPLY AND SANITATION PROJECT

BHOJPUR, BHOJPUR DISTRICT

Submitted by:	Submitted to:
TAEC CONSULT P. Ltd. JOINT VENTURE WITH INTEGRATED CONSULTANTS NEPAL (P) LTD	Government of Nepal Ministry of Water Supply and Sanitation Department of Water Supply and Sewerage Third Small Town Water Supply and Sanitation Sector Project PROJECT MANAGEMENT OFFICE Panipokhari, Kathmandu

NOVEMBER, 2016

Phone/ Fax: 025-588306
Email: erdsmc3@gmail.com

TAEC Consult P. Ltd.
Joint Venture with
Integrated Consultants Nepal Pvt. Ltd.
Eastern Region Design, Supervision and Management Consultant
Third Small Towns Water Supply & Sanitation Sector Project
Itahari, Sunsari

Ref.: WS-72-315/ KO - 214 *Date:* November 23, 2016

To,

The Regional Project Manager,
Eastern Regional Project Management Office
Itahari, Sunsari

Ref : ERDSMC
Contract No. TSTWSSSP/CS-02/070-71

Sub : **Submission of ToR for IEE of Bhojpur STWSSP**

582
2063/7/18

Dear Sir,

We are pleased to submit one copy of the ToR for Initial Environment Examination (IEE) as part of the Feasibility Study Report of Bhojpur STWSSP for your review and comments as per the work program proposed in consultant's Technical Proposal to meet requirement of Terms of Reference (ToR).

Thank you and regards

Yours faithfully,

Anand Mohan Lal Das
Team Leader

Cc:
1. Project Director, PMO, Maharajgunj, Kathmandu: One copy is attached herewith.
2. TAEC & ICON Consultants Pvt. (Ltd) J/V, Sankhamul, Kathmandu
3. WUSC, Bhojpur

To, Er. Laxmi Pauta
I have gone through the report & recommend to send ToR to Ministry for approval.
28 Nov. 2016
Coordinator, DPTAC

Kathmandu Office:
PO Box: 2519, Shankhamul, Kathmandu
Phone: 01-4781446 / 4782340; Fax: 01-4781447
Email: taec@mos.com.np

Government of Nepal
Ministry of Water Supply and Sanitation
Department of Water Supply and Sewerage
Second/ Third Small Town Water Supply and Sanitation Project
PROJECT MANAGEMENT OFFICE

Ref: 672 to 673 of 073

Date: March 10, 2017

Mr. Anand Mohanlal Das
Team Leader
TEC-ICON JV
Kathmandu, Nepal

Sub: Approval of TOR of Kothariya (Rautahat) & Bhojpur (Bhojpur) Water supply and Sanitation Project

The TOR of IEE is approved by Ministry of Water Supply and Sanitation on 2073.11.23. Now we request you to prepare IEE reports, as per the approved TOR of Kathariya (Rautahat) & Bhojpur (Bhojpur) Water supply and Sanitation Project. The copy of approved Tor is attached herewith.

Thank You.

Divakar Prasad Dhakal
(Deputy Project Director)

Phone No.: 977-1-4223648, 4412384, Fax No.: 977-1-4413280, Email: info@sswsp.gov.np

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

TERMS OF REFERENCE (ToR)

for

INITIAL ENVIRONMENTAL EXAMINATION

of

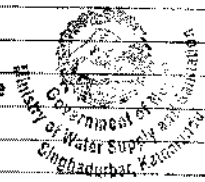
BHOJPUR BAZAAR TOWN WATER SUPPLY AND SANITATION PROJECT

BHOJPUR, BHOJPUR DISTRICT

Submitted by:	Submitted to:
TAEC CONSULT P. Ltd. JOINT VENTURE WITH INTEGRATED CONSULTANTS NEPAL (P) LTD	Government of Nepal Ministry of Water Supply and Sanitation Department of Water Supply and Sewerage Third Small Town Water Supply and Sanitation Sector Project PROJECT MANAGEMENT OFFICE Panipokhari, Kathmandu

NOVEMBER, 2016

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



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

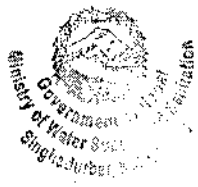
Table of Contents

List of Tables

List of Figures

List of Annexes

Annex I: Project Location Map
Annex II: Schematic & Layout Plan for the Proposed Project
Annex III: ADB's REA Checklist, Environmental Checklists & Socioeconomic Questionnaires for IEE Study



Chapter 1

1. NAME AND ADDRESS OF THE PROPONENT

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

Name of Proponent:

Project Management Office

Third Small Towns' Water Supply and Sanitation Sector Project

Department of Water Supply and Sewerage

Ministry of Water Supply and Sanitation

Government of Nepal

Address of the Proponent:

Panipokhari, Kathmandu

Tel: 977 1 442388, 977 1 4412348

Fax: 977 1 4413280

E-mail: info@stwsssp.gov.np

Website: www.sstwsssp.gov.np

Government of Nepal
Ministry of Water Supply and Sanitation
Singhadurbar, Kathmandu

Chapter 2

2. BACKGROUND AND DESCRIPTION OF THE PROJECT

2.1 Project Background

In January 2000 the government endorsed the 15-year Development Plan for Small Towns' Water Supply and Sanitation in order 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 executive agency.

The first phase of the Project, whose duration was 2001-2008, has already been completed and the people of 29 small towns have been benefitted by the Project. Upon the completion of the first phase and after finding positive impacts of the Project, the Government of Nepal decided to implement the second phase, with the name, Second Small Town's Water Supply and Sanitation Sector Project. Simultaneously after the successful completion of the second phase DWSS has brought some changes on this project and named as Third Small Town 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), Design and Supervision and Management Consultant (DSMC) 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 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 to:

- Identify the major issues that may arise as a result of proposed works on bio-physical, socioeconomic 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 Bhojpur Bazaar Town area as baseline data. Make sure that IEE is sufficient for the proposed water supply project.

2.3 Description of the Project

2.3.1 Location and Accessibility of the Project Area

The Project is located in Bhojpur Municipality, which is situated in Bhojpur district in Koshi Zone of the Eastern Development Region of Nepal. The Municipality lies between 27° 07' 58" N to 27° 16' 42" N latitude to 87° 02' 40" E to 87° 04' 56" E longitude. The Municipality is in hilly region with an altitude ranging between 560 m (Pikhuwa Khola) to 2560 m (Suntale Danda) above mean sea level with an average altitude of 1630 meters.

The North-South Koshi Highway joins project area to Dhankuta, Dharan and Itahari. The distance from Bhojpur bazaar to Hile, Dhankuta and Dharan is approximately 92 km, 118 km and 167 km respectively. The nearest airstrip, Taksar connects project area to Biratnagar and Kathmandu with regular flight.

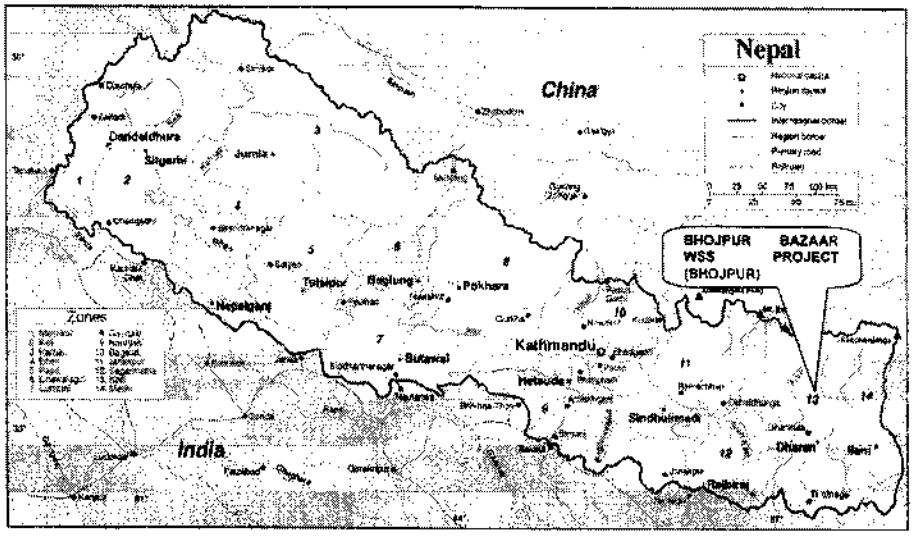


Figure 2-1: Project Location

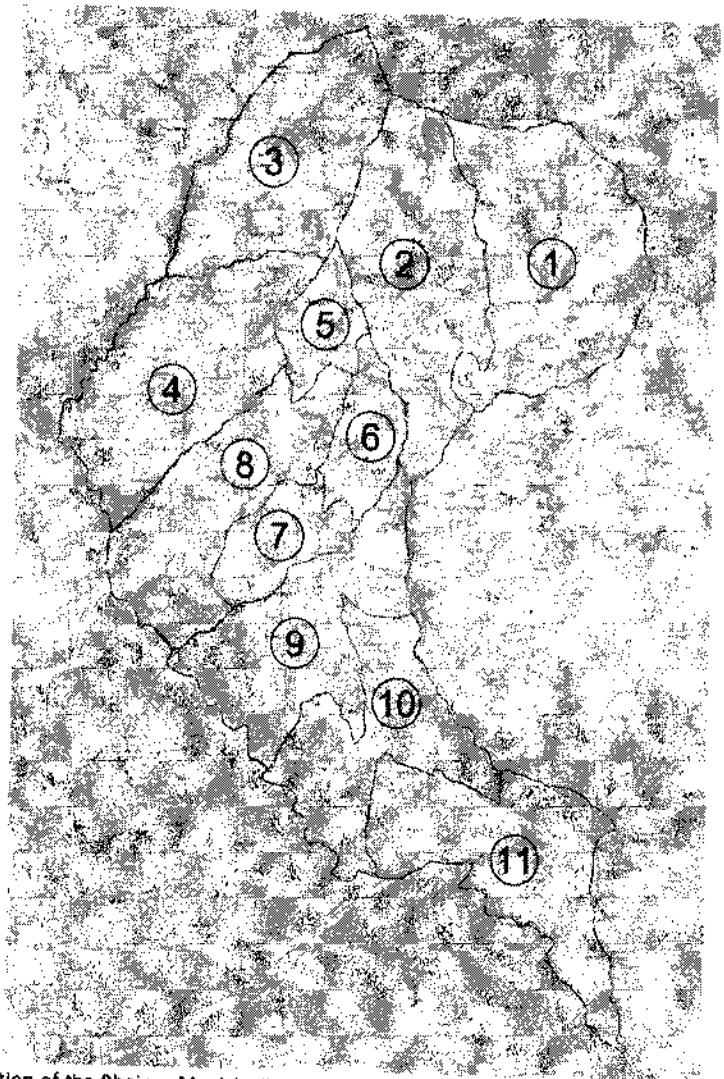
The project area is in hilly region .The Municipality has subtropical to temperate climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of about 1700 mm.

2.3.2 Proposed service area

The proposed service area includes complete area of ward no. 6 to 8 & partial area of ward no. 3, 4, 5, 9, 10 & 11.

Figure 2-2: Proposed service area

2.3.3 Population and Demographic Characteristics



The total population of the Bhojpur Municipality as per 2011 census was about 16,102 in 4093 households. The average HHs size of the area has decreased from 4.62 in 2001 to 3.94 in 2011. The ward-wise population of the project area of the town according to census, 2001 and 2011 has been presented below:

Table 2-1: Population of the Concerned Ward of Project Town

Ward	W. Area (Ha)	Census 2001			Census 2011			Growth Rate
		HHs	Pop	P. Densities (PPHA)	HHs	Pop	P. Densities (PPHA)	
1	981.55	275	1,415	1.4	257	1,123	1.1	-2.28
2	842.64	299	1,604	1.9	278	1,301	1.5	-2.07
3	252.56	345	1,688	6.7	350	1,534	6.1	-0.95
4	843.70	308	1,459	1.7	314	1,348	1.6	-0.79
5	189.25	362	1,527	8.1	489	1,771	9.4	1.49
6	221.29	217	1,002	4.5	311	1,160	5.2	1.47
7	244.57	506	1,859	7.6	862	2,805	11.5	4.2
8	686.17	343	1,493	2.2	408	1,710	2.5	1.37
9	693.01	302	1,442	2.1	271	1,112	1.6	-2.57
10	612.66	299	1,419	2.3	291	1,182	1.9	-1.81
11	761.55	279	1,403	1.8	262	1,056	1.4	-2.8
Total	3,110	3,535	16,311	5.3	4,093	16,102	5.2	-0.13

Source: CBS 2001 and 2011

The above Table 2-1 shows that the average HHs size of the area has decreased from 4.62 in 2001 to 3.94 in 2011. Ward no. 5, 6, 7 and 8 of Municipality, area of former Bhojpur VDC are only comparatively densely populated area.

The consultants conducted a socio economic survey in 2016 of the proposed service area. It shows that the total population of the service area is 12,323. The following Table 2-2 shows the coverage of population including beneficiaries' households in the project area.

Table 2-2: Beneficiaries households

Ward	HHS	Population
3	29	148
4	142	698
5	284	1,458
6	232	1,515
7	456	3,239
8	332	1,864
9	260	1,300
10	248	1,091
11	207	1,010
Total	2,190	12,323

Source: Socio-economic survey 2016

2.3.4 Existing Water Supply Situation

Existing Water Supply

Sillichung Water Supply system in Bhojpur Bazaar is the only existing pipe water system in the project area. The system served partly areas of ward no. 7, 8, 9 and 10 of the Municipality .

Source description and Intake

There are [redacted] sources supplying existing Sillichung water supply system. All these sources are registered in District Water resources committee. There is no dispute in water sources, two sources Bhulke and Jor-sangu are in public land and other sources Daduwa and Tindhare are in private land which are owned by Sillichung WUSC.

The sources were well protected by stone Masonry wall and barbed wire fencing and covered with vegetated forest.

The source Daduwa, Jor-sanghu and Tindhare are clustered in east side of the Municipality in Khurila area. The source Bhulke is located in western area of the Municipality . The details of existing sources are illustrated in the table below.

Table 2-3: Existing Source Details

Name of the Source	Bhulke	Daduwa	Jor-sanghu	Tindhare
WN of the Municipality	WN 4 of BM	WN 1 of BM	WN 1 of BM	WN 1 BN, Khurila
Type (Spring/Stream)	Spring	Spring	Stream	Spring
Measured flow (lps)	6 lps	1 lps	4 lps	3 lps

Transmission Line, Distribution lines and Storage Capacity

The cumulative length of transmission line is about 32 Km. Entire length of transmission line comprises of HDPE pipe. There is less chances of landslide in transmission pipeline route unless other development activities like road and other construction works are commenced. Similarly, the distribution pipe line of about 45 Km comprises of HDPE pipe networks are serving water to town. The pipe was not properly laid and distribution system was not properly maintained.

The cumulative storage capacity of the existing system is 555 cum. The storage capacity is very high as Compared to drawing discharge. The storage capacity is more than 50% of the daily supply.

Table 2-4: Existing Storage Reservoir Details

Ward No.	Location	Capacity (CUM)	Condition
WN 5	Hattigaunda	40	Good
WN 5	Hattigaunda	10	
WN 5	Hattigaunda	10	
WN 5	School Danda	10	
WN 5	Kafle	60	Good
WN 5	Welfare	75	Good
WN 5	Panitanki	200	Good
WN 5	Panitanki	150	Very Good
	Total	555	

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

There are several piped water supply system within the project area. There are about 17 major system operated by 17 different WUSC. The detail of each system with regard of name of source, number of taps and storage tanks is shown in Table 2-5.

Table 2-5 : Name list of WUSC and Details

SN	Name of WUSC	Source	No. of Taps	No. x Cum of RVT
1	Bhojpur Bazaar WUSC BNP	Dund Khola, Gairi Khola, Arupate in WN 13, Odare 1 , 2 , 3 WN 9, Jhule Khola WN 10 and Suspa WN 6 all are in BNP	707	1-200, 2-95, 3-130, 1-100
2	Chothang WUSC BNP -10	Jhule Khola	60-65	1
3	Maidane WUSC BNP-10	Beesauna	40-50	NA
4	Khole WUSC BNP-12	Local spring	20	
5	Teknagi WUSC BNP-10	Tagnagi	60	No
6	Ramkot WUSC BNP-10	Ramkot spring	75	No
7	Gauri Swora Thapa Group BNP-10	Mulkharka	95	3x10
8	Purano Bazar WUSC BNP-1	Darfe ko Jungle Tundikhel	125	1x100
9	Bhojpur WUSC BNP 2 & 3	Gautam Tole,	500	1x20, 2x50, & 1x90
10	Hatti Chara Charighang Manedanda BNP	Hattichara,		18
11	Jilu Bhatmase BNP 7	Jhulekhola	80	1x200
12	Upper Marti WUSC BNP 8	Thulo Dharo, Sano& Thulo Pokhari	125	3x10
13	Middle Marti WUSC BNP 8	Banpale and Tnshul Munan	200	1x10, 3x20 & 1-25
14	Junge Chanse WUSC BNP6	Chanse Muhan	200	
15	Jilu WUSC BNP 5&7		200	
16	Khanepani WUSC(Bhojpur)	Darfe Jungle	155 PVT. +35 P	2x20, 1x50 & 1x90
17	Bhojpur WUSC	Teekhatal & Chaktnati	110 PVT & 3 P	1x20 & 1x40

Source: Feasibility Report of Bhojpur Bazaar Water Supply and Sanitation Project, 2016

2.3.4.1 Coverage

Existing system has been serving about 1329 household with approximate population of more than 10,000 in Bhojpur Bazaar town area. More than 750 household have already applied for tap connection but due to insufficient discharges available for tapping in the available local sources, the tapped discharge are not sufficient to meet the water demand of the Bhojpur Bazaar area.

2.3.4.2 Service Level and Consumption

The existing system has very good operating system. Supply hours for general public is about 4 hours and for district administrative office, district development committee, district hospital, district police office, district jail, army barracks, armed police force barracks supply is 24 hours.

2.3.4.3 Water Quality

The consumer or users are to get water virtually without any treatment in many system. The socio economic survey 2015 shows that the perception of water users about water quality is divided into good (4%), moderate (96 %) respectively.

Some of the major system carries out occasional disinfection (use of 3-5 kg bleaching powder once in a month during rainy season). Water Samples collected from different sources were tested for various physical, chemical and bacteriological parameters. The results of the test is shown in Table 2-6.

Table 2-6: Result of water quality tests

S. N.	Parameters	Unit	Observed Value of Sample			NDWQS, Nepal
			Bhulke	Jor-Sanghu, Tindhare & Daduwa	Tin Bhangale	
1	pH at 260C	-	6.6	6.5	6.3	6.5-8.5
2	Electrical Conductivity	µmhos/cm	58	48	52	1500
3	Turbidity	NTU	1.4	1.2	1.2	5(10)
4	Taste and Odor		N.O.	N.O	N.O.	N.O.
5	Color	TCU	0.14	0.27	0.21	500
6	Total hardness as CacO3	mg/l	32	32	34	5(15)
7	Total Dissolved Solid	mg/l	38	29	33	1000
8	Total Residual Chlorine	mg/l	<0.10	<0.10	<0.10	0.1-0.2
9	Chloride	mg/l	0.99	<0.50	0.99	250
10	Ammonia	mg/l	0.42	0.46	0.23	1.5
11	Nitrate	mg/l	0.40	0.44	0.58	50
12	Aluminum	mg/l	0.03	0.03	<0.02	0.2
13	Fluoride	mg/l	0.46	0.20	0.13	0.5-1.5
14	Sulfate	mg/l	6.4	2.4	2.1	250
15	Mercury	mg/l	<0.001	<0.001	<0.001	0.001
16	Calcium	mg/l	3.2	3.2	4.8	200
17	Iron	mg/l	<0.05	<0.05	0.12	0.30(3)
18	Manganese	mg/l	<0.05	<0.05	<0.05	0.2
19	Lead	mg/l	<0.01	<0.01	<0.01	0.01
20	Cadmium	mg/l	<0.003	<0.003	<0.003	0.003
21	Chromium	mg/l	<0.05	<0.05	<0.05	0.05
22	Copper	mg/l	<0.05	<0.05	<0.05	1
23	Zinc	mg/l	<0.02	<0.02	<0.02	3
24	Arsenic	mg/l	<0.01	<0.01	<0.01	0.05

Source: Feasibility Report of Bhojpur Bazaar Water Supply and Sanitation Project, 2016

All parameters of water quality of sampled well are within the permitted value by NDWQS. It is recommended taking few samples from the source before or during construction phase also to ensure about the water quality so as to make adequate provision for water treatment, if required.

2.3.4.4 Operation costs and current Tariff

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

2.3.4.5 Problems of Existing System

The problems of existing water supply systems and service in Bhojpur Municipality are as follows:

- The water source is not sufficient to meet 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 water demand of the population;
- The WUSC is not able to meet demand for private connections from the consumers in the service area;
- The existing system supplied water as without treatment therefore the existing system has not been able to deliver water quality conforming to NDWQS standards;
- The WUSC has not been able to extend distribution system to new areas where the demand of water exist and most of existing systems need improvements in terms of its design and construction.

2.3.5 Ethnicity and caste

The survey revealed that Janajatis/ethnics (Newar, Rai, Magar & Tamang etc.) are the major caste group of the project area comprising about 63.7% of the total households. Similarly, Brahmins/Chhetris, Dalits and other caste (Madeshis , Musalmans etc.) are comprising 26.5 %, 8.4 % and 1.4 % of the total households respectively.

2.3.6 Settlement pattern

The town is located in hilly area with heterogeneous ethnic composition. Most of the government and non-governmental offices are located in ward no 7 which has most dense population of the service area. However, the settlement pattern of the other wards is scattered.

2.3.7 Education and Health

Education

The institutional data shows that eighteen educational institutions including campus for higher education, higher secondary schools , secondary schools as well as primary schools was recorded in the service area with 7588 people including students, staffs and teachers.

The socio-economic survey of 2016 AD shows that the overall literacy rate is 80 %.

Health

Medical facilities for diagnosis and treatments are available in the service area. There are 15 medical institutions including 12 hospitals, 2 health posts and polyclinics with 67 beds .

2.3.8 Water- borne and Communicable Diseases

Cases of water-borne diseases such as diarrhea, dysentery, stomach ache and skin disease etc. are found very few in numbers. Similarly, cases of mortality due to water related diseases are nil. The information related to water borne and communicable disease was crossed checked by visiting hospitals and health posts within the service area. According to the survey, about 4.27% (526) suffered diseases from diarrhea where as 3.17% (391) suffered from dysentery. Similarly, about 2.73% (337) were suffered from other water- borne diseases (such as skin, stomach pain, fever) etc. (Table 2-7.)

Table 2-7: Reported Water Borne and Communicable Diseases during last year

Diseases	Children (<5 Yrs.)	Female	Male	Total	%
Diarrhea	244	156	126	526	4.27
Dysentery	185	111	95	391	3.17
Other	111	101	125	337	2.73
Total	540	368	346	1254	10.18

Source: Socio-economic Survey 2016 and Data from Hospitals and Health Posts

2.3.9 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 course of the household surveys of project area, detailed information has been collected on the major occupation and economic activities of all household heads. As a result of the survey shows about 46% are engaged in agriculture, about 23% depend on business, 10.8 % are service holders about 9.4 % are engaged in foreign employment, 4.6 % are labor.

There are more than 42 hotels/lodges with 524 beds and are managed by 109 staff in the project area. At the moment, there are 4 industries and businesses in Bhojpur. The type of industries operating in the Municipality are rice mills, cotton, grill and carpet etc.

There are eight public and private banks proving banking services to the people of the Municipality . Similarly some cooperatives are also in operation in the service area.

There are 14 educational institutions and 73 government/NGO offices. The major government offices are district based offices and the Municipality office.

2.3.10 Poverty Conditions

The survey revealed that the main sources of household income of the service area are agriculture, service, remittance and wage labour, respectively. Among the total households 14.7% have monthly income of less than Rs. 7500 which is considered as a poor household. About 15.2% of the households have monthly income ranging from Rs. 7501 to Rs. 10875. Similarly, 54.1% of the households have income ranging from Rs. 10,876 to Rs. 20,000, 13.3% of households have income ranging from Rs. 20001 to Rs. 35,000, 1.9% of the households have income ranging from 35001 to 50000 and about 0.9 % of the households have income of above Rs. 50,000 a month. Similarly, the survey shows that about 14.7 % of the total populations live below the poverty level (Table 2-8).

Table 2-8: Distribution of mean monthly household income

Income Range	Ward									Total	%
	3	4	5	6	7	8	9	10	11		
<7500	4	25	52	19	15	66	7	61	72	321	14.7
7501-10875	8	30	40	40	43	74	28	41	28	332	15.2
10876-20000	8	74	146	124	310	162	172	133	55	1184	54.1
20001-35000	6	7	40	36	77	23	49	11	42	291	13.3
35001-50000	3	5	3	8	7	4	2	2	8	42	1.9
> 50001	0	1	3	5	4	3	2	0	2	20	0.9
Grand Total	29	142	284	232	456	332	260	248	207	2190	100.0

Source: Socio-economic survey 2016

2.3.11 Existing Sanitation Facilities

Sanitary Facilities

The overall sanitary condition of the Municipality is found to be reasonably satisfactory. In the core area, almost all HHs have private toilets whereas in isolated/semi-urban areas some people still practice open defecation. The socio-economic survey (2016) reported that 2.9% HHs still practice open defecation in the project area and the majority of HHs i.e. 93.7 % have either pit latrines or ventilated pit latrines. Only 3.3 % are using cistern flush type of pit latrine. (Table 2-9).

Table 2-9: Toilet coverage (HHs)

Type of Toilet	Ward									Total	%
	3	4	5	6	7	8	9	10	11		
No Toilet	0	2	17	3	6	13		11	11	63	2.9
Pit Latrine	0	8	20	78	154	75	20	78	113	546	24.9
Ventilated Pit Latrine	26	132	247	140	254	232	237	159	80	1507	68.8
Cistern Flush	3	0	0	10	42	12	3	0	3	73	3.3
Grand Total	29	142	284	232	456	332	260	248	207	2190	100

Source: Socio-economic survey, 2016

The existing latrines in the houses as well as in 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.

Drainage Facilities

There is no proper drainage system for storm water as well as for the domestic sewage in Bhojpur Municipality . The core area of the city along the highway has about 1 km of open surface drains on each side in ward 1 and other few stretches of surface drains to avoid local pondage. As the terrain is mostly steep, people are less concerned about storm water drainage.

Wastewater Management Practices

There is no sewerage system in the project area. Wastewater from individuals is managed inside the house. The socio-economic survey conducted in 2016 shows that 97.1% HHs have their own toilets. Some of them have constructed septic tanks and some have direct connections with surface drains. There is no wastewater treatment plant in the Municipality to treat domestic sewage/septage. The Municipality is planning to organize separate units for septage and solid waste management. 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.

Solid Waste

The major sources of waste generation in Bhojpur Municipality are households, hotels, hospitals, vegetable and fruits market, meat stores, groceries, clothing store/ fancy stores/tailoring shops etc. There has been no study on types and volume of solid wastes.

Existing Institutions involved in Water Supply and Sanitation

The main institutions involved in water supply and sanitation in the project area are Bhojpur Municipality , Water Supply and Sanitation Division Office (WSSDO), Bhojpur Water Users and Sanitation Committee, other WUSC Committees and some NGOs. WSSDO, Bhojpur has been actively supporting most of the WUSCs to operate the existing water supply system and carry out different WASH activities in the project area. They have been providing both financial and technical support for large scale maintenance and

providing pipes, bleaching powder and human resources as and when needed. DWSS through WSSDO, Bhojpur constructed and then rehabilitated the water supply systems. The WUSCs have been managing the existing systems

2.3.12 Project Rationale

Demand for the Project

The Municipality is an attraction for internal migration from the hill regions and hence the population growth is comparatively high. Because of its strategic location, the city will tend to grow in the future. However the existing water supply system has not been able to meet the growing demand.

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 service area population. There is a demand from other parts of the Municipality for 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.

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 the service area throughout the year.

Willingness and Affordability to Pay

According to the concept of Third Small Town Water Supply and Sanitation Sector Project, the local community has to contribute 5% of total cost as up-front contribution (Waived off for earth quake victims of Bhojpur) and has to take 25% as a loan from the TDF. It is also required to pay monthly water bills to the system operator. The local people are familiar with this modality from the experience of other nearby small town projects already implemented. The socio-economic survey, 2016 shows that people are willing to contribute cash as up front collection.

Connection charge

The sample survey shows that most people in the project area (56.1%) are willing to pay up to NPR 6001 to 9000 for a water supply connection. About 17.1% of the households in the project area are willing to pay more than NPR 1,500 and up to NPR 3,000 for a new connection. (Table 2-10).

Table 2-10: Willingness to pay connection charge (in NPR)

Willingness for Cash Contribution	Service Area									Grand Total	%
	3	4	5	6	7	8	9	10	11		
Rs.>15000	0	2	0	2	0	0	3	0	2	9	7.3
Rs. 9001-15000	0	2	0	0	0	0	0	0	1	3	2.4
Rs. 6001-9000	2	2	6	4	12	4	25	5	9	69	56.1
Rs. 3001-6000	2	0	0	2	0	0	0	1	1	6	4.9
Rs. 1501-3000	0	0	10	0	0	0	0	1	1	12	9.8
Rs.< 1500	0	0	12	4	0	0	3	1	1	21	17.1
Not Responding	0	0	3	0	0	0	0	0	0	3	2.4
Grand Total	4	6	31	12	12	4	31	8	15	123	100.0

Source: Socio-economic survey 2016

Monthly Tariff

The survey revealed that the community has shown a positive response towards willingness to pay monthly water tariffs. As per the findings, more than 17.1% households prefer to pay monthly water tariff ranging from Rs. 251 to 300 whereas about 56.1% of households prefer to pay tariff ranging from Rs. 401-450. Similarly, 2.4% of households are willing to pay Rs. 451-500 per month. Likewise, about 7.3% of household are willing to pay more than Rs 501 (Table 2-11).

Table 2-11: Willingness to pay monthly water Charges (NPR)

Willing Range NRs	Service Area									Grand Total	%
	3	4	5	6	7	8	9	10	11		
Not Interested			3							3	2.4
>500		2		2			3		2	9	7.3
451-500		2							1	3	2.4
401-450	2	2	6	4	12	4	25	5	9	69	56.1
351-400	2			2				1	1	6	4.9
301-350			10					1	1	12	9.8
251-300			12	4			3	1	1	21	17.1
201-250											0.0
151-200											0.0
Total	4	6	31	12	12	4	31	8	15	123	100.0

Source: Socio-economic survey, 2015

Poverty Alleviation Aspects

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

2.3.13 Need of the Sanitation Component

Bhojpur Bazaar Municipality was not declared as Open Defecation Free (ODF) area. About 3% of the HHs does not have toilets and percentage of pit latrine is 24.9 which demand up gradation or renovation. Institutional toilets & public toilets will be dealt in totality of sanitation components. These sub-components of sanitation help for betterment of sanitation facilities in this area. These facilities also inculcate behavior of toilet use among students and general public.

Proper and effective management of storm water drainage has become the most important problem of the Bhojpur Bazaar Town. As the urbanization increases, frequency of localize poundage during the monsoon in several areas of the town increases. These problems need to be addressed in a holistic manner with correct remedial measures. It is envisaged to formulate and prepare Master Plan for the Municipality area in close consultation and collaboration of the newly formed Municipal Office.

Since significant work and procedure has been felt necessary in development of septage treatment concept, the septage bed would be dealt separately and additional separate contract package would be developed for implementation. It requires extensive work to manage septage collection, conveyance, treatment, and disposal. Hence, separate study could be conducted. Similarly, Solid waste management Master Plan will be prepared and submitted as waste management master plan in totality. All sanitation activities could be done in second phase only.

2.3.14 Hydrology and Climate

The district has a subtropical to temperate climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of 1700 mm. The average maximum & minimum temperature of the district is 19° and 8° Celsius respectively.

2.3.15 Flora and Fauna

The common species of plants within and around the proposed project area are shown in Table 2-12.

Table 2-12: List of Plants in the Project Area

S.No.	Scientific Name	Local Name	Family
1	*Vepris bilocularis*	Ainselu	Rosaceae
2	*Emblica offficinalis*	Amala	Euphorbiaceae
3	*Pieris ovalifolia*	Angeri	Ericaceae
4	*Cedreallo toona*	Tuni	Meliaceae
5	*Lagerstroemia indica*	Ashare phul	Lythraceae
6	*Adhatoda vasica*	Asuro	Acanthaceae
7	*Melia azedarach*	Bakaino	Meliaceae
8	*Ficus bengulensis*	Bar	Moraceae
9	*Terminalia bellirica*	Barro	Combretaceae
10	*Aegle marmelos*	Bel	Rutaceae
11	*Rhus wallichii*	Bhalayo	Anacardiaceae
12	*Populus ciliate*	Bhote Pipal	Salicaceae
13	*Lagerstroemia Parviflora*	Bot Dhayaro	Lythraceae
14	*Schima wallichii*	Chilaune	Theaceae
15	*Bassia butyracea*	Chyuri	Sapotaceae
16	Berberis aristata	Chutro	Berberidaceae
17	*Debregeasia salicifolia*	Daar	Urticaceae
18	*Garuga pinnata*	Dabdabe	Burseraceae
19	*Mussaenda macrophylla*	Dhobeni	Rubiaceae
20	*Colebrookea oppositifolia*	Dhursul	Labiatae
21	*Dioscorea bulbifera* L.	Githa	Dioscoreaceae
22	*Callicarpa macrophylla*	Guyanlo	Verbenaceae
23	*Lannea coromandelica.*	Hallunde	Anarcardiaceae
24	*Terminalia chebula*	Harro	Combretaceae
25	*Syzygium cumini*	Jamun	Myrtaceae
26	*Phoebe lanceolata*	Jhankri syaula	Lauraceae
27	*Ficus lacor*	Kabro	Moraceae
28	*Anthocephalus chinensis*	Kadam	Rubiaceae
29	*Myrica esculenta*	Kafal	
30	*Adina cordifolia*	Karam	Rubiaceae
31	*Acacia catechu*	Khayar	
32	*Ficus semicordata*	Khanayo	Moraceae
33	*Sapium insigne*	Khirro	Euphorbiaceae
34	*Morus alba*	Kimbu	Moraceae
35	*Litsea monopelata*	Kutmiro	Lauraceae
36	*Duabanga grandiflora*	Lampate	Lythraceae
37	*Engelhardtia spicata*	Mauwa	Juglandaceae
38	*Erythrina stricta*	Phaledo	Leguminosae
39	*Ficus religiosa*	Pipal	Moraceae
40	*Pinus roxiburghii*	Sallo	Coniferae
41	*Terminalia tomentosa*	Saj	
42	Bombax ceiba	Simal	Bombacacea
43	*Vitex negundo*	Simali	Verbenaceae
44	*Mallotus philippensis*	Sindure	Euphorbiaceae
45	*Albizia chinensis*	Siris	Leguminosae

46	*Dalbergia sisoo*	Sisoo	
47	*Bauhinia vareigata*	Tanki	Leguminosae
48	*Alnus nepalensis*	Uttis	Betulaceae
49			

Source: IEE Field Visit SurSource: Field Survey, 2016

Non Timber Forest Products (NTFPs) are defined products derived from forest species other than timber and fuel wood. The main NTFP species found along the project area are: Amala (*Phyllanthus emblica*), Asura (*Justicia adhatoda*), Bilaune (*Maesa chisia*), Kurilo (*Asparagus officinalis*), Dhasingare (*Gaultheria fragrantissima*).

Some of the mammals reported to be present in the nearby forests are listed in Table 2-13.

Table 2-13: Mammals in the Project Area

S N	Common Names	Scientific Names
1	Buanso	*Canis lupus*
2	Common Leopard	*Panthera pardus*
3	Dumsi	*Histrix indica*
4	Fox	*Vulpes vulpes*
5	Golden Jackal	*Canis aureus*
6	Hill Mouse	*Mos hosmour*
7	Jungle Cat	*Felis Chaus*
8	Lokharke	*Funambulus sp.*
9	Long-winged Tomb Bat	*Taphozous longimanus*
10	Malsapro	*Martes flavigula*
11	Monkey	*Macaca mulatta*
12	Nepal Grey Langur	*Semnopithecus schistaceus*

Source: IEE Field Visit Survey, 2016

Some of the birds reported in the forest areas are listed in Table: 2-14.

Table 2-14: List of Birds in the Project Area

S.No.	Common Names	Scientific Names	Status of occurrence		
			Common	Sparse	Rare
1	Asain Koel	*Eudynamys scolopacea*		√	
2	Barn owl	*Tyto alba*		√	
3	Battai			√	
4	Bhangera	*Passer domesticus*	√		
5	Bhudi Phor	*Ciconia espiscopus*		√	
6	Bhyakur	*Pellorneum ruticepa*			
7	Blue-throated Barbet	*Megalaima australis*	√		
8	Chil	*Ictinaetus malayensis*		√	

S.No.	Common Names	Scientific Names	Status of occurrence		
			Common	Sparse	Rare
9	Chyakhura	*Arborophila torqueola*		√	
10	Common Myna	*Acridotheres tritis*	√		
11	Dangre		√		
12	Dhukur	*Streptofelia sp*	√		
13	Huchil	*Bubo bubo*		√	
14	Indian Cuckoo	*Cuculus micropterus*	√		
15	Jureli	*Pycnotus cafen*		√	
16	Kag	*Crovus macrorhynchos*	√		
17	Kalij	*Lophura leucomelano*	√		
18	Koili	*Cuculus micropterus*	√		
19	Lampuchure	*Caprimulgus macrurus*		√	
20	Lato Koshero	*Bubo nepalensis*			√
21	Nyauli	*Megalaima spexies*		√	
22	Suga	*Psittacula cyanocephala*	√		

Source: IEE Field Visit Survey, 2016

The commonly found reptiles and amphibians observed in the project area are presented in Table 2-15.

Table 2-15: List of Reptiles and Amphibians Found in the Project Area

Common Name	Scientific Name
Rat snake	*Ptyas mucosus*
Mountain pit viper	*Ovophis monticola*
Green Pit viper	*T. albolabris*
Garden lizard	*Calotes versicular*
Common lizard	*Hemidactylus brookii*
Common toad	*Bufo melanostictus*
Stream frog	*Rana cyanophylectis*

Source: IEE Field Visit Survey, 2016

Similarly, common fishes found in the project area are given in Table 2-16.

Table 2-16: List of Fishes Found in the Project Area

SN	Scientific Name	Local Name	Migratory species	Economic Importance
1	*Barilius Vagra*	Faketa	R	Food
2	*Garra* sp	Buduna	R	Food
3	*Glyptothorax* sp	Kabre	R	Food
4	*Heteropneustes fossilis*	Singhi	R	Food
5	*Neolissocheilus hexagonolepis*	Katle	MM	Food
6	*Noemacheilus* sp	Gadela	R	Food
7	*Psilorhynchoides pseudecheneis*	Tite (Endemic)	R	Medicinal

8	*Schizothoraichthys sp*	Asala	R to MM	Food
9	*Channa gachua*	Hile	R	Food
10	*Tor tor*	Sahar	R to MM	Food

Source: IEE Field Visit Survey, 2016

2.3.15 Protected Areas

No national parks and protected areas for forest/ wildlife exist in the project area. No forest will get affected from the proposed project intervention.

2.3.16 Community Forest

The community forests within and nearby of the proposed project are Aahale Community Forest, Piyeale Kalipatal Community Forest, Aapthhare Hatti Kharka Community Forest, Dimala Patal Community Forest, Yeklea Panni Community Forest, Kaggate Dhunge Community Forest, Panthale Community Forest, & Bhaktimle Community forest

2.4 Infrastructure Facilities

2.4.1 Transportation, Electricity and Communication

The North-South Koshi Highway joins project area to Dhankuta, Dharan and Itahari. The distance from Bhojpur bazaar to Hile, Dhankuta and Dharan is approximately 92 km, 118 km and 167 km respectively. The nearest airstrip, Taksar connects project area to Biratnagar and Kathmandu with regular flight.

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.

2.4.2 Educational Institutions

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

2.4.3 Other institutions

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

2.5 Quality of Life Values

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

2.6 Cultural and religious sites

Siddhakali Temple, Kaflea Gufha & Taxar Bouddha Bihar are some famous cultural & religious sites of the project area. But due to the construction of the project these sites won't get affected.

Government of Ministry of Water Supply Singhadurbar

2.7 Resettlement, Relocation and Compensation Issues

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

2.8 Salient Features

Table 2-17: Salient features of the project

S.N.	Items	Description
1	Name of Project	Bhojpur Bazaar Water Supply and Sanitation Project
2	Type	Gravity
3	Study Level	Feasibility
4	Location Area	
	Region	Eastern Development Region
	Zone	Koshi
	District	Bhojpur
	VDC/Municipality	Bhojpur Municipality
	Ward	Complete area of Ward No. 6 to 8 and partial area of ward No. 3, 4, 5, 9, 10 and 11
5	Available Facilities	
	Road	Along Hulaki Road from Gaur to Kalaiya stretch via Garuda
	Supply Water System	Hile-Bhojpur road (92 km)
	Electricity	WUSCs
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
6	Social Status	
	Present HHs Numbers (2016)	2,190
	Present Population (2016)	12,323
	Base Year Population (2018)	12,849
	[redacted]ign Year Populat[redacted]	[redacted]
	Weighted Growth Rate % (WGR)	2.16
	Projected HHs in Design Year (based on WGR)	~3,504
7	Water Demand (MLD)	
	Base Year (2018)	1.625
	Design Year (2037)	2.495
	Source Name	Apart Existing source, Tin Bhanghale and its tributaries are proposed source
	Source Type	Perennial River at two stream
	Source Location	Timma VDC of Bhojpur
	Safe Yield (lps)	20 to 22 of proposed source at Tin Bhangale
7	Type of Structures	
	Proposed Intakes	6 Nos with rehabilitation of 4 Nos Existing intakes
	[redacted]	At two location total capacity for 31.32 [redacted]
	Ground Reservoir - No (Existing (E)/New(N) and Capacity in Cum	Total 7 numbers, (1E-40 cum + 1N-700 cum + 1E-60 cum + 1E-200 cum + 1E-150 cum + 1N-150)
	Valve Chamber (Bricks/RCC)	25/15

S.N.	Items	Description
	Guard House (G1) / Small Guard House (G2) /Dosing House (DS)	3-G1 / 7- DS
	Household Connection	2,283
	Fire Hydrant	10
	Total Length of pipe in transmission and Bulk Distribution	Transmission line of about 25.8 km (7 km for old sources and 18.8 km for new source) and BDS of 6 km.
	Total Length of pipe in Distribution	68,386 m
9	Total Cost of WS Component (Inclusive of all) NRs.	839,563,541.36
10	Cost Sharing Arrangement	
	GON Component (75 %)	587,694,478.95
	TDF Loan (25 %)	209,890,885.34
11	WUSC's Commitment for O&M as upfront (Cash)	41,978,177.07
12	Tariff	
	Up to 6 cum/monthly (NRs)	240
	7 to 10 cum/monthly (NRs)	60
	11 to 20 cum/monthly (NRs)	90
13	Economic Analysis	
	EIRR (Base case) %	26.05
14	Environment	
	ADB Category	B, Only IEE necessary
	IEE finding	No significant adverse impact.
15	Per Capita Cost for W/S component	
	Per Capita Cost (for base year pop.)	68,130
	Per Capita Cost (for design year pop.)	42,572

Source: Feasibility Report of Bhojpur Bazaar Water Supply and Sanitation Project, 2016

2.9 Proposed water supply system

Service Area

The IEE study area covers the environment that will potentially be affected by the intake, transmission mains, thrust blocks, saddle blocks & thrust beam, water treatment plants, service reservoir, bulk distribution mains, distribution mains, and appurtenances such as office building, laboratory unit, guard house and generator house etc.

All the project components are located in the Direct Impact Zone (DIZ) considering the environmental as well as socio-economic impacts. The delineated service area includes complete areas of ward no 6 to 8 and partial areas of wards 3, 4, 5, 9, 10 & 11 of Bhojpur Municipality

The study area is also referred to as "area of influence", and areas within 200 m from the area of influence is the Indirect Impact Zone (IIZ) where environmental and socio economic impacts will be less.

Concept Design of Sub-project

The Bhojpur Bazaar sub-project has been conceptualized as a gravity surface water system. The overall concept has been developed with a distribution system comprising of a bulk water system (BDS) and household distribution system (DS). The whole service area will be divided in number of service area with dedicated storage reservoirs. The service area is very scattered and stretch 7 to 10 km with very high elevation differences within the service area (in the range of 1500 m). The concept of BDS has been conceptualized in order to reduce inequality of pressure in HHs connections within the service area. Each service reservoir will have a control mechanism with a bulk meter so that it will support the principles of DMA. The entire distribution network is to be supplied from six reservoirs.

Sub-project Components

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

Intake

There are altogether six intakes. Four intakes are existing intakes and two intakes will be newly proposed intakes. Of the four existing intakes, three are spring intakes and one is stream intake.

Two stream intake have been proposed at Tin-Bhangale stream located in Sumlikha village in Teema VDC of the Bhojpur district. Water from two streams will be collected at collection chamber. In totality cumulative discharge of 21 lps have been proposed from these sources. Slightly high discharge has been proposed for diversion than actual required assuming of about 15% leakage in transmission system. Relative Level (RL) of these intakes are around 2150 m msl.

Transmission Main

The cumulative length of transmission line is about 32 km. There are three different transmission system. The total length of the transmission main of the Old System is about 7.0 km.

The transmission length of the Tin-bhangale to main WTP is about 17 km. This is the length of pipe between Tin Bhangale intakes and proposed WTP-2. The transmission comprises combination of 150 and 200 ND DI pipe and 160 and 200 OD PE pipes.

Thrust Blocks, Saddle Blocks and Thrust Beam

Thrust blocks have been proposed for DI pipes (both transmission and distribution mains). Typical Thrust Blocks for horizontal bends, vertical bends, these have been designed for pressures of 30 kg/sq cm and 20 kg/sq cm for the transmission and distribution line, respectively.

Similarly, thrust beams and saddle blocks are proposed for DI Pipes laid in slopping areas and un-buried portions. All saddle block are proposed to be anchored with concrete at the centre of each pipe. Provision of RCC support for the stretches of buried and un-buried DI pipe lines which are laid in slopping areas has been made to prevent pipe movement.

River and Stream Crossing

There are a number of small river crossings in proposed transmission systems. A simple crossing by providing SP4 type concrete saddle blocks is recommended for small type of crossings for DI pipes. These types of crossings are used only when the span of crossing is less than 5 m. There are about fifteen numbers of this type of crossings in

all transmission system. In case of crossing near the existing bridges and culverts, provision has been made for pipe clamps.

Water Treatment Plant

The Bhojpur Bazaar water supply system will have two water treatment plants. Each water treatment plant will consist of the following components: a) Inflow chamber; b) Sedimentation tank for primary settling; c) Horizontal flow roughening filter; d) Slow sand filter; and e) Chlorination unit.

Service Reservoir

The cumulative capacity of the seven service reservoirs provided is about 1375 cum.

Bulk Distribution Mains

As the service area is very scattered and stretches 7 to 10 km with high elevation differences within the service area (in the range of 1500 m), the concept of Bulk Distribution has been proposed. This has been done in order to reduce inequality of pressure in HHs connection within the service area.

All of the storage reservoirs of the Sub-system will get required water from corresponding water treatment plants. The BDS comprises of GI, PE and DI pipes from 75 ND to 160 OD diameter.

Distribution Main

The distribution system comprises of a pipe network, looped in certain cases and branched in others. 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. The size of DI pipes is 150 mm and above. For proper saddle arrangements at household connections a minimum of 50 mm diameter distribution pipe has been adopted. Use of GI pipes has been limited. The total pipe length of the proposed distribution system is 68.363 km.

House Connection

Three type of house connections have been envisaged in the project. There are about 46 number of house connections from DI pipes, about 1598 number of house connection from PE pipes and about 639 number of house connections from GI pipes. Most of the connections will be private.

The house connection shall comprise of about 12 m pipe PE or GI Pipe (as per requirement) and a water meter. The house connection pipe shall be PE-80 or 100, 20 mm OD diameter pipe of rating PN-16 for tapping from DI or PE pipes. In case of tapping from GI pipes, the house connection pipe shall be medium class GI of 15 ND. Tapping of household connection in PE pipe has been proposed from PE saddle with ferrule and in case of DI pipe, DI saddle shall be used with a ferrule. Tapping from GI pipes has been proposed from PE saddle with a ferrule

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

Appurtenances

These shall primarily comprise of valve chambers to house flow control valves, control valves for controlling flow etc. Altogether 50 to 60 valve chambers are expected in the system. A RCC valve chamber has been proposed on the carriage way and a brick type is proposed in other places where vehicular traffic is not expected.

DMA Establishment

One increasingly common principle of managing a large water network is to sub-divide it into a number of areas, typically between 500 and 3000 connections, each established area having a defined and permanent geographical and/or hydraulic boundary. Such an area is known as a District Management Area or more commonly, a District Meter Area (DMA). Ideally each DMA has a single source of supply to maximize accuracy of data, with a

strategically placed and suitably sized meter installed at the inlet that is capable of accurately measuring flow into the area.

An important factor in lowering and subsequently maintaining a low level of leakage in a water network is pressure control. The division of the network into DMAs facilitates the creation of a permanent pressure control system, thus enabling pressure reduction in DMAs which reduces the level of background leakage, the rate of flow of individual bursts and the rate of the annual burst frequency. In order to manage NRW in the proposed system, the total system is divided into 7 DMAs.

2.10 Relevancy of the Project

As per the 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 service area that includes complete areas of ward no 6 to 8 and partial areas of wards 3, 4, 5, 9, 10 & 11 of Bhojpur Municipality of Bhojpur District. It is expected that on implementation of the project the users of the area will be able to avail adequate amount of safe drinking water.

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 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 19,721 (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 2-18 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 2-18: Criteria for requirement of IEE and/or EIA for Drinking water supply Projects

Condition described in the Act and Regulations	IEE Required as per the Regulation Annex 1 g	EIA Required as per the Regulation Annex 3 h	Conditions in the project
River Control (training)	Up to 1 kilometer	Over 1 kilometer	NA
Channeling Water from one Watershed to Another	Applicable	Applicable	NA
Rain Water Collection and Use of spewing Wetland	Up to 200 hectares	More than 200 hectares	NA
Supply of Water in Dry Season from Surface Water Source with a safe yield of	Up to 1 cusec and utilizing up to 50 % of the available quantity	More than 1 cusec and utilizing the total available quantity	NA
Ground Water Recharge	Up to 50 % of total aquifer	More than 50 % of aqulfer	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	25 to 100 people	Over 100 people	Not done

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
Permanent Residents)			
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 21,909 in 2016 and the project is designed for a final population of 34,610 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 ground water from sources which are located at point and non-point sources of biological and chemical pollution and/or their influenced areas.	Not done	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

CHAPTER 3

3. PROCEDURES TO BE ADOPTED FOR THE STUDY

The IEE approach, methodology and procedure adopted to prepare a comprehensive IEE report will generally follow the provisions of the EPA & EPR and related national and sectoral guidelines. The IEE study will focus on impact identification, prediction and finally evaluating the extent and weightage 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 data base 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 collection of primary data for both the bio-physical and socio-economic assessments.

Provide a description of 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 a number of 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 ground water 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 implication (issues) in terms of 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 the pipeline routes under consideration. Additional data shall be collected from various Committees (Municipalities/VDCs, DDCs, NGOs, Community groups, etc.) through which the respective pipe alignments pass.

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

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

3. 2 Report Preparation

An IEE report as per the revised format combining formats of both GoN and ADB shall be prepared in accordance with 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

CHAPTER 4

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 & International Convention:

Law

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

Acts

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

Rules & Regulations

- Solid Waste (Management & Resource Mobilization), Rules, 2047 B.S. (1990 A.D.)
- Water Resources Regulations 2049 B.S. (1993 A.D.)
- Forest Regulation 2052 B.S. (1995 A.D.)
- Environmental Protection Rules 2054 B.S. (1997 A.D.) with Amendment
- Drinking Water Regulations 2055 B.S. (1998 A.D.)
- Child Labor Prohibition & Regulation Act 2056 B.S. (2001 A.D.)
- Urban Water Supply & Sanitation Policy 2066 B.S. (2009 A.D.)

Plans and Policies

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

Standards, Manuals, Strategies & Guidelines

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

Chapter 5

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

This includes the time 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 the 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

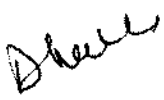
The total estimated cost for the Initial Environmental Examination (IEE) work of Bhojpur Bazaar Small Town Water Supply and Sanitation sub-project is approximately NRs. 500,000.00.

5.3 Human Resource Required

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

1. Environmental Specialist
2. Water Supply and Sanitation Engineer
3. Sociologist
4. Geo-hydrologist
5. Botanist/Forester

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



Chapter 6

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 in terms of magnitude, (ii) long term, short term & medium term in terms of duration and (iii) site specific, local & regional/national in terms of extent. As a part of the study, enhancement of the positive impacts 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 intake in high earthquake zone

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 construction of different component structures.

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

iii) Changes in land form and in 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 off shore erosion, silt runoff and sedimentation.

Post Construction and Operation Stage

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

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

6.2 Biological Issues

Design Stage

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

Pre-Construction Stage

i) Forest clearance if so
ii) Tree cutting and forest clearance process

Construction Stage

i) Encroachment of vegetation as well as wildlife habitats and bio-diversity 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 of the construction workforce.
iv) Impacts on groundwater resource/water resources
v) Extinction/impacts of rare and endangered species of floral 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 water resource

6.3 Socioeconomic, Cultural and Chemical Issue

Design Stage

Health & Safety of community & workers

Pre-Construction Stage

i) Water use conflicts due to source dispute
ii) Land acquisition, resettlement and compensation
iii) Impairment of historical/ cultural monuments/ areas

Construction Stage

i) Effects of land and property acquisition on the social and economic status of the people.
ii) Impacts on the social structures, social amenities and community resources due to exposition to outside workforce.
iii) Impacts on sanitation and health of the community due to increase in disease vector and transmission of disease from outside workforce.
iv) Loss of cultural values and norms due to exposition to outside workforce.
v) Impacts due to encroachment to religious and cultural sites having historical significance by the project structures and associated facilities.
vi) Changes in migration pattern, influx of the workers and impact on vulnerable groups of the community.
vii) Possibility of employment (income) generation activities amongst the community people of the project area.

Post-Construction and Operation Stage

i) Impacts due to withdrawal of economic activities after the completion of the construction.
ii) Changes in aesthetic values of landscape due to project structures and facilities associated impacts.
iii) Impacts of permanent loss of production from the project occupied areas.
iv) Changes in Religious values of area due to project
v) Changes in religious aspects of the people in and around source areas

Besides 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 comfort of human life in the project area.

The above aspects of impacts will be considered during the environmental examination period. The study will reveals the impacts associated with the various aspects.

Chapter 7

7. ALTERNATIVE ANALYSIS

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. The aim of alternative analysis will be 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 in terms of 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 adverse potential 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 office 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 the EMP in order 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. The system design for the sub-project can be done under two different scenarios. Optimization of a proposed water supply system can be done in terms of system layout, alternative technology, alternative materials or even alternative design parameters.

Chapter 8

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 systematically manage all the perceived environmental impacts of the project. It shall be therefore based on the mitigation measures for the project induced impacts. An Environmental Management Plan (EMP) has a dual purpose. It is designed to monitor the contractor's work during project implementation. It helps to check contractual compliance with specified mitigation measures. It also helps in making periodic checks on the actual environmental impacts of the Project over the years following completion of the works, and compares these with those impacts anticipated at the time of Project appraisal. The EMP therefore provides the necessary feedback required for correcting potentially serious Project deficiencies, and for planning of other projects. The EMP shall include the responsibilities of different stakeholders based on preliminary plans and schedules. This program shall include measures required during the project design, construction and operational phases and shall include recommendations on allocation of components of the EMP to the various parties involved. Feasible and cost-effective measures to prevent/mitigate/reduce significant negative impacts should be recommended in an Environmental Management Plan. The impacts and costs associated with implementing the measures will have to be detailed. The EMP will include proposed work programs, budget estimates, schedules, staffing and training requirements and other support services to implement the mitigating measures.

8.2 Environmental Monitoring Plan

The project will develop an Environmental Monitoring Program for the pre-construction, construction and post construction activities of the project. The program will evaluate: (i) the extent and severity of the adverse environmental impacts as compared to what was predicted, (ii) how effective the mitigating measures were and compliance with the regulations and (iii) the overall effectiveness of the EMP. The environmental monitoring of the project includes field supervision and reporting of project activities prior to and during the project construction and operation in order to ensure that the works are being carried out in accordance with the approved design and that the environmental mitigation measures are fully implemented in accordance with the EMP. A monitoring system will be developed involving (i) front 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 organisations with a legitimate interest in a project and/or who are likely to be affected by the project (stakeholders). It is a two-way process that informs and involves the community in developing a project, and informs the proponent about issues and concerns, which can then be addressed in project design. Information disclosure involves stakeholders in monitoring the development and implementation of a project and fosters openness in decision-making by presenting documents and other project materials for public scrutiny. The consultation and disclosure involves consultation with stakeholders at an early stage of project preparation, and throughout project implementation. As a minimum, stakeholders will be consulted regarding the scope of the environmental study before work has commenced in earnest, and should then

be informed about the likely impacts of the project and proposed mitigation once the draft IEE report is under preparation. The report should record the views of stakeholders and indicate how these have been taken into account in project development. Information is disclosed through public consultation and more formally by making documents and other materials available and at a location in which they can be easily accessed by stakeholders. This normally involves making draft reports available (in the local language) at public locations in the community and providing a mechanism for the receipt of comments and making documents available more widely.

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

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 resolution of affected persons' concerns, complaints, and grievances related to social, environmental and other concerns on the project. GRM will aim to provide a time-bound and transparent mechanism to resolve such concerns.

A Grievance Redress Committee (GRC) will be formed at the town/VDC/Municipality level, comprising the Chairperson of V/M/D WASH CC as the chairperson of GRC, and Secretary of 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[1], and (5) contractor's representative. The secretary of the GRC will be responsible for convening timely meetings and maintaining minutes of meetings. The concerned social safeguards expert of DSMC will support the RPMO safeguard's officer and Project Manager of RPMO to ensure that grievances, including those of the poor and vulnerable are addressed. All GRCs shall have at least two women committee members. Along with representatives of the APs, civil society and eminent citizens can be invited as observers in GRC meetings. A three tier GRC will be operative as per PAM, TSTWSSSP.

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

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

Chapter 9

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 report will be in accordance with 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

Appendices

List of Abbreviations

Acknowledgements

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

Chapter 10

10. OTHER NECESSARY MATTERS

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

11. LITERATURE REVIEWED

ADB, 2003. Environmental Assessment Guidelines.

Constitution of Nepal (2015). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu

District Development profile of Nepal 2010/11 with VDC Profile. A Socio-Economic Development

District Health Office, Bhojpur, 2062/63

Environment Protection Act, (1997). Ministry of Science, Technology and Environment Kathmandu

Environment Protection Rules, (1997), Ministry of Science, Technology and Environment, Kathmandu

Environment Statistics of Nepal, CBS, 2011

Environmental Impact Assessment Guidelines, (1993). National Conservation Strategy Implementation Project, National Planning Commission, His Majesty's Government, Nepal

Feasibility Study of Bhojpur Bazaar Water Supply and Sanitation Project, 2015

Ministry of Population and Environment, 1999. Environmental Protection Act, 1997 and Environment Protection Rules, 1999. (Amendment, 1999). Ministry of Law, Justice and Parliament Affairs, Nepal

Municipality profile and baseline information of Bhojpur Municipality . and National Population and Housing 2011, CBS, 2012

National Urban Policy (2007). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu

Shrestha K 1998. Dictionary of Nepalese Plant names. Mandala Book Point, Kathmandu, Nepal.

Solid Waste Management Act (2011). Ministry of Science and Technology and Environment, Kathmandu

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

Uprety, B.K (2003). Safeguard the Resources Environmental Impact Assessment Process and Practice, Kathmandu

Water Resource Act (1992). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu

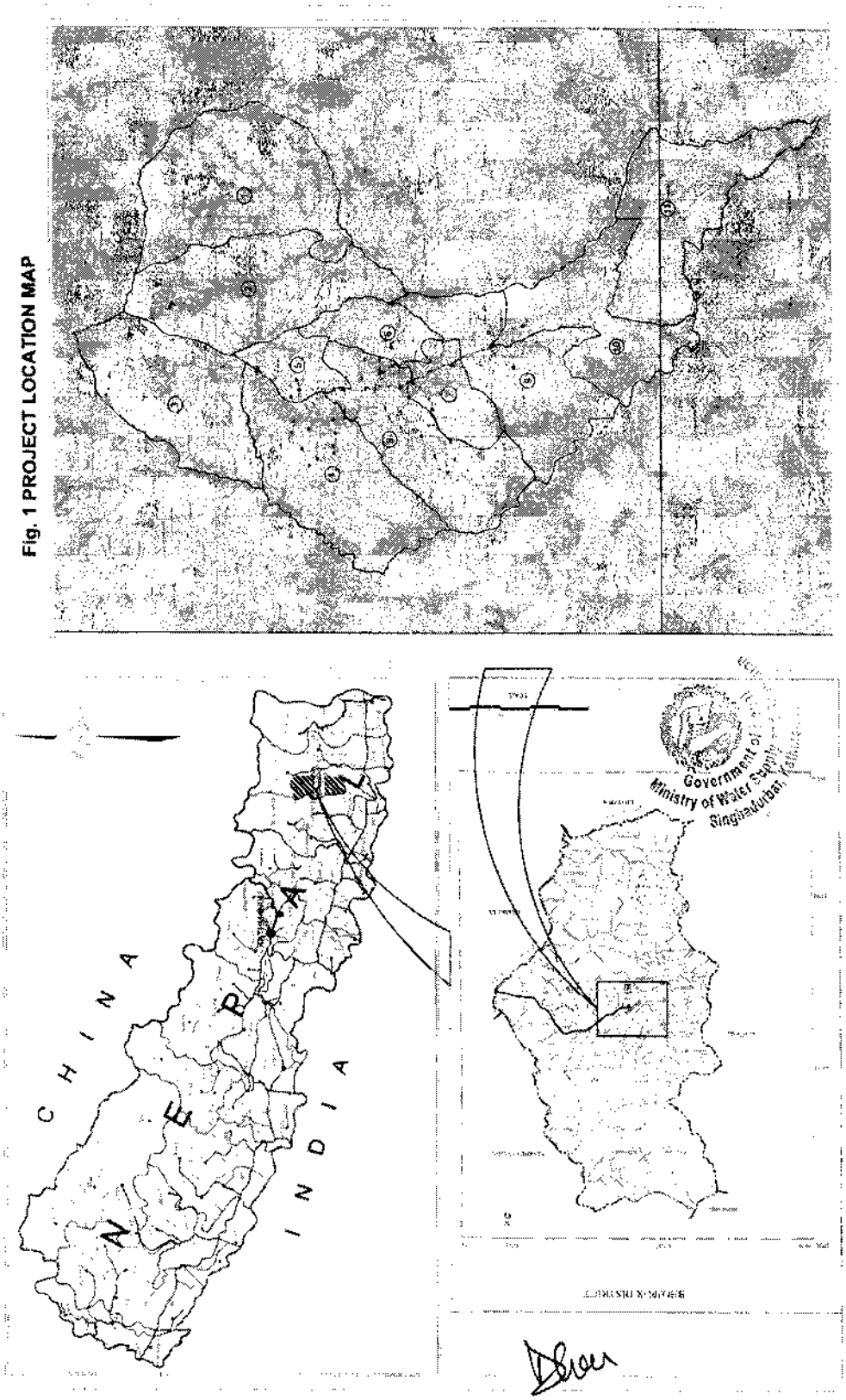
ANNEXES


Government of Nepal
Ministry of Water Supply and Sanitation

ANNEX I

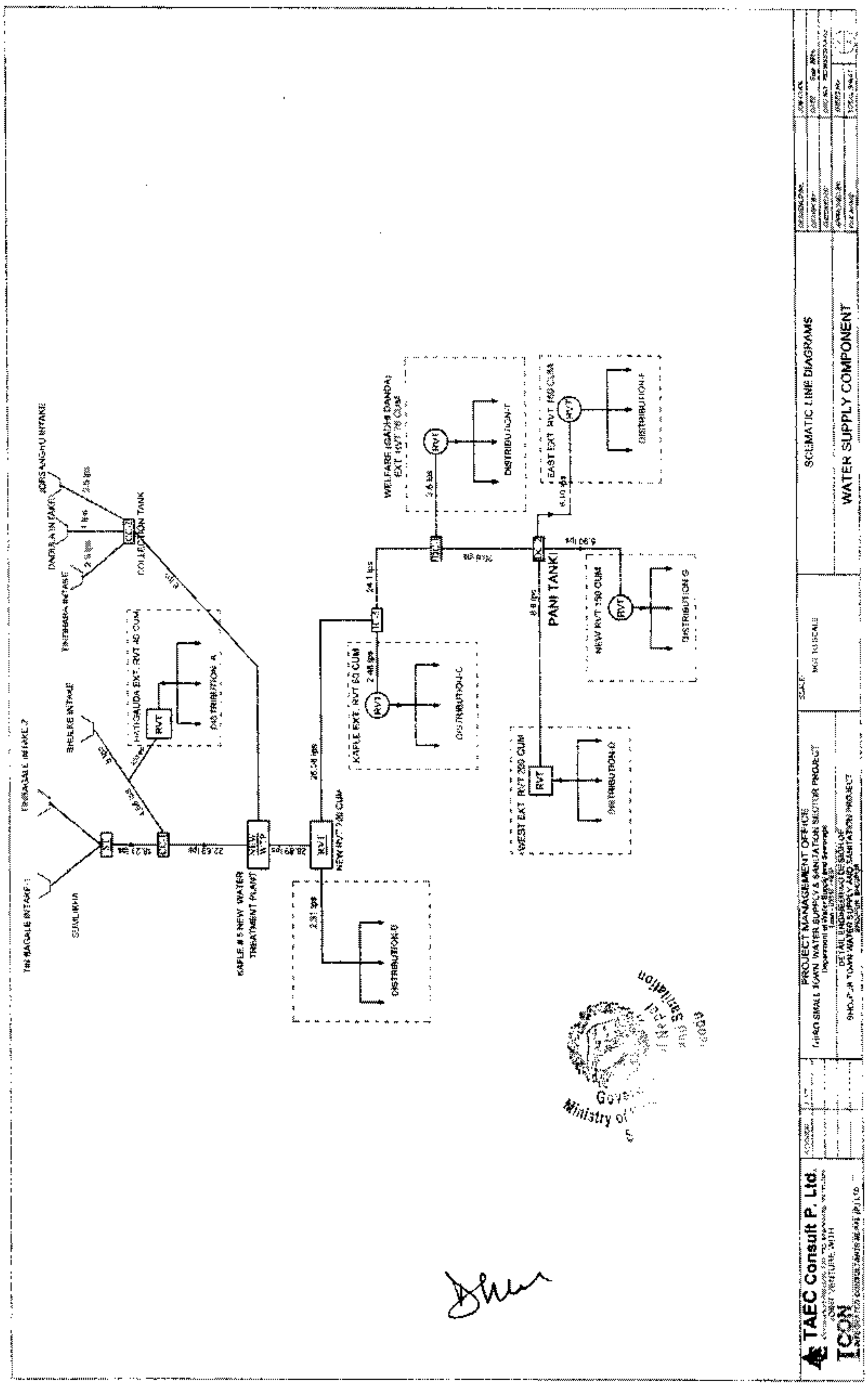
Project Location Map

Fig. 1 PROJECT LOCATION MAP



ANNEX II

Schematic Layout Plan for the Proposed Project



SCEMATIC LINE DIAGRAMS
WATER SUPPLY COMPONENT
PROJECT MANAGEMENT OFFICE
TAEC Consult P. Ltd.
ICON
PANI TANKI
COLLECTION TANK
KAPLE # 5 NEW WATER TREATMENT PLANT
NEW RVT 200 CUM
NEW RVT 150 CUM
WEST EXT. RVT 200 CUM
KAPLE EXT. RVT 50 CUM

ANNEX III

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

ADB's Rapid Environmental Assessment (REA) Checklist for Bhojpur Bazaar Sub Projects and preliminary Climate Risk Screening Checklist for Sample Sub project Towns

Instructions:

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

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

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

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

Subproject: **Bhojpur Bazaar Water Supply and Sanitation Subproject**

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA			
▪ DENSELY POPULATED?			
▪ HEAVY WITH DEVELOPMENT ACTIVITIES?			
▪ ADJACENT TO OR WITHIN ANY ENVIRONMENTALLY SENSITIVE AREAS?			
• CULTURAL HERITAGE SITE			
• PROTECTED AREA			
• WETLAND			
• MANGROVE			
• ESTUARINE			

Screening Questions	Yes	No	Remarks
• BUFFER ZONE OF PROTECTED AREA			
• SPECIAL AREA FOR PROTECTING BIODIVERSITY			
• BAY			
B. POTENTIAL ENVIRONMENTAL IMPACTS Will the Project cause…			
• pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?			
• impairment of historical/cultural monuments/areas and loss/damage to these sites?			
• hazard of land subsidence caused by excessive ground water pumping?			
• social conflicts arising from displacement of communities ?			
• conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?			
• unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?			
• delivery of unsafe water to distribution system?			
• inadequate protection of intake works or wells, leading to pollution of water supply?			
• over pumping of ground water, leading to salinization and ground subsidence?			
• excessive algal growth in storage reservoir?			
• increase in production of sewage beyond capabilities of community facilities?			
• inadequate disposal of sludge from water treatment plants?			
• 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?			
• health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.			
• 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?			

Screening Questions	Yes	No	Remarks
• 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?			
• increased road traffic due to interference of construction activities?			
• continuing soil erosion/silt runoff from construction operations?			
• 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?			
• delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?			
• accidental leakage of chlorine gas?			
• excessive abstraction of water affecting downstream water users?			
• competing uses of water?			
• increased sewage flow due to increased water supply			
• increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant			
• 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?			
• 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?			
• 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?			

Preliminary Climate Risk Screening Checklist for Sample Sub Project Towns

	Screening Questions	Score	Remarks
Location and design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides		
	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.)		
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)		
Performance of Project Outputs	Would climate/weather conditions and related extreme events likely to affect the performance throughout their design life time?		

Options for answers and corresponding scores are given below.

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

Checklist for Physical Environment

A. Topography/Physiography

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

B. Climate and Meteorology

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

C. Air Quality

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

D. Erosion and land Stability

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

E. Land Use

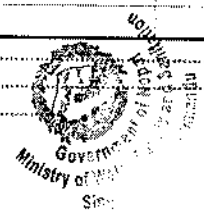
1. Investigate on the land use of the Project Blocks from the topo-maps, and other available land use maps
2. Investigate the land use affected by the project structures and subsidiary facilities
3. Investigate on the land use potentials of the area

CHECKLIST OF PLANT RESOURCES

Date:

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

Note:.....



CHECKLIST OF WILDLIFE ANIMALS

Date:

S.N.	Wild Animals	Remarks

Note:.....

CHECKLIST OF (Birds)

Date:

S.No.	Birds	Remarks

Note:.....

.....

.....

Household Survey

१. परिचय

१.१ अन्तर्वार्ता दिने व्यक्तिको नाम ठेगाना:

(क) जिल्ला: (ख) गा.वि.स:

(ग) टोल स्थान: (घ) वार्ड नं.:

१.२ पारिवारिक विवरण

(क) घरमुलिको नाम: श्रीमान् र श्रीमती .....

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

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

(ज) बसेको वर्ष: (झ) शिक्षा :

(ञ) कुल परिवार संख्या .....

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

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

जम्मा	विद्यालय गएका		विद्यालय नगएका	
	पुरुष	महिला	पुरुष	महिला

२. साक्षरता : (तपाईको परिवारमा)

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

३. कृषि (भु-उपयोग)

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

छ ☐ छैन ☐

३.२ यदि छ भने कति छ ? रोपनीमा भन्नुहोस :

क्र.स.	स्वामित्व	खेत	बारी	खरबारी	वन	कैफियत
१	आफ्नै					
२	सगोलको					

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

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

क्स.	ठाउँको नाम	जग्गा				कैफियत
		खेत	बारी	खरबारी	वन	

३.४ तपाईको जग्गा आयोजना भित्र पर्छ रु ९ण्भिबकभ नभलतष्यल तजभ अकउयलभलत या उचयबभअत धजभचभ ज्ज

विकि०

घर

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

खेत

- ☐ पाखा बारी
- ☐ जंगल
- ☐ अन्य
- ☐ अन्दाजी मूल्य (चलनचल्तीमा) नेरु

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

घर ☐ गोठ ☐

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

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

	संख्या	क्षेत्रफल
गाठ		
अन्य (खुलाउने)		

३.५ (क) तपाईको आयोजना क्षेत्र भित्र पर्ने जमिनमा कुन कुन फसल लगाउनु हुन्छ र

क्स.	खाद्यान्न बाली	बाली लगाएको क्षेत्रफल	उत्पादन परिणाम
१.	खाद्यान्न बाली		
	धान		
	गहु		
	मकै		
	कोदो		

	बाल गोडागुडी		
	अन्य		
२. नगदे बाली			
	आलु		
	तोरी		
	तरकारी		
	अन्य		

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

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

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

भयो ☐ भएन ☐

३.७ यदि अपर्याप्त भयो भने कति महिनाको लागि पुगेन रु महिना

(क) तिन महिना (ख) छ महिना

(ग) नौ महिना (घ) बाह्र महिना

३.८ आफ्नो उत्पादित खाद्यान्न अपर्याप्त भएको बेला आफ्नो परिवारलाई कसरी जुवाउनु हुन्छ ?

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

३.९ पशुपालन सम्बन्धी :

तपाईको घरमा कति /कस्ता पशु पक्षीहरु पाल्नु भएको छ रु

क.सं.	पशुपंक्षी	संख्या
१	गाई	
२	गोरु	
३	भैंसी	
४	बाछा	
५	बाछि	
६	पाडा	
७	पाडि	
८	राँगो	
९	घोडा	
१०	बाख्रा	
११	बोका	
१२	खसी	
१३	पाठा पाठी	
१४	सुँगुर बंगुर	
१५	हाँस	
१६	कुखुरा	
१८	अन्य (खुलाउने)	

४. घर परिवारको वार्षिक औषत आम्दानी :

श्रोत	वार्षिक आम्दानी (रु.)	श्रोत	वार्षिक आम्दानी (रु.)
कृषिबाट		अन्य श्रोतहरु	
खाद्यान्न		नोकरी, सेवा	
नगदेवाली		ज्याला मजदुरी र भरीया	
फलफुल		निवृतिभरण	
जम्मा (१)		व्यापार	
पशुपालनबाट		घरेलु उद्योग	
दुग्ध उत्पादन		पेशागत सेवा	
अण्डा कुखुरा हाँस बिक्री		माछा बिक्री	
बाख्रा/बाछी/गोरु/बिक्रि		अन्य	
भैंसि/राँगो बिक्रि		जम्मा (३)	
बोका/खसी/भेडा/बाख्रा बिक्रि			
सुगर/बंगुर बिक्रि			
कुखुरा/हाँस बिक्रि			
जम्मा (२)			
जम्मा आय (१+२+३)			

५. घर परिवारको वार्षिक औषत खर्च :

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

६.पानीको आपूर्ति

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

गर्छु ☐ गर्दिन ☐

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

सिचाई ☐ नुहाउने, कपडा धुने ☐

पिउने ☐ अन्य ☐

७.स्वास्थ्य सम्बन्धि:

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

थिए ☐ थिएनन् ☐

(ख)यदि थिए भने निम्न विवरण दिनुहोस् रु

क्रम	नाता	पुरुष	महिला	उमेर	रोग
१					
२					
३					
४					

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

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

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

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

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

८ महिलाको अवस्था:

(क) श्रमको वर्गिकरण

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

(ख) सम्पत्तिमा अधिकार

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

(ग) निर्णय प्रकियामा अधिकार

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

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

९. मुआब्जा सम्बन्धी:

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

नगद ☐ जग्गाको सट्टा जग्गा ☐ अन्य ☐

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

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

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

ANNEX 2: SAMPLE FORMS, FORMATS AND REPORT TEMPLATE

ANNEX 2A:RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST FOR BHOJPUR 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: **Bhojpur Water Supply and Sanitation project**

Screening Questions	Yes	No	Remarks
A.Project Siting : Is the project area			
Densely populated?	√		Bhojpur Municipality has moderate population density.
Heavy with development activities?	√		The distribution pipeline will partially go through the old Bhojpur main bazaar area. 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		√	

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		√	
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)?	√		The existing water treatment plant is hardly functioning. Hence, untreated water is being supplied. EMP recommends water quality monitoring as prescribed in the NDWQS & its Directives.
Delivery of unsafe water to distribution system?	√		Design proposes office building that also comprises water quality laboratory to deliver safe water. EMP recommends continuing training of WUSC in water quality monitoring, as prescribed in the NDWQS Directives.
Inadequate protection of intake works or wells, leading to pollution of water supply?	√		Design has considered the safest site for intake regarding environmental pollution and proposes enough measures to mitigate contamination.
Over pumping of ground water, leading to salinization and ground subsidence?		√	
Excessive algal growth in storage reservoir?		√	EMP providesmitigation 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 measures to mitigate impacts on power supply poles in the bazaar that are immediately adjacent to, or onto, road carriageways.
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	√		EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.
Health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?		√	EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents &/or human error in dosing.
Dislocation or involuntary resettlement of people?		√	
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
Noise and dust from construction activities?	√		EMP provides mitigation measures.
Increased road traffic due to interference of construction activities?		√	EMP provides mitigation measures.
Continuing soil erosion/silt runoff from construction operations?		√	
Delivery of unsafe water due to poor O&M treatment processes (especially mud acm3ulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√		EMP incorporates monitoring of distributed water according to the Directives for the NDWQS.
Delivery of water to distribution system, which is corrosive due to inadequate attention to the feeding of corrective chemicals?	√		Concern for corrosion of G.I. pipes caused by the chlorine content in treated water is low. EMP provides mitigation measures.
Accidental leakage of chlorine gas?		√	
Excessive abstraction of water affecting downstream water users?		√	
Competing uses of water?		√	
Increased sewage flow due to increased water supply		√	
Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	√		There is no wastewater collection & treatment system. EMP provides mitigation measures.
Large population influx during project construction and operation that causes an increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	

Screening Questions	Yes	No	Remarks
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 Project Towns

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

Outputs	the performance throughout their design life time?	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 ($\mu g/m^3$) *	WHO Air Quality Guidelines ($\mu g/m^3$) **	
			Global Update 2005	Second Edition ^ 2000
TSP	Annual	-	-	-
	24-hour	230	-	-
PM_{10}	Annual	-	20	-
	24-hour	120	50	-
$PM_{2.5}$	1-year	-	10	-
	24-hour	-	25	-
SO_2	Annual	50	-	
	24-hour	70	20	-
	10-minute	-	500	-
NO_2	1-year	40	40	-
	24-hour	80	-	-
	1-hour	-	200	-
CO	8-hour	10,000	-	10,000
	15-minute	100,000	-	100,000
Pb	1-year	0.5	-	0.5
Benzene	1-year	20	-	-

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

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

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

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

B.2 Noise Level Standards

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

* Guidelines for Community Noise, WHO, 1999.

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

B.3 National Drinking Water Quality Standards, 2006

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

* Health-based guideline values

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

^ These standards indicate the maximum and minimum limits.

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

Parameter with WHO guideline value as more stringent than 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.

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

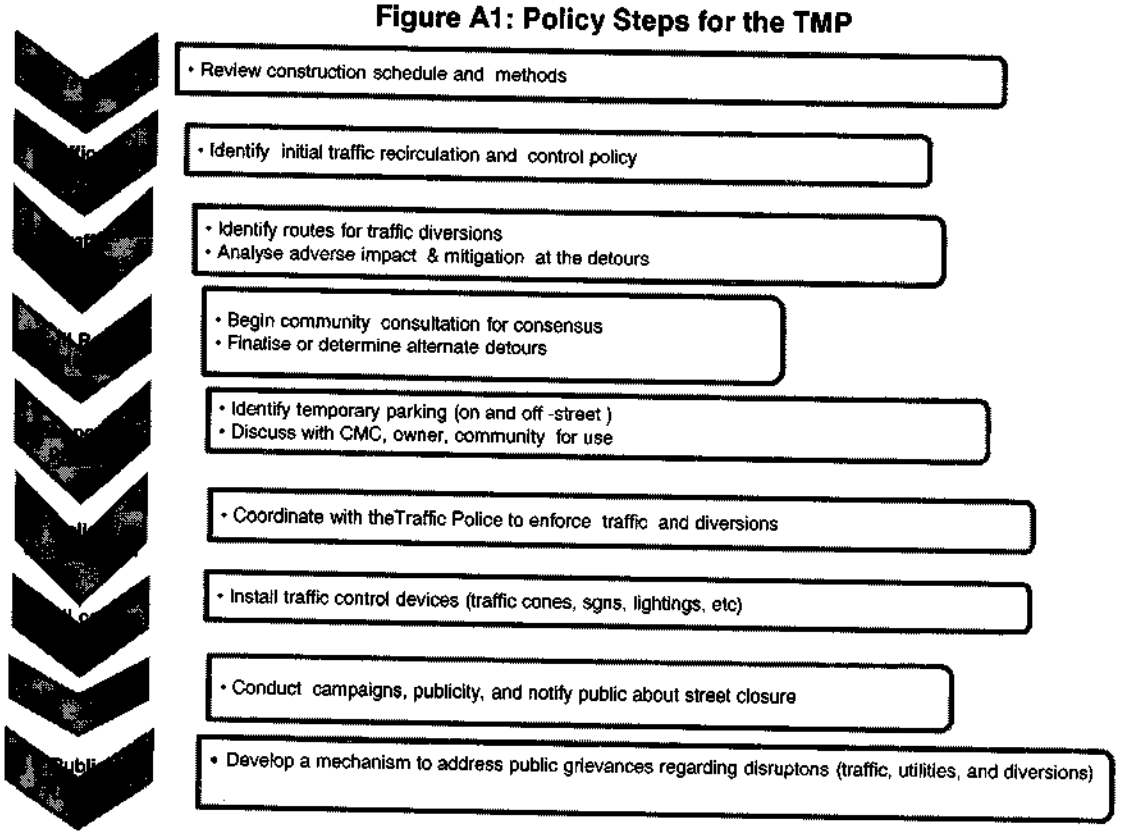
Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

(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
- Mange onsite spoil handling to minimize environmental impacts on resident and other receivers
- Minimize any further site contamination of land, water, soil
- Manage the transportation of spoil with consideration of traffic impacts and transport related emissions

Structure of SMP:

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

Aspects and Potential Impacts

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

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

Spoil volumes, Characteristics and Minimization

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

Characterization of spoil: Based on the type of spoil; characterization is done (sand stone, 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 cliental approval should be obtained to use it as spoil disposal area. The local administration must be consulted and if required permission should be obtained from them.

Storage and stock piling

Transportation and haulage route

Based on the above, the contractor will prepare a SMP as an integral part of EMP and submit it to the 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

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

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

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored

- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

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

Air Quality Results

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

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

Water Quality Results

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

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

Noise Quality Results

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

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

ANNEX 2G:SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

NAME: _____ DATE:

TITLE: _____ DMA:

LOCATION: _____ GROUP:

WEATHER CONDITION:

INITIAL SITE CONDITION:

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory_____ Incident_____ Resolved _____ Unresolved _____

INCIDENT:
Nature of incident:

Intervention Steps:

Incident Issues

Resolution

Project 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

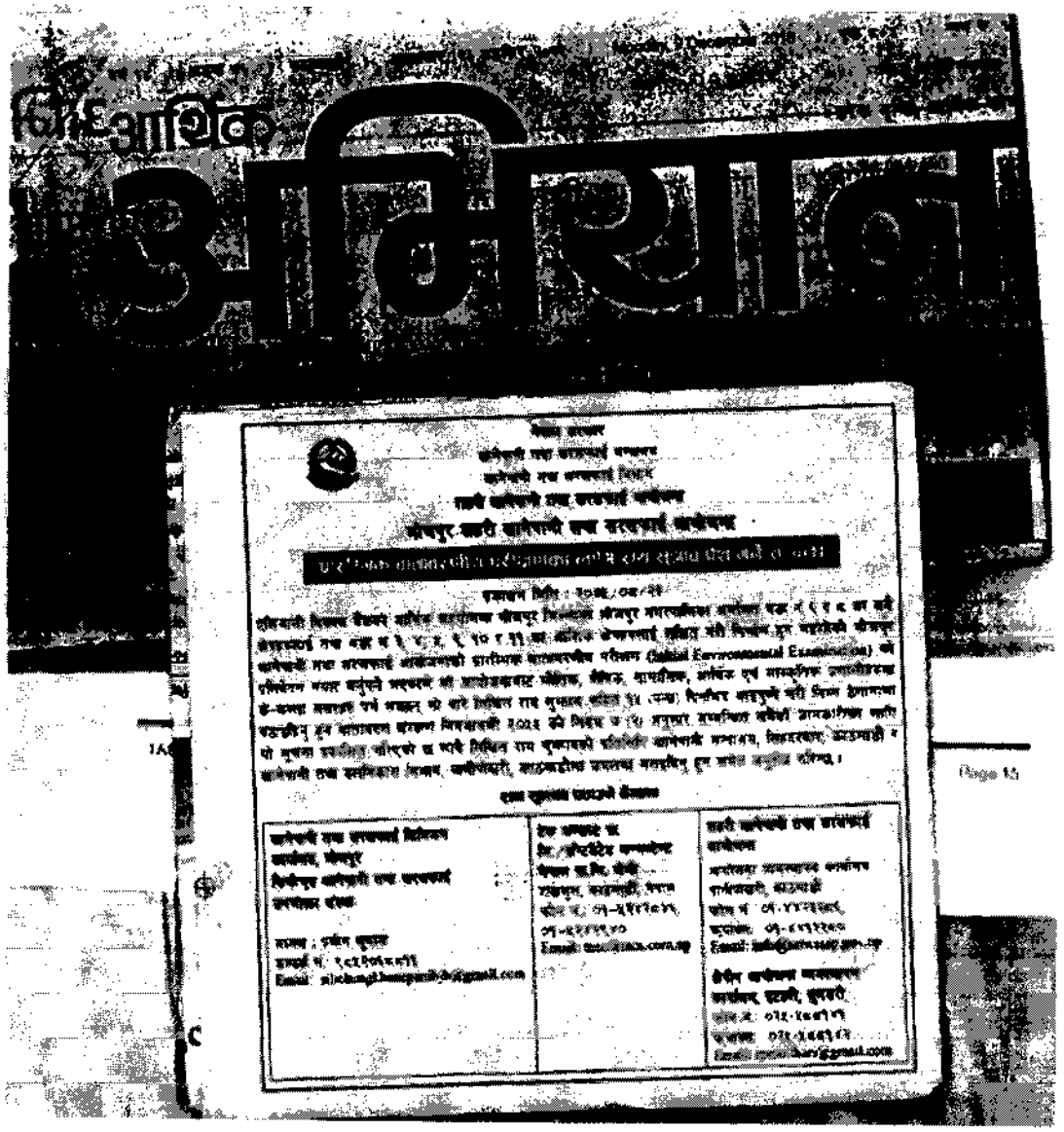
Position **Name**

Name
Position

ANNEX 3:

PUBLIC NOTICE, MUCHULKA, MINUTES OF MEETINGS AND RECOMMENDATION LETTER

PUBLIC NOTICE



MUCHULKAS

भोजपुर नगरपालिका
नगर कार्यपालिकाको कार्यालय

प.सं. : २०७५/०७६
चलानी नं.:- ५८८

प्रदेश नं.१, नेपाल
मितिः- २०७५/०९/१

विषय : सूचना टाँसको जानकारी सम्बन्धमा ।

श्री सिलिचुङ खानेपानी तथा सरसफाई मुल उपभोक्ता समिति
भोजपुर ।

प्रस्तुत विषयमा ताहाँको च.नं. ३०, मिति २०७५/९/१ को पत्र साथ प्राप्त साना शहरी खानेपानी तथा सरसफाई आयोजनाको प्रारम्भिक वातावरणिय परीक्षण कार्यको सार्वजनीक सूचना यस कार्यालयको सूचना पाटिमा टाँस गरी सो को जानकारी पठाइएको व्यहोरा अनुरोध छ ।

.....
मिलन राई
नि. प्रमुख प्रशासकिय अधिकृत
नि. प्रमुख प्रशासकीय अधिकृत

सूचना टास गरिएको मुचुल्का

लिखीतम हामी तपशिलमा उल्लेखित भएका व्यक्तिहरुको रोहवरमा भोजपुर जिल्ला स्थित भोजपुर नगर क्षेत्रमा संचालन हुने तेश्रो साना शहरी खानेपानी तथा सरसफाइ आयोजना संचालनको सिलसिलामा गर्नुपर्ने कार्यक्रम अनुसारको यस योजना क्षेत्रको प्रारम्भिक वातावरणिय परिक्षण कार्यक्रमको सार्वजानिक सूचना टाँस मिति २०७५/०९/१ मा भोजपुर नगरपालिकाको कार्यालयमा टाँस गरिएको हुँदा सो को मुचुल्का गरिदिएका छौं ।

तपशिल

१
२. बबिन शाक्य
३
४

☎ : ०२९४२०११३

जिल्ला प्रशासन कार्यालय

पत्र संख्या : ०७५/७६
चलानी नं : ४६५

मिति : २०७५/०९/१९

विषयः- सुचना टाँसको जानकारी सम्बन्धमा ।

श्री सिंचाई खानेपानी तथा सरसफाई क्षेत्र उपभोक्ता समिति
.....भोजपुर.....

प्रस्तुत विषयमा तहाँ कार्यालयको च.नं. ३०...मिति २०७५/०९/१९ गतेको पत्रसाथ प्राप्त सुचना यस कार्यालयको सुचना पाटीमा टाँस गरिएको व्यहोरा जानकारीका लागि अनुरोध छ ।

१९/०९/२०७५
सहायक प्रमुख जिल्ला अधिकारी

सूचना टास गरिएको मुचुल्का

लिखीतम हामी तपशिलमा उल्लेखित भएका व्यक्तिहरुको रोहवरमा भोजपुर जिल्ला स्थित भोजपुर नगर क्षेत्रमा संचालन हुने तेश्रो साना शहरी खानेपानी तथा सरसफाइ आयोजना संचालनको सिलसिलामा गर्नुपर्ने कार्यक्रम अनुसारको यस योजना क्षेत्रको प्रारम्भिक वातावरणिय परिक्षण कार्यक्रमको सार्वजानिक सूचना टाँस मिति २०७१/०९/१ मा जिल्ला प्रशासन कार्यालयमा टाँस गरिएको हुँदा सो को मुचुल्का गरिदिएका छौं ।

तपशिल

१. श्री चन्द्र बहादुर [illegible] -

२ श्री लाल बहादुर [illegible] -

३ श्री [illegible] बहादुर [illegible] -

४ श्री [illegible]

५ श्री [illegible]

जिल्ला समन्वय समितिको कार्यालय

भोजपुर

प.स.: ०७५/०७६ प्रशासन 　　　　　　　　१ नं. प्रदेश- (नेपाल)

च.न. १८५ 　　　　　　　　　　मिति :- २०७५/०९/१

विषय : सूचना टाँस जानकारी सम्बन्धमा ।

श्री पिपले कुड खानेपानी तथा सरसफाई मुल क. उ. स. भोजपुर

भोजपुर ।

प्रस्तुत विषयमा तहाँ कार्यालयको च.नं. ३० ...... मिति २०७५।०९।१.
को पत्रसाथ प्राप्त ...... प्र. Cil सुचना ......
सम्बन्धी सूचना पाना थान ...... ३ ...... यस कार्यालयको सूचना पाटीमा
टाँस गरी सो को जानकारी पठाईएको ब्यहोरा अनुरोध ।

जिल्ला समन्वय अधिकारी

नेपाल सरकार
शहरी विकास मन्त्रालय
खानेपानी तथा ढल निकास विभाग
खानेपानी तथा सरसफाई सब-डिभिजन कार्यालय
भोजपुर धनकुटा जिल्ला आफिस, भोजपुर
कोशी अञ्चल नेपाल

☎ ०२९-४२०११०

प. सं. : ०६४/०६५
च. नं. : ९०

मिति :- २०६४/३/१

विषय :- सूचना टाँस गरी मुचुल्का पठाईदिने सम्बन्धमा

श्री सिलिचुङ खानेपानी तथा सरसफाई
उपभोक्ता समिति, भोजपुर

प्रस्तुत विषयमा यहाँको चैत्र ३० को पत्र साथ प्राप्त भएको साना शहरी खा. पा. आ. को वातावरणीय परीक्षण कार्यको सार्वजनिक सूचना यस कार्यालय सूचना पाटीमा टाँस गरी मुचुल्का पठाईएको व्यहोरा अनुरोध छ।

२०६५/३/१
(लोकप्रसाद तिवारी)
नि. डिभिजन प्रमुख

सूचना टास गरिएको मुचुल्का

लिखीतम हामी तपशिलमा उल्लेखित भएका व्यक्तिहरुको रोहवरमा भोजपुर जिल्ला स्थित भोजपुर नगर क्षेत्रमा संचालन हुने तेश्रो साना शहरी खानेपानी तथा सरसफाइ आयोजना संचालनको सिलसिलामा गर्नुपर्ने कार्यक्रम अनुसारको यस योजना क्षेत्रको प्रारम्भिक वातावरणिय परिक्षण कार्यक्रमको सार्वजानिक सूचना टाँस मिति २०७५/०९/१ मा जिल्ला समन्वय समितिको कार्यालयमा टाँस गरिएको हुँदा सो को मुचुल्का गरिदिएका छौं ।

तपशिल

१. बिपुल खतिवडा

२. प्रकाश मेहता

३. शेखर घिताल

४. नविन लङ्का

सूचना टास गरिएको मुचुल्का

लिखीतम हामी तपशिलमा उल्लेखित भएका व्यक्तिहरुको रोहवरमा भोजपुर जिल्ला स्थित भोजपुर नगर क्षेत्रमा संचालन हुने तेश्रो साना शहरी खानेपानी तथा सरसफाइ आर्योजना संचालनको सिलसिलामा गर्नुपर्ने कार्यक्रम अनुसारको यस योजना क्षेत्रको प्रारम्भिक वातावरणिय परिक्षण कार्यक्रमको सार्वजानिक सूचना टाँस मिति २०७५/०९/१ मा खानेपानी तथा सरसफाइ सव डिभिजन कार्यालयमा टाँस गरिएको हुँदा सो को मुचुल्का गरिदिएका छौं ।

तपशिल

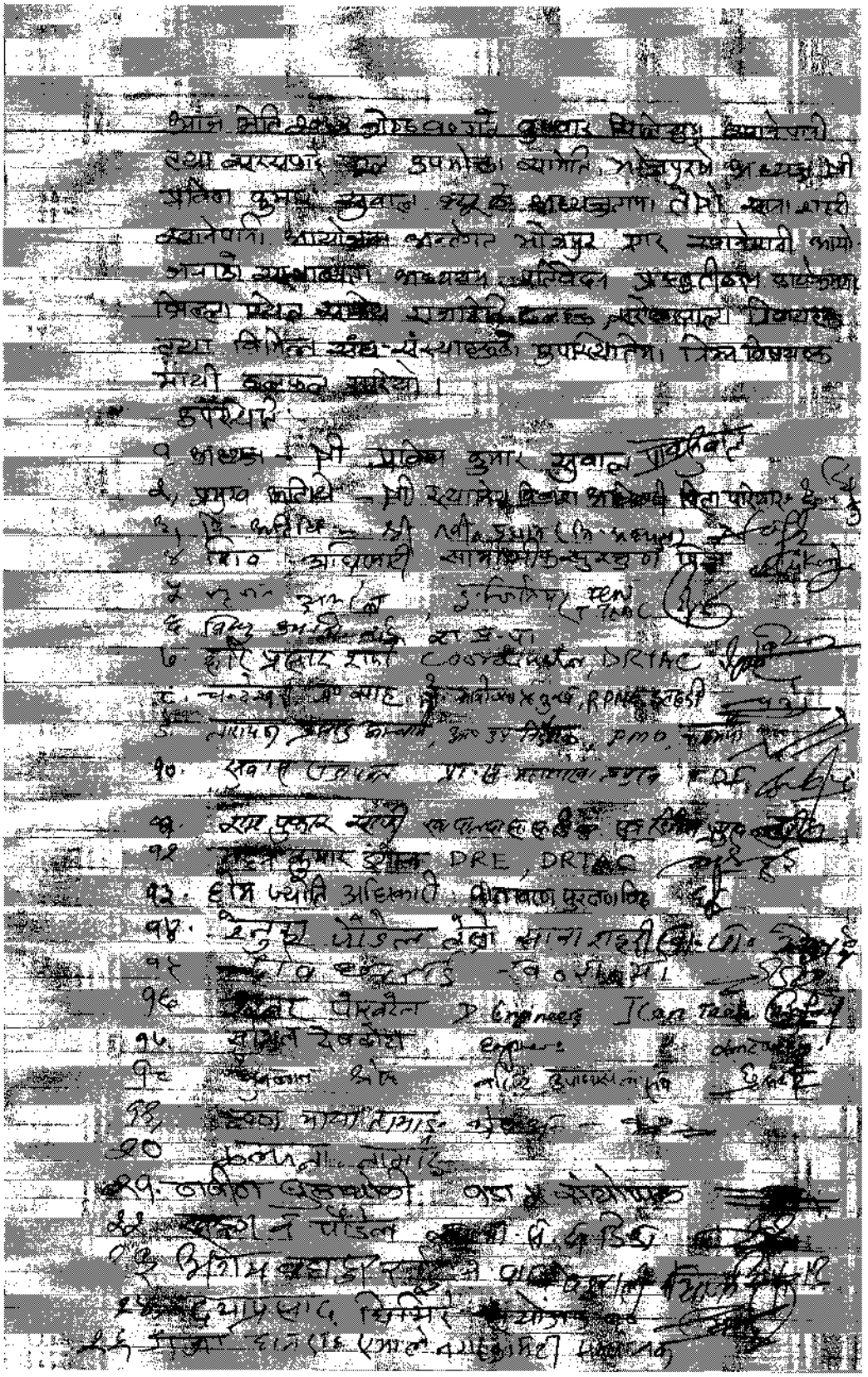
१. [illegible]

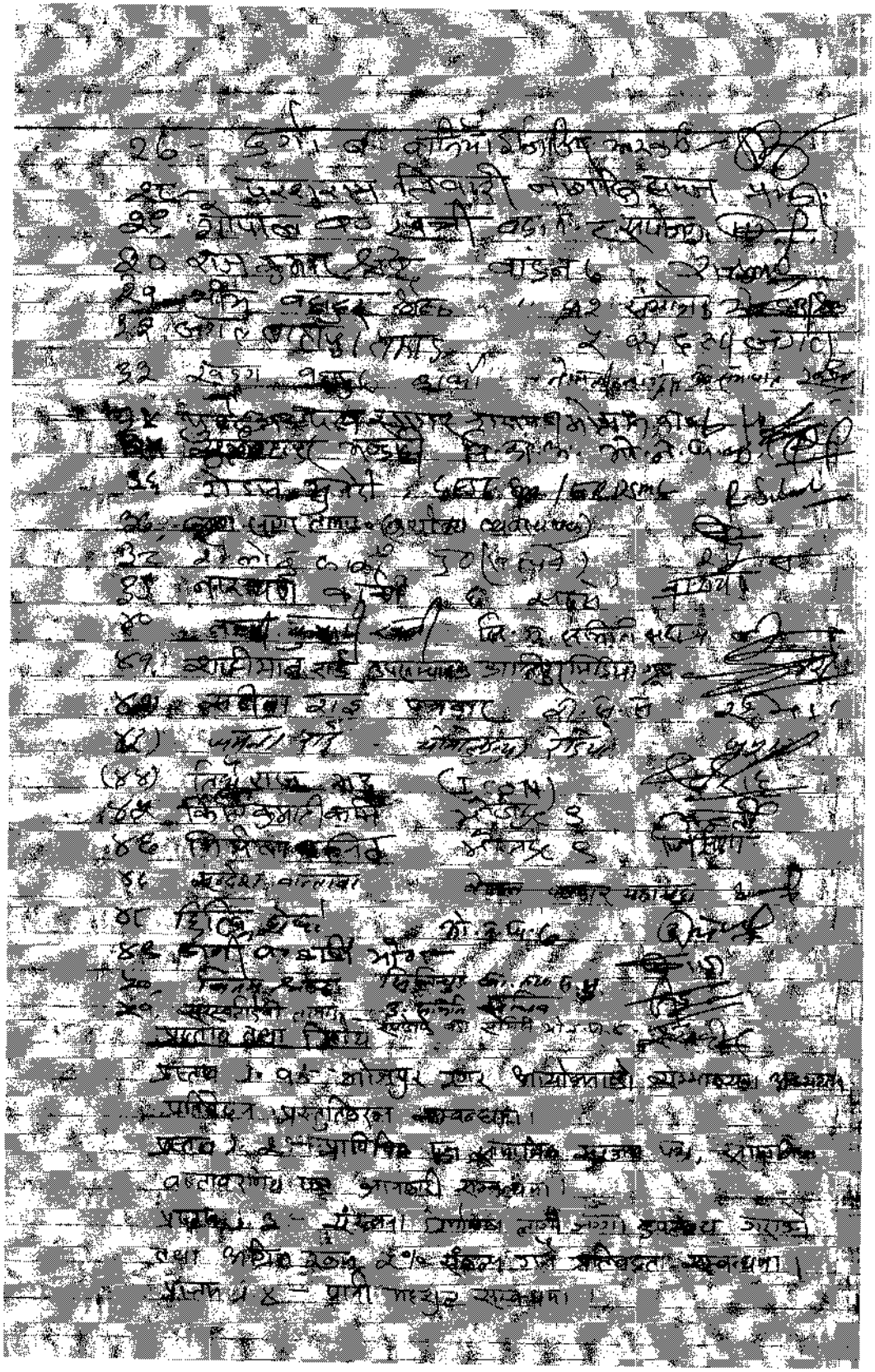
२. [illegible]

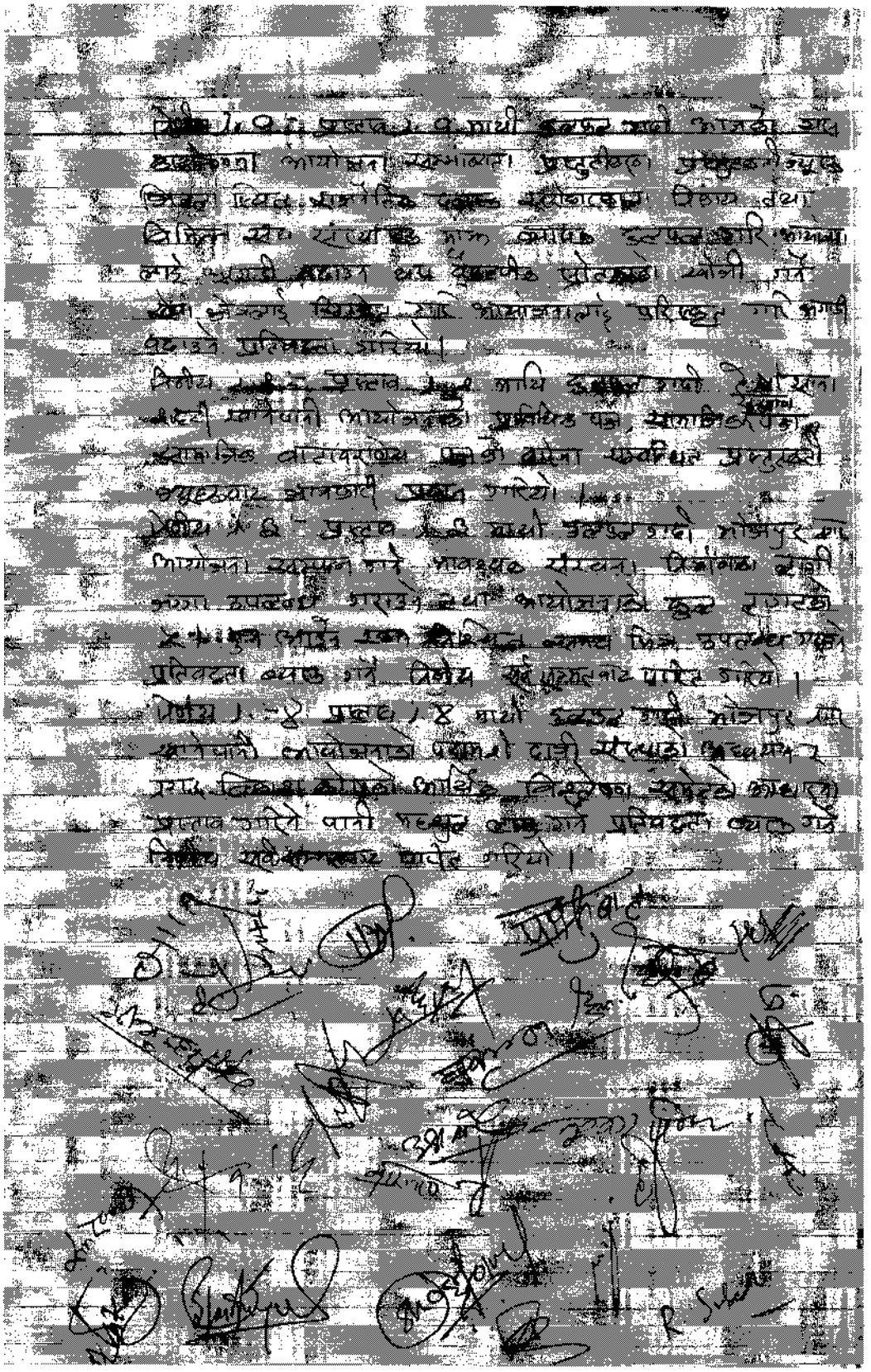
३. [illegible]

४. [illegible]

MINUTES OF MEETINGS







RECOMMENDATION LETTER FROM BHOJPUR MUNICIPALITY

भोजपुर नगरपालिका
नगरकार्यपालिकाको कार्यालय,
भोजपुर
प्रदेश नं. १, नेपाल

प.सं. : २०७४/०७५
च.नं : ६०२

मिति :२०७४/१०/१९

विषय :- जग्गा उपलब्ध गराईने सम्बन्धमा ।

श्री आयोजना निर्देशक ज्यू ,
तेश्रो साना शहरी खानेपानी तथा सर सफाई आयोजना ,
आयोजना व्यवस्थापन कार्यालय , काठमाण्डौ ।

यस नगरपालिका अन्तरगत नगरक्षेत्रमा संचालन हुने खानेपानी आयोजना संचालनार्थ पानी टंकी निर्माणको लागी आवश्यक पर्ने जग्गाहरु मा खानेपानी टंकी निर्माण गरि भोगचलन गर्ने गरि तपशिलका स्थानहरुमा जग्गा उपलब्ध हुने व्यहोरा अनुरोध छ ।

तपशिल

वडा नं ६ स्थित शैक्षीक तालिम केन्द्र/सुन्नीमा पोलीटेक्नीक ईन्टीच्यूट आसपास ।
वडा नं ७ स्थित नगर कार्यपालिका को कार्यालय आसपास ।
वडा नं ९ स्थित हात्तीगौडा २०००० लि पानी टंकी रहेको स्थान आसपास ।
वडा नं १२ स्थित पर्यटन सूचना केन्द्र आसपास ।

बोधार्थ

श्री तेश्रो साना शहरी खानेपानी तथा सर सफाई आयोजना ,
क्षेत्रिय आयोजना व्यवस्थापन कार्यालय ,
ईटहरी , सुनसरि ।

(कैलास कुमार आले)
प्रमुख

RECOMMENDATION LETTER FROM TYAMKE MAIYUNG RURAL MUNICIPALITY

ट्याम्केमैयुम गाउँपालिका

गाउँ कार्यपालिकाको कार्यालय

अन्नपूर्ण, भोजपुर

प्रदेश नं. १, नेपाल

प.सं. : २०७४/७५

च.नं. : २२५

मिति : २०७४।१०।२८

विषय : खानेपानीको मुहान स्वीकृति सम्बन्धमा ।

प्रस्तुत विषयमा यस ट्याम्केमैयुम गाउँपालिका वडा नं. ३ (साविक तिम्मा गा.वि.स.) स्थित तीन धंगाले खानेपानीको मुहान [illegible] भोजपुर नगरपालिकामा प्राविधिक डिजाइन इस्टिमेट अनुसार [illegible] वस्थित खानेपानी ल्याउन तथा तेस्रो साना शहरी खानेपानी आयोजना भोजपुर नगरपालिकामा सञ्चालन हुनुपर्ने, जल कुनै प्रकारको [illegible] अवरोध गर्ने छैन एवं खानेपानी [illegible] सञ्चालनमा पूर्ण सहयोग प्रदान गर्ने व्यहोरा [illegible] लागि अनुरोध छ ।

ध्रुवराज राई

अध्यक्ष

ANNEX 4:
SAMPLE SURVEY QUESTIONNAIRE & CHECKLISTS

तेस्रो साना शहरी खानेपानी तथा सरसफाइ आयोजना

घरधुरी सर्वेक्षण प्रश्नावली

(आयोजना प्रयोजनको लागिमात्र तथ्यांकको प्रयोग गरिनेछ)

नगर आयोजना: Bhojpur WSSP घर नं. ....
जिल्ला: Bhojpur नगरपालिका/गा.वि.स. Bhojpur वडा नं. 9
अन्तरवार्ता लिनेको नाम: Priya अन्तरवार्ता मिति: ....
सुपरिवेक्षकको नाम: .... नोड नं.: J9-16 J9-2E

१. सामाजिक-आर्थिक तथा अन्य विवरण

(उपयुक्त कोठामा (✓) चिन्ह लगाउनुहोस् वा आवश्यक विवरणहरु भर्नुहोस्)

१.१ अन्तरवार्ता दिनेको नाम: Dambar Bdr. Lamichhane

१.२ घरमूलीको नाम: Dambar Bdr. Lamichhane लिङ्ग: पुरुष ☑ महिला ☐ तेस्रो लिङ्ग ☐ पेशा ☐

परिवार सदस्य: पुरुष 3 महिला 3 तेस्रो लिङ्ग X जम्मा: 6 एकल महिला घरमूली भए ☐

१.३ यस परिवारमा शारीरिक तथा अशक्तता भएका परिवार सदस्य संख्या: X

१.४ जाति जनजातिमध्ये कुन हो? क: ब्राह्मण/क्षेत्री ☑ ख: जनजाति ☐ ग: दलित ☐ घ: अन्य ☐

परिवारको स्वरुप: एकल ☐ संयुक्त ☑

१.५ घर परिवारका सदस्यहरुको विवरण दिनुहोस्

क्रम सं.	परिवारका सदस्यको नाम	उमेर	लिङ्ग	शिक्षा स्तर	पेशा
१					
२					
३					
४					
५					
६					
७					
८					
९					
१०					

नोट: पेशा: १. कृषि २. व्यापार ३. नोकरी ४. उद्योगधन्दा ५. रेमिटेन्स (वैदेशिक रोजगार) ६. ज्याला ७. अन्य ८. (कुनै पेशा नभएका आश्रित जस्तै विद्यार्थी, गृहिणी, अशक्त बुढाबुढी, ५ वर्ष मुनिका बालबालिका आदि नोट गर्ने)

१.६ शिक्षा: १. निरक्षर २. साक्षर (✓) ३. प्राथमिकसम्म ४. माध्यमिकसम्म ५. एस.एल.सी. उत्तीर्ण ६. आइ.ए. ७. बि.ए. ८. एम.ए. ९. अन्य

१.७ यस परिवारमा बसोबास गर्ने अन्य सदस्यहरुको विवरण: सहयोगी ☐ डेरावाल ☐ कुल संख्या ☐

१.८ यस नगर क्षेत्रमा कहिले देखि बस्दै आउनु भएको छ? ☐ वर्ष

स्थायी ☑ बसाइ सरेको ☐ बसाई सरी आएको भए कुन जिल्लाबाट ....

१.९ बसाइ सर्नुको कारण: प्राकृतिक प्रकोप ☐ व्यापार व्यवसाय ☐ शिक्षा ☐ द्वन्द्व ☐ जीविकोपार्जन ☐

१.१० यो घर आफ्नै हो ☑ भाडामा बसेको ☐ अन्य ☐ भाडामा बसेको भए मासिक कति तिर्नुहुन्छ ☐

१.११ यस घरमा भान्छा कोठा बाहेक अन्य कति वटा कोठाहरु छन्?

१ कोठा ☐ २ कोठा ☐ ३ कोठा ☐ ४ कोठा वा सो भन्दा बढी ☑

१.१२ घरको अवलोकन गरी घरको किसिम लेख्ने । पक्की ☐ अर्धपक्की ☐ कच्ची ☑

(पक्की : [illegible] इट्टा/ढुङ्गा, [illegible] ; अर्धपक्की : [illegible] ; कच्ची : [illegible] ढुङ्गा/माटोले बनेको।)

१.१३ यस परिवारसंग जग्गा [illegible] छ : छ ☑ [illegible] ☐ [illegible] (मुकुम्दारीको रुपमा [illegible])

जग्गा कति ... 2 Ropani

१.१४ तपाईंले गाई, भैंसी पाल्नु भएको छ ? छ ☑ छैन ☐ छ भने [illegible] ☐ दुइटा वा बढी ✓

१.१५ तपाईंको परिवारमा तल उल्लेखित कुन कुन सामान छन् ? [illegible] संख्या लेख्ने।

क्र.सं.	सामग्री	संख्या	कैफियत	क्र.सं.	सामग्री	संख्या	कैफियत
१	साइकल/रिक्सा			९	स्टोभ/ग्यास चुल्हो	1	
२	मोटरसाइकल			१०	रेडियो/टेप	1	
३	[illegible]			११	सिलाई मेशिन	×	
४	कार/जिप			१२	वाटर फिल्टर		
५	मिनीबस/बस			१३	कम्प्युटर	×	
६	ट्याक्टर/ट्रक			१४	[illegible]	✓	
७	रेडियो/क्यासेट	1		१५	अन्य भए उल्लेख गर्ने ।	१	Mobile
८	टेलिभिजन/भिडियो [illegible]	1					

१.१६ यदि मूल पेशा कृषि भए कति महिना खान पुग्छ ? ३ महिना ☐ ६ महिना ☐ ९ महिना ✓ १२ महिना ☐

यदि नपुग भएमा कसरी आपूर्ति हुन्छ ? १ [illegible] ☐ २ [illegible] ☐ ३ [illegible] ☐ ४ [illegible] वैदेशिक रोजगार ५ व्यापार ✓ अन्य

१.१७ तपाईंको परिवारको औसत वार्षिक खर्च कति छ उल्लेख गर्नुहोस् ।

क्र.सं.	खर्चको शिर्षक र किसिम	मासिक खर्च रु.	कैफियत
१	(क) कृषि तर्फ		
१.१	रासायनिक मल, बिउ, कितनाशक औषधी खरिद गर्न		
१.२	[illegible] तयारी [illegible] ज्याला [illegible] मिसाउने, [illegible] र बिक्री [illegible] गर्ने खर्च		
१.३	अन्य भए उल्लेख गर्नुहोस्		
	(क) को जम्मा		
२	(ख) गैर कृषि तर्फ		
२.१	खाद्यान्न, [illegible] र दैनिक उपभोग्य वस्तु		
२.२	कपडा		
२.३	[illegible]		
२.४	घर भाडा, घर मर्मत		
२.५	[illegible] संचार		
२.६	बिजुली		
२.७	पानी [illegible] मर्मत सुधार		
२.८	औषधि उपचार (पानीबाट [illegible] रोग)		मासिक खर्च
२.९	औषधि उपचार (अन्य रोग)		वार्षिक खर्च
२.१०	अन्य चाडपर्व कार्यक्रम संस्कार आदि उल्लेख गर्ने		वार्षिक खर्च
	(ख) को जम्मा	15,000/-	
	क+ख को कुल जम्मा		

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

क्र.सं.	आयस्रोत	संलग्न परिवार		आय हुने आय (रु. मासिक)	कैफियत
		पुरुष	महिला		
१	(क) कृषि तर्फ				

२

१.१	कृषि उत्पादनको बिक्रीबाट आय (गर्ने गर्ई अन्न, तरकारी, फलफूल)				
१.२	पशुजन्य उत्पादन (दूध, दही, घ्यू, मासु, कुखुर आदि)				
	(क) को जम्मा				
२	(ख) गैर कृषि तर्फ				
२.१	नोकरी / जागिर				
२.२	ज्याला मजदुरी				
२.३	पेन्सन / उपदान भत्ता				
२.४	वैदेशिक रोजगार (रेमिट्यान्स)				
२.५	उद्योग / व्यापार				
२.६	व्याज				
२.७	भाडा / घर भाडा				
२.८	सानो घरेलु व्यवसाय				
२.९	अन्य आय उल्लेख गर्ने				
	(ख) को जम्मा				
	कुल जम्मा			40,000/-	

१.११ यहाँको परिवारले कुनै ऋण लिएको छ ? छ ☐ छैन ☑ (छ भने रकम रु

२. खानेपानी तथा सरसफाइ व्यवस्थापन

२.१ तपाईंको परिवारले पिउन, अन्य प्रकारको लागि प्रयोग गर्ने पानीको श्रोत कुन हो ? दैनिक कति लिटर पानी खपत हुन्छ (कृपया तलको कोठामा (✓) चिन्ह लगाउनुहोस्)

क्र.सं.	मुख्य स्रोत	✓	लिटर/दिन	वैकल्पिक स्रोत	✓	लिटर/दिन
१	इनार / कुवा	☐		इनार / कुवा	☐	
५	ट्युबवेल / हयाण्डपम्प / डिप ट्युबवेल	☐		ट्युबवेल / हयाण्डपम्प / डिप ट्युबवेल	☐	
६	सार्वजनिक धारा	☑	400	सार्वजनिक धारा	☐	
७	निजी धारा	☐		निजी धारा	☐	
८	मूल, खोला, नदी, पोखरी	☐		मूल, खोला, नदी, पोखरी	☐	
९	बिक्रेताबाट पानी किनेर	☐		बिक्रेताबाट पानी किनेर	☐	
१०	वर्षातको पानी संकलन गरेर	☐		वर्षातको पानी संकलन गरेर	☐	
११	अन्य	☐		अन्य	☐	

२.२ दैनिक आवश्यक पानी आपूर्ति गर्नका लागि पानी संकलनबारे निम्नलिखित विवरण दिनुहोस्।

क्र.सं.	विवरण	वर्षा याममा			जम्मा	सुख्खा याममा				जम्मा
		मुख्य स्रोत	वैकल्पिक	सहायक		मुख्य	वैकल्पिक	[illegible]	सहायक	
१	जाने दिन पटक									
२	लिटर खेप									
३	कुल परिमाण									
४. पानी ल्याउन लाग्ने समय (मिनेट/ खेप)										
	• पानीको मुहान सम्म पुग्न									
	• मुहानमा पर्खन पर्ने समय									
	• फर्केर आउने समय									
५	पानी भर लाग्ने समय	5min								

नोट : आवश्यकता पर्दा अधिकतम दुईवटा स्रोत मात्र लिई सोको जम्मा अंकित गरि परिमाण उल्लेख गर्ने।

३. निजी धारा जडान

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

क) परम्परागत निजी धारा ☐ ख) कम्पाउण्ड भित्र निजी धारा ग) सामुदायिक धारा ☐

३.२ तपाईंको धारा 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) घर अक्षमा 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 महिनामा पानीको महशुल तिर्नु हुन्छ ? छ छैन (✓)

सह-लगानि अवधारणा सम्बन्धी प्राथमिकता

४.१ यदि तपाईको नगरपालिका/गा.वि.स. मा विभिन्न योजना सञ्चालन गर्ने रकम उपलब्ध छ भने निम्नलिखित मध्ये कुन कुन २ योजनालाई पहिलो प्राथमिकता दिनुहुन्छ ?

क)	सडक बत्ती		छ)	विद्युत	
ख)	कालोपत्रे सडक		ज)	संचार	
ग)	विद्यालय	4	झ)	सरसफाई सुविधा	2
घ)	अस्पताल	5	ञ)	सिंचाई	
ङ)	व्यवस्थित खानेपानी प्रणाली	1	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 निजि धारा राख्न कति रकम सम्म लगानी गर्नुहुन्छ लगानीको रकमको सीमामा ☑ चिन्ह लगाउनुहोस ।

[redacted]					
१	१५००० भन्दा माथि		४	३००१ देखि ५००० सम्म	
२	१०००१ देखि १५००० सम्म		५	१५०१ देखि ३००० सम्म	
३	५००१ देखि १०००० सम्म		६	१५०० भन्दा कम	(✓)

४.३ निजी धारा जडान बापत लाग्ने शुल्क ब्यहोर्न् पर्दछ? मन्जुर छ (✓) मन्जुर छैन ।

४.४ नयाँ खानेपानी योजना शुरु भएमा आफ्नो घरमा धारा जडान गरी नयाँ नियमानुसार मासिक पानी महशुल नियमित बुझाउनु तयार हुनुहुन्छ?

छु (✓) छैन यदि इच्छुक हुनु हुन्छ भने तल दिइएको तालिकामा पानी महशुलको सीमामा ☑ चिन्ह लगाएर आफ्नो इच्छा व्यक्त गर्नुहोस ।

[redacted]		
१	रु ५०० भन्दा माथी	
२	रु ४५१ देखि ५००	
३	रु ४०१ देखि ४५०	
४	रु ३५१ देखि ४००	
५	रु ३०१ देखि ३५०	
६	रु २५१ देखि ३००	(✓)
६	रु २०१ देखि २५०	
७	रु १५१ देखि २००	

४

४.५ नयाँ खानेपानी वितरण प्रणालीको व्यवस्था हुँदा तपाईको परिवारबाट प्रतिबद्धता स्वरुप अग्रिम लागतको ५% रकम दिन तयार हुनु हुन्छ ? छ ☑ छैन ☐

४.६ नयाँ सरसफाई सुविधा (सामुदायिक शौचालय तथा सतही ढल) निर्माणको लागि सह लगानी स्वरुप १५% स्थानीय निकाय र उपभोक्ताले सहलगानी गर्न इच्छुक हुनुहुन्छ? छ ☑ छैन ☐

५. लैङ्गिक दृष्टिकोणबाट महिला सहभागिता

आयोजनाको विभिन्न चरणमा महिला सहभागिता सम्बन्धि, गैरलाभान्वित विपन्न वर्गको, आदिवासी जनजाति, दलित तथा पिछडिएका वर्गको समावेशी सहभागिता सम्बन्धि जानकारी संकलन गर्न प्रत्येक घरधुरीमा सोधिने प्रश्नहरुलाई प्रस्तुत गरिएको छ ।

क) महिलाहरुको उपस्थिति र सहभागीता

५.१ आयोजनाकाबारेमा छलफल गर्न कुनै बैठक बोलाइएको थियो ?

थियो ☑ थिएन ☐

५.२ के आयोजनाको छनौट गर्न बैठकमा महिला उपभोक्ताहरुको उपस्थिती थियो ?

थियो ☑ थिएन ☐

यदि थियो भने महिला उपभोक्ताहरुको भुमिका कस्तो थियो ?

सुन्ने मात्र ☐ अन्तर्क्रियात्मक ☑ निर्णायक ☐

५.३ आयोजनाको क्रियाकलापहरुको रेखदेख गर्न के खानेपानी उपभोक्ता तथा सरसफाई समिति/संस्था गठन भएको छ ? छ ☑ छैन/थाहा छैन ☐

ख) लैङ्गिकताका आधारमा कार्य विभाजन

५.४ तलको तालिकामा दिइएको कामहरु अक्सर कस्ले गर्ने गर्दछ? (✓)चिन्ह लगाउनुस् (दैनिक घण्टामा)

क्र.सं.	घरायसि क्रियाकलापहरु	पुरुष	महिला	कुल समय
१	खानेपानी भर्ने, बोक्ने, भण्डारण	✓	✓	
२	भान्छा तयार गर्ने, भाँडा माझ्ने		✓	
३	बालबालिका र वृद्धवृद्धाको स्याहार		✓	
४	लुगा धुने घर सफा गर्ने		✓	
५	खाद्यान्न भण्डारण तथा तयारी		✓	
६	अन्य			

ग) पारिवारिक व्यवस्थापन, आय श्रोत र अन्य विषयमा महिलाहरुको नियन्त्रण र पहुँच

५.५ तलको तालिकामा उल्लेखित पारिवारीक विषय वा क्षेत्रहरुमा निर्णय गर्दा यहाँको घर परिवारमा महिलाको भनाई सुनुवाई हुन्छ ? उपयुक्त कोठामा (✓)चिन्ह लगाउनुस्

क्र.सं	विषय वा कार्यक्षेत्रहरु	हुन्छ (✓)	हुँदैन (✓)
१	आर्थिक सरोकारका कुराहरु		✓
२	केटाकेटीको शिक्षा दिक्षा		✓
३	केटाकेटी र वृद्धवृद्धाको स्वास्थ्य र स्याहार	✓	
४	अचल सम्पति किनबेच (घर जग्गा)		✓
५	दैनिक क्रियाकलापहरु	✓	
६	सामाजिक विधि व्यवहार विवाह, व्रतबन्ध, चाडपर्व तथा सामाजिक/पारिवारीक सुसम्बन्धहरु आदि	✓	
७	अन्य		

५.९ यहाँको परिवारमा पारिवारिक सम्पत्तिका निम्न विषयमा महिलाको पहुँच र स्वामित्व रहेको छ ? तलको तालिकामा उपयुक्त कोठामा (√)चिन्ह लगाउनुस्

क्र स	विवरण	पहुँच	स्वामित्व
१	जग्गा जमिन	✗	✗
२	घर लगा अन्य सरचनाहरू	✓	✗
३	चल सम्पत्ति गरिना पैसा	✓	✗
४	दैनिक क्रियाकलापहरू	✓	✗
५	अन्य		

घ) **खा.पा.उ.स.स. तथा समुदायमा महिलाको स्तर (हैसियत)** निम्न बुँदाहरू फोकस ग्रुप छलफलको आधारमा जानकारी लिएर टिपोट गर्नुपर्नेछ ।

क्रस	विषय	उच्च	मध्यम	निम्न
१	आत्मसम्मानबोध		✓	
२	आत्मविश्वास नेतृत्व क्षीप		✓	
३	शक्तिबोध र क्षमता	✓		
४	न्याकत, तर्क संगत, धैर्य र मेहनत		✓	
५	अन्य			

६. क्षम विकासमा पहुँचका आधारमा सामाजिक समावेशी सहभागिता

क) **आयोजना क्रियाकलापमा गैरसामाजिक विपन्न वर्गहरु, पिछडिएका वर्ग, जातजाति, दलित, अपाङ्गता भएको व्यक्तिको उपस्थिति**

६.१ आयोजनाकोबारेमा छलफल गर्ने कुनै लेला बैठकमा समावेशी तवरले बोलाईएको थियो ?

थियो ☑ थिएन ☐

६.२ के आयोजनाको छनौट गर्न बैठकमा समावेशीताका आधारमा सहभागीहरुको उपस्थिती थियो?

थियो ☑ थिएन ☐

६.३ के खा.पा.उ.स.स.को गठनमा समावेशीता अपिकार भएको थियो? थियो ☑ थिएन ☐

ख) **निर्णय प्रक्रियामा समावेशी प्रकृया अपनाईएको थियो ?**

६.४ आयोजना छनौट गर्न जातजातिहरुको कस्तो भूमिका कस्तो थियो ?

उच्च ☐ मध्यम ☑ निम्न ☐

६.५ साना सहरी खानेपानी आयोजना कार्यान्वयन गर्न सामाजिक समावेशी आधारमा उपभोक्ताहरुको परिचालन गर्न भएको प्रयास कस्तो थियो? राम्रो ☐ मध्यम ☑ निम्न ☐

७. स्वास्थ्य र सरसफाइ

क. **खानेपानी**

१ तपाईको विचारमा पानीको गुणस्तर नराम्रो (खराब) भएमा के समस्याहरू देखिन सक्छ ?
(एक भन्दा बढी उत्तर आउन सक्ने)

१.१) दुर्गन्ध आउने / नमिठो स्वाद ☑ १.२) दाग लाग्ने / रङ्गीन ☑

१.३) बिरामी बनाउने ☑ १.४) अन्य उल्लेख गर्ने .....

२ के तपाईंसाई पानी भर्ने र राख्ने साँढो पानी भर्नु र भण्डार गर्नु पूर्व सफा गर्नुपर्छ भन्ने थाहा छ ? छ ☑ छैन ☐

यदि छ भने पानी राख्ने साँढो कसरी सफा गर्नु हुन्छ ?

२.१ माझी पानी माझने ☐ २.२ खरानी पानीले ☑ २.३ अरु पिठो र पानीले ☐

२.४ साबुन पानीले ☐ २.५ अन्य उल्लेख गर्नुस् .....

३. तपाईं घरमा पानी कसरी राख्नु हुन्छ ?

(एक भन्दा बढी उत्तर आउन सक्ने)

३.१) पानी भर्नु पहिले भाँडा सफा गर्ने ✓ ३.२) बासी पानी फ्याँक्ने

३.३) पानी राख्ने भाँडो राम्रोसँग ढाकेर/छोपेर राख्ने ✓ ३.४) अन्य (उल्लेख गर्ने) ....

४. तपाई गाग्री वा घैंटोबाट पानी कसरी निकाल्नुहुन्छ ?

४.१) पानी खानु अघि अम्खोरा, लोटा, करुवा, मग धोएर

४.२) गिलास, मग, जग गाग्रीमा डुबाएर

४.३) गाग्रीबाट ... अम्खोरा, करुवा, गिलासमा पानी सारेर ✓

४.४) अन्य (उल्लेख गर्ने) ....

ख. चर्पी

१. के तपाईको घरमा चर्पी छ ? छ ✓ छैन (छैनभने १.३ जाने)

१.१ यदि छ भने कस्तो प्रकारको चर्पी छ ?

१) खाल्डे चर्पी ४) सिस्टर्न फ्लस

२) भेन्टिलेटेड खाल्डे चर्पी ✓ ५) अन्य

३) वाटर सिल/पोर फ्लस

१.२ यदि छ भने, तपाईको घरमा चर्पी कसकसले प्रयोग गर्नुहुन्छ ?

१. सबैले, २. ✓ ... बालक बाहेक सबैले ३. वयस्क र प्रौढले मात्रै ४. बिरामी मात्रैले।

१.३ यदि छैन भने, दिसा गर्न कहाँ जानुहुन्छ ?

क. खोला/जङ्गल किनार ख. खुल्ला मैदान ठाउँ ग. घर सडक क्षेत्र ङ. जहाँ सजिलो हुन्छ।

१.४ के तपाईको समुदाय खुल्लादिसामुक्त क्षेत्र घोषणा भएको छ ? छ छैन ✓

ग. खानेकुराको सरसफाइ

१. खाद्यपदार्थ दूषित हुनबाट कसरी बचाउनुहुन्छ ? (एक भन्दा बढी उत्तर आउनसक्ने)

१.१) पकाएको खाना छोपेर ढाकेर राख्ने ✓ १.२) सफा हातले खाना पस्कने गर्ने ✓

१.३) काँचै खाइने खानेकुरा राम्रोसँग पखालेर धोएर ✓ १.४) थाल, गिलास सफा गरेर मात्र भान्सामा पसेर

१.५) धेरै बासी वा बढी पकेका खाना ... मिसाउन विसर्जन गर्ने ✓

१.६) हातु धुने, थाल, भाँडाकुँडा सफा गरेर मात्र खाना पस्कने, खाने ✓

१.७) चुलो चौकी पकाउने भाडा, ढकनहरू सफा राख्ने ✓

२. के तपाई खानेकुरा छोपेर ढाकेर राख्नुहुन्छ ? राख्छु ✓ राख्दिन

घ. व्यक्तिगत सरसफाइ

घरपरिवारको संख्या अनुसार कुनाकाप्यमा ठीक चिन्ह लगाएर संख्या राख्ने। यस्तो भारतको परिवार भए हरेक कुनाकाप्यमा टीक सहित मान्छेको संख्या राख्नुपर्ने।

१. तपाई र परिवारका अन्य सदस्यले कहिले र के गरेपछि हात धुनुहुन्छ ? धुने भए यस्तो (✓) चिन्ह लगाउनुहोस् र नधुने भए यस्तो (✗) चिन्ह लगाउनुहोस्। (एक भन्दा बढी उत्तर आउन सक्ने)

१	खाना खानु अघि		✓	✓		✓	
२	खाना खाएपछि	—	—	✓		✓	
३	दिसा गरेपछि			✓		✓	
४	फोहर मैला ... पछि			✓		✓	

४	कामबाट फर्केपछि			✓		✓	
६	केटाकेटीलाई दिसा पिसाब गराइ सकेपछि			✓		✓	
७	अन्य (उल्लेख गर्ने)						

तपाई र परिवारका अन्य सदस्यले के ले हात धुनुहुन्छ ? धुनेमा यस्तो (✓) चिन्ह लगाउनुहोस र नधुनेमा यस्तो (✖) चिन्ह लगाउनुहोस ।

१.	पानी मात्रै						
२	खरानी पानी						
३	माटो पिठो पानी						
४	साबुन पानी			✓		✓	
५	अन्य (उल्लेख गर्ने)						
	जम्मा						

३. तपाई र परिवारका अन्य सदस्यले कहिले कहिले नुहाउनुहुन्छ ?
नुहाउने भए यस्तो (✓) चिन्ह लगाउनुहोस् र ननुहाउने भए यस्तो (✖) चिन्ह लगाउनुहोस ।

१	प्रत्येक दिन			
२	एक दिन बिराएर			
३	हप्तामा २ पटक	✓	✓	✓
४	हप्तामा १ पटक			
५	२ हप्तामा १ पटक			
६	महिनामा एक पटक			
	जम्मा			

ङ. फोहर मैला व्यवस्थापन

१. तपाईको घरबाट निस्कने ठोस फोहर मैला कहाँ विसर्जन गर्नुहुन्छ ?

१.१ घर नजिक खाल्डोमा ☑ १.२ निजी फोहर संकलनकर्तालाई दिने ☐

१.३ गा.वि.स. / नगरपालिकाले व्यवस्था गरेको खाल्डो वा क्षेत्रमा ☐ १.४ अन्य (उल्लेख गर्ने)

२. ठोस तथा तरल फोहर वस्तुलाई अव्यवस्थित तरिकाले विसर्जन गर्नाले हुने नराम्रा असरहरूके के हुन ? (एक भन्दा बढी उत्तर आउन सक्ने)

२.१ फोहोर वातावरणमा वृद्धि ☑ २.२ लामखुट्टे झिंगा, किराहरूको वृद्धि ☑

२.३ रोग सर्ने वृद्धि ☑ २.४ अन्य उल्लेख गर्ने दुर्गन्ध [illegible]

३. तपाईको घरबाट निस्कने फोहर पानी कहाँ विसर्जन गर्नुहुन्छ ?

३.१ खाल्डोमा (Soak pit) ☐ ३.२ तरकारी बारीमा / करेसा बारीमा ☑

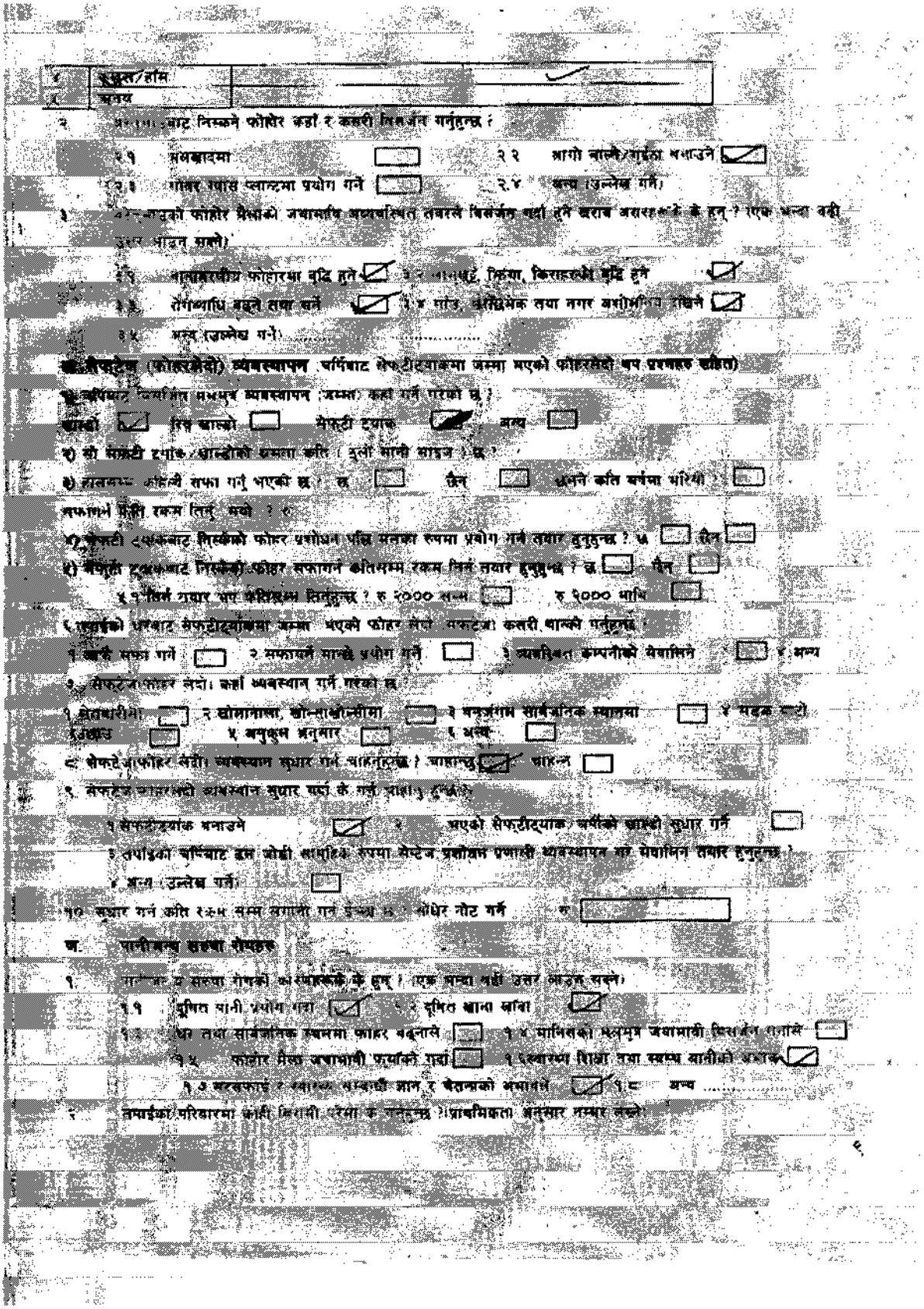
३.३ सार्वजनिक ठाउँमा ☐ ३.४ अन्य (उल्लेख गर्ने)

च. वस्तुभाउको फोहर व्यवस्थापन

१. के तपाईले वस्तुभाउ पाल्नु भएको छ ? छ ☑ छैन ☐ छैन भने पानी जन्य सरुवा रोगमा जाने।
यदि छ भने कुन कुन प्रकारका छन् र तिनीहरूलाई कहाँ राख्नु हुन्छ ?

१	गाई / भैंसी	✓
२	बाख्रा / बंगुर	
३	माछा	✓

८



२.१ घरायसी उपचार गर्ने [ ] २.२ धामी, झाँक्री, पुजारी कहाँ जाने [ ]
२.३ औषधि पसलमा जाने [✓] 1 २.४ स्वास्थ्य चौकि वा अस्पतालमा जाने [✓] 2
२.५ अन्य (उल्लेख गर्ने)

३. यदि परिवारमा कसैलाई झाडापखाला लागेमा के गर्नुहुन्छ ? (प्राथमिकता अनुसार नम्बर लेख्नु)

३.१ जीवनजल खुवाउने [1] ३.२ घरायसी उपचार गर्ने [ ]
३.३ धामी, झाँक्री वा पुजारी कहाँ जाने [ ] ३.४ औषधि पसलमा जाने [2]
३.५ स्वास्थ्य चौकि वा अस्पतालमा जाने [3] ३.६ अन्य (उल्लेख गर्ने)......

४. गत एक वर्षभित्रमा तपाइँका परिवारका सदस्यहरु झाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरुबाट प्रभावित थिए ? प्रभावित भएका भए कति जना थिए तलको तालिकामा संख्या नोट गर्ने।

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
१	झाडापखाला				
२	[illegible]				
३	जुका				
४	टाइफाईड				
५	हैजा				
६	छाला सम्बन्धी रोग				
७	औलोरोग (मलेरिया)				
८	कमलपित्त (जण्डीस)				
९	अन्य				
	जम्मा				

५. गत एक वर्षभित्र तपाइँका परिवारमा झाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरुबाट कसैको मृत्यु भएको छ ? (मृत्यु संख्या)

[illegible]	[illegible]	[illegible]	[illegible]
झाडा पखाला			
[illegible]			
पानीजन्य अन्य सरुवा रोगहरु			
जम्मा			

६. गत एक वर्षभित्र तपाइँको परिवारका सदस्यलाई झाडापखाला र पानीजन्य अन्य सरुवा रोगहरुको उपचारमा कति रकम खर्च गर्नु भयो ?

[illegible]	[illegible]
झाडापखाला	
पानीजन्य अन्य सरुवा रोगहरु	
जम्मा	

धन्यवाद!

Checklists for Physico Chemical Environment

Parameters	Description
Topography	Hilly region
Geology (Rock and Soil Types)	Slate, Phytllite, Schist, Quartzite, Limestone & Dolomite Alluvium Soil
Erosion and Sedimentation	No such events recorded and observed
Climate	Warm and Temperate Climate
Quarry Sites (If any)	No
Land Use	No exact data obtained. The field observation shows that Agriculture dominates the land use pattern followed by forests and residential areas.
Air Quality	Not that severe
Water Quality	Moderate
Noise Level	Not that severe
Drainage Network	No proper drainage system

Checklist for Biological Environment

Project: Bhojpur WSSP

CHECKLIST OF FLORA

Date: December, 2015

S.No.	Name of plants	Uses			Others
		Fuel-wood	Fodder	Medicine	
1.	Ainselu			✓	Fruits, Agroforestry
2.	Amala	✓		✓	Edible fruits
3.	Angeri	✓		✓	
4.	Asuro			✓	
5.	Bakaino			✓	Edible fruits, Agroforestry
6.	Bar			✓	"
7.	Barro			✓	Fruits
8.	Bel			✓	Fruits, Agroforestry, Religious
9.	Bhalayo				Edible Oil
10.	Bhote Peepal	✓	✓	✓	Paper Manufacture
11.	Bot Dhaiyaro				Edible gum, Others
12.	Chilaune			✓	Agroforestry, Dyeing
13.	Chiuri	✓		✓	Edible fruits, Agroforestry
14.	Chutro			✓	Fruits, Dyeing, Alcohol drink
15.	Daar	✓			Fruits for flavouring
16.	Dobdabe				Edible fruits, Agroforestry
17.	Dhabini			✓	Salad Vegetables
18.	Dhusure			✓	
19.	Gueilo	✓		✓	Edible fruits
20.	Hallunde			✓	Edible leaves, Agroforestry
21.	Harro			✓	Edible fruits, Dyeing
22.	Jamun	✓		✓	Edible fruits, Agroforestry
23.	Thankari Syauda	✓			Agroforestry
24.	Katro			✓	
25.	Kadam			✓	Edible fruits, Agroforestry
26.	Kafal			✓	Edible fruits, Dyeing
27.	Kamain			✓	
28.	Khair	✓	✓	✓	Edible Seeds, Dyeing, Tannin
29.	Khanayo			✓	Edible fruits
30.	Khirro			✓	
31.	Kimbu	✓		✓	Agroforestry, Edible fruits
32.	Kutmiro			✓	Furnitures, Industrial purposes
33.	Lampate				Edible fruits
34.	Mauwa				Agroforestry, Furnitures, Ornamental
35.	Phaledo			✓	Agroforestry
36.	Pipal	✓		✓	Religious
37.	Sallo			✓	
38.	Sajh	✓		✓	Furnitures

S.No.	Name of plants	Uses			Others
		Fuel-wood	Fodder	Medicine	
39.	Simal			✓	
40.	Simali	Firewood		✓	Edible Seeds, Agroforestry
41.	Sindure	✓		✓	Agroforestry, Preservative
42.	Sirís	✓			Agroforestry
43.	Sisam	✓		✓	" , Paper making, Plywood, Furnitures
44.	Tanki	✓		✓	Edible fruits, Vegetables, Agroforestry, Dyeing
45.	Tuni			✓	" " Furniture, Carvings
46.	Uttis	✓		✓	Agroforestry

Note:.....

.....

.....

.....

Project: Bhojpur WSSP

CHECKLIST OF MAMMALS

Date: December, 2015

S.N.	Mammals ~~Wild Animals~~	Remarks
1.	Ban Dhade	
2.	Bwanso	
3.	Chituwa	
4.	Dhedu	
5.	Dumsi	
6.	Gauro	
7.	Lampakhete Chamero	
8.	Malsapro	
9.	Musa	
10.	Paanch Dharke Lokharke	
11.	Rato Badar	
12.	Syaal	

Note:.....

.....

.....

.....

Project: Bhojpur WSSP

CHECKLIST OF BIRDS

Date: December, 2015

S.No.	Birds	Remarks
1.	Kolli	
2.	Gathe Latakesera	
3.	Kotiai	
4.	Ghar Bhangera	
5.	Thopte Bhyakur	
6.	Basanta	
7.	Dronak Chil	
8.	Piura	
9.	Dangre Rupi	
10.	Taame Dhukur	
11.	Mahakaushik	
12.	Kagal Pakuro	
13.	Jureli	
14.	Kaalo Kaag	
15.	Kalij	
16.	Phusro Chaite Chara	
17.	Nyauli	
18.	Madana Sugga	

Note:.....

.....

.....

Project: Bhojpur WSSP

CHECKLIST OF REPTILES, AMPHIBIANS & FISHES

Date: December, 2015

S.No.	Reptiles, Amphibians & Fishes	Remarks
1.	Reptiles & Amphibians	
	Haryau	
	Adhbo Sarpa / Tirishe / Batmsa	
	Chhirbire Sarpa	
	Chheparo	
	Bhyaguta	
2.	Fishes	
	Asala	
	Chuche Buduna	
	Faketa	
	Kabre	
	Katle	
	Singhi	
	Gaddela	
	Tite	
	Hile	
	Saiar	

Note:

CHECKLISTS FOR FOCUS GROUP DISCUSSION

A. FOCUS GROUP DISCUSSION 1

Date: 25 December, 2015

Project: Bhojpur Water Supply & Sanitation Project

Venue: Silingchung WUSC Office, Bhojpur

Number of Participants: 8

Purpose Statement: Information Dissemination to the participants regarding UWSSSP, Discussions regarding the proposed project and Roles & Responsibilities of various Stakeholders

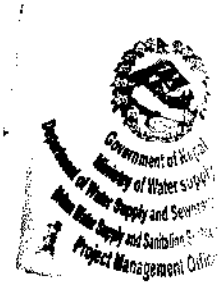
QUESTIONS/ISSUES

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. As a stakeholder, how can you contribute from your side to minimize the anticipated environmental issues?
7. Lastly, what would you say are the most important issues you would like to express about this project?

FINDINGS OF FOCUS GROUP DISCUSSION 1

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. They are getting water supply service from the existing system intermittently only. However, it is known that water supply service for major government offices is continuous. They expressed anger towards such kind of partiality of water supply service Thus; they are highly expecting this proposed project to improve the existing condition of the existing water system.
3. The participants are also found aware about the environment.
4. Neither protected areas not 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. The information regarding the proposed mitigation measures for the anticipated environmental concerns they raised has been shared to all the participants to assure them about the efforts of the project to minimize or avoid these impacts.

   As a responsible stakeholder, they committed to contribute to support safeguard implementation of the proposed project. They also committed to help to establish coordination with the locals during the project construction period.
7. 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.



Engineer

B. FOCUS GROUP DISCUSSION 2

Date: 25 December, 2015

Project: Bhojpur Water Supply & Sanitation Project

Venue: Bhojpur Bazaar

Number of Participants: 8

Purpose Statement: Information Dissemination to the participants regarding UWSSSP, Discussions regarding the proposed project and Roles & Responsibilities of various Stakeholders

QUESTIONS/ISSUES

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. Do you have any idea about the environmental concerns regarding the proposed project?
5. Do you have any objection regarding the project activities that will be carried out at the core bazaar area?
6. As a stakeholder, how can you contribute from your side to minimize the anticipated environmental issues?
7. Lastly, what would you say are the most important issues you would like to express about this project?

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

FINDINGS OF FOCUS GROUP DISCUSSION 2

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. They are getting water supply service from the existing system intermittently only. It is known that water supply service for major government offices is continuous. They expressed anger towards such kind of partiality of water supply service Thus; they are highly expecting this proposed project to improve the existing water system.
3. The participants are also found to be quite familiar with the term "Environment" and also with its anticipated issues.
4. Their main concerns regarding the environmental aspects are Dust Emissions, Water Quality, Noise Pollution, Community Forest Conservation, Traffic Congestion, and 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.
5. 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 & prompt backfilling works so that hindrance to access to the shops & houses can be minimized and anticipated discomfort to the vendors & passerby can be minimized.
6. After assuring about the mitigation measures for the environmental concerns they raised, they committed to contribute to support safeguard implementation of the proposed project. They also assured us that there will be no interference of locals during construction works of the proposed project.
7. 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.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

C. FOCUS GROUP DISCUSSION 3

Date: 24 May, 2017

Project: Bhojpur Water Supply & Sanitation Project

Venue: WUSC Office, Bhojpur

Number of Participants: 8

Purpose Statement: Discussions regarding the proposed project

QUESTIONS/ISSUES

1. You must be familiar with UWSSSP as we had already discussed about it in our earlier discussion programs. Now, we are here for Feasibility Study Report presentation and other related discussions. Do you have to say anything regarding this?

2. The issue you raised regarding the initiation of the project is intrinsic as we understand the hardship you all are facing for the reliable water supply system. After the approval of feasibility study report, we will be heading for detailed design works. Once it gets completed, the project will go for construction and operation accordingly. During this, we need full support from the WUSC as well as local people.

3. As we have already discussed about the environmental concerns regarding the proposed project in our earlier discussion programs, we like to inform you that more or less obviously some environmental issues will be raised during construction of the project; During construction period, these anticipated environmental issues may bother the surroundings to some extent only; however, we assure you that those issues will not be either extreme or permanent.

4. We also want to inform you that this project is focused on the enhancement of GESI issues. We are happy to know that the WUSC has considered GESI issues during appointment of members of WUSC as here WUSC has two female members at decision making level and it has also included people belonging to various community especially indigenous communities. We further urged to give continuity to this till the completion of the project like considering GESI issues in various capacity building programs under the proposed project and other various related programs.

5. As a stakeholder, how will you contribute from your side to minimize the anticipated environmental issues?

6. Lastly, what would you like to say about this project?

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector
Project Management Office

FINDINGS OF FOCUS GROUP DISCUSSION 3

1. According to the participants, they are very much enthusiastic towards the proposed project. They want this proposed project to be commenced as soon as possible. They do not want the commencement of the project to be delayed for years.
2. The participants acting as the representatives of local community are ready to provide full support to the consultant team to lead the proposed project towards ultimate success.
3. Like other projects, people of this project town are concerned about the environmental issues that include especially Dust Emissions, Water Quality, Noise Pollution, Obstruction to the vendors & passersby, Damage to the existing facilities and Construction Waste & Solid Waste Management during construction period as like in the earlier discussion programs. We assure them about the mitigation of these likely environmental impacts by adopting the proposed mitigation measures.

   However, some participants queried that how the environmental impacts can be evaluated as temporary or moderate. In regard to this, we informed them about our safeguard expert team and their expertise to evaluate the significance of the impacts during design study period. Similarly, we also informed them about the mobilization of the safeguard expert team during project construction period also.
4. The participants showed positive response towards GESI issues as they stated that the proposed project is for all and there will be no prejudice. Hence, they assured us to give continuity to prioritize GESI issues during the implementation of the proposed project.
5. As a responsible stakeholder, they committed to contribute to support safeguard implementation of the proposed project like a) establishing coordination with the locals during construction works at the core bazaar are as some ignorant people may create hindrance to the project works due to the temporary discomfort they may suffer; b) facilitating to contact local scrap vendors for the sale of recyclable wastes generated from the construction works; c) facilitating to dispose the wastes to the approved landfill sites of the project town etc.
6. Lastly, the participants articulated their desire to get adequate, safe, reliable and potable water supply service from the successful completion & implementation of the proposed project along with the mitigated environmental impacts. They are very pleased to know that their aspiration for the proposed project has now become real & tangible.

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Project Management Office

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)***

*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.

Engineer

Government of
Ministry of Water
Department of Water Supply and Sewer
Urban Water Supply and Sanitation
Project Management

ANNEX 6:
WATER QUALITY TEST REPORTS

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector
Project Management Office

NS Lab Accreditation No.: 09-2068/69 Regd. No. 5387/064/065

AASTHA SCIENTIFIC RESEARCH SERVICE PVT. LTD.

P.O. Box No. 4316, Dillibazar, Kathmandu, Nepal
Tel: +977-1-4433748, E-mail: aasthalab2065@gmail.com

(C e n t e r f o r c o m p l e t e s c i e n t i f i c s o l u t i o n)

Test Report/Certificate

Report No. : 88/2073
Entry No. : AASTHA – 43– 2073
Sample : Surface Water
Client : ICON - TAEC JV
Location : Tin Bhangale, Bhojpur

Date received : 29 – 01 – 2073
Date completed : 07 – 02 – 2073
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 26°C	4500-H⁺ APHA-AWWA-WEF 2012, 22nd Edition	6.3	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	52	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	1.2	5 (10)
4.	Taste and Odor	-	N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.21	5(15)
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	34	500
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	33	1000
8.	Total Residual Chlorine, (mg/l)	4500 - Cl B, APHA- AWWA - WEF 2012, 22nd Edition	<0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl- B, APHA-AWWA-WEF 2012, 22nd Edition	0.99	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.23	1.5
11.	Nitrate, (mg/l)	4500-NO_3-B, APHA-AWWA-WEF 2012, 22nd Edition	0.58	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	<0.02	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	0.13	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	2.1	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	4.8	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	0.12	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg.l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		<0.02	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd Edition	<0.01	0.05

Remarks: Observed level of pH is slightly lower than the NDWQS required limit.

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. Liability of our institute is limited to the involved detriments and amount only.
3. Even in the case of stable samples such as limestone, minerals, soil etc. they will not be stored more than six [illegible]
4. Parameters in * are not accreditated by NBSM.

Engineer

Government of Nepal
Ministry of Water supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector Project
Project Management Office

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: aastha_b2065@gmail.com

(C e n t e r f o r c o m p l e t e s c i e n t i f i c s o l u t i o n)

Test Report Certificate

Report No. : 87/2073
Entry No. : AASTHA – 43– 2073
Sample : Surface Water
Client : ICON - TAEC JV
Location : Bhulke, Bhojpur

Date received : 29 – 01 – 2073
Date completed : 07 – 02 – 2073
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 26°C	4500-H⁺ APHA-AWWA-WEF 2012, 22nd Edition	6.6	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	58	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	1.4	5 (10)
4.	Taste and Odor		N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.14	5(15)
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	32	500
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	38	1000
8.	Total Residual Chlorine, (mg/l)	4500- Cl B, APHA - AWWA - WEF 2012, 22nd Edition	<0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl- B, APHA-AWWA-WEF 2012, 22nd Edition	0.99	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition,	0.42	1.5
11.	Nitrate, (mg/l)	4500-NO_3- B, APHA-AWWA-WEF 2012, 22nd Edition	0.40	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	0.03	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	0.45	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	6.4	250
15.	Mercury*, (mg/l)	3500-Hg-C, APHA-AWWA-WEF, WPCF, 17th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WEF 2012, 22nd Edition	3.2	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	<0.05	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg.l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		<0.02	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd Edition	<0.01	0.05

Remarks: *Water quality meets NDWQS required limit.*

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 intended nor implied.
2. Liability of our institute is limited to the invoiced detrimands and amount only.
3. Even in the case of stable samples such as limestone, minerals, soil etc. they will not be stored more than six months.
4. Parameters in * are not accreditated by NBSM.

Engineer

Government of Nepal, Ministry of Water Supply, Department of Water Supply and Sewerage Management, Urban Water Supply and Sanitation Sector Project, Project Management Office

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: aasthalab2065@gmail.com

(Center for complete scientific solution)

Test Report/Certificate

Report No. : 86/2073
Entry No. : AASTHA – 43– 2073
Sample : Surface Water
Client : ICON - TAEC JV
Location : Jor Sanghu, Tindhare, Daduwa, Bhojpur

Date received : 29 – 01 – 2073
Date completed : 07 – 02 – 2073
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 26°C	4500-H⁺ APHA-AWWA-WEF 2012, 22nd Edition	6.5	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22nd Edition	48	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22nd Edition	1.2	5 (10)
4.	Taste and Odor		N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.27	5(15)
6.	Total Hardness as $CaCO_3$, (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22nd Edition	32	500
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	29	1000
8.	Total Residual Chlorine, (mg/l)	4500 - Cl B, APHA - AWWA - WEF 2012, 22nd Edition	≤0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl- B, APHA-AWWA-WEF 2012, 22nd Edition	≤0.50	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.46	1.5
11.	Nitrate, (mg/l)	4500-NO_3-B, APHA-AWWA-WEF 2012, 22nd Edition	0.44	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	0.03	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	0.20	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO_4^{2-} C, APHA - AWWA - WEF 2012, 22nd Edition	2.4	250
15.	Mercury*, (mg/l)	3500-Hg-C, APHA-AWWA-WEF, WPCF, 17th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WEF 2012, 22nd Edition	3.2	200
17.	Iron*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	<0.05	0.30(3)
18.	Manganese*, (mg/l)		≤0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)		<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		<0.02	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22nd Edition	<0.01	0.05

Remarks: *Water quality meets NDWQS required limit.*

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 implied nor supplied.
2. Liability of our Institute is limited to the invoiced detrimands and amount only.
3. Even in the case of stable samples such as limestone, minerals, soil etc. they will not be stored more than six months.
4. Parameters in * are not accreditated by NBSM.

Government of Nepal, Ministry of Water Supply, Department of Water Supply and Sewerage Management, Urban Water Supply and Sanitation Sector Project, Project Management Office

Engineer

ANNEX 7: PHOTOGRAPHS

1. Bhulke Source Spring

2. Daduwa Source

3. Tindhare Source

4. Jorsanghu Source

5. Proposed source, Tin Bhangale Intake area

6. Proposed Barren Land for Kafledanda WTP-2, RVT & SSF

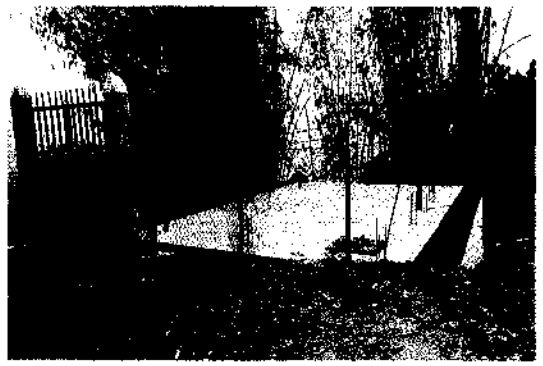
Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector
Project Management Office

7. Hattigauda Ex- RVT 40,60 and Proposed WTP-1 area

8. Proposed Barren Land at Lower Taxar Area for the proposed RVT of 50 Cum capacity

9. Proposed Barren Land for RVT at CTEVT area



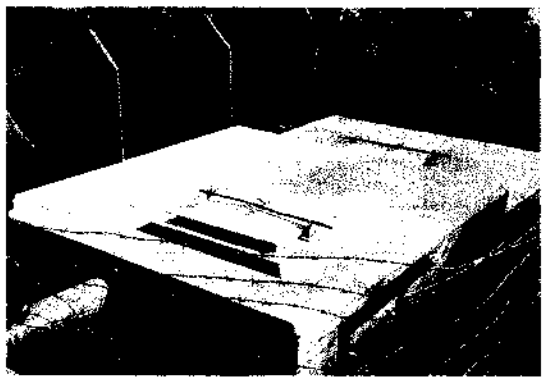
10. RVT at Upper Taxar Area, (Under construction)

11. Core Bhojpur Bazaar Area

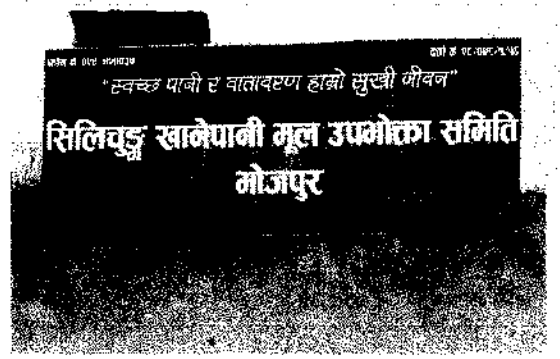
12. Road along service area

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage
Urban Water Supply and Sanitation Sector
Project Management Office



13. Newly Constructed Existing RVT (75cum) at Welfare - Gadhidanda



14. Existing Office of Silinchung WUSC

15.Existing RVT (150cum) at Pani Tanki Area

16. Existing RVT (200cum) at Pani Tanki Area

17.Meeting with WUSC in Bhojpur

18. Women Participation in WUSC meeting

Engineer

Government of
Ministry of Water
Department of Water Supply and
Urban Water Supply and
Project

ANNEX 8: COMMENT INCORPORATION MATRIX

Comment and Response Matrix

Bhojpur Water Supply & Sanitation Project, Bhojpur

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 Bhojpur WSSP Presentation**				
1	Chapter 2, Section 2.1, Figure 1, Page 5 Section 2.4, Sub Section 2.4.15, Figure 3, Page 20	A clear project layout map, preferably laid on a topo-map of the project area, also showing locations of all temporary construction facilities such as camps, stockpiling sites, spoil disposal sites, quarry sites (if applicable) etc. with clear legends need to be presented as well	Chapter 2, Section 2.1, Figure 1, Page 7 Chapter 2, Section 2.4, Sub Section 2.4.14 e, Figure 3, Page 27	This has been incorporated.	
2	Chapter 2, Section 2.4, Sub section 2.4.14 d), Pages 18 & 19	It should be clearly stated whether or not a crusher plant and internal access roads required for connectivity among project sub systems are also among the project components. If they are, the IEE study should also address impacts associated with them.	Chapter 2, Section 2.4, Sub section 2.4.14 d), Line 69 Page 25	This has been incorporated.	
3	Chapter 2	A categorical list of project construction and operation activities needs to be presented in a separate sub-chapter of Project Description. It should be made very clear if quarrying, rock crushing and drilling are construction activities or not	Chapter 2, Section 2.5, Page 30 & 31	This has been incorporated.	
4	Chapter 3, Section 3.7, Page 24	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, Sub Section 2.4.15, Pages 29	This has been incorporated.	

Engineer

Department of Water Supply and Sewerage
Government of Nepal
Water Supply and Sanitation Sector Project
Project Management Office

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. Whether or not the baseline information collected and impacts assessed are covered for the outlying area as well.			
5	Chapter 3, Section 3.1, Page 21	Mention of Detailed Engineering Design Report and Due Diligence Report seems to be left out of the literature reviewed.	Chapter 3, Section 3.1, Line 96,Page 36	This has been incorporated.	
6	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 3.7, Pages 40-42 Chapter 3, Section 3.3, Pages 37 to 40 Annex 4	This has been incorporated.	
7	Chapter 3, Section 3.2, Sub Section 3.2.1,Page 22	It is confusing how data on climate, rainfall and other meteorological conditions were collected as primary information/data through field survey as mentioned in section 3.2.1.	Chapter 3, Section 3.3, Sub Section 3.3.1,Line 102,Page 37	This has been incorporated.	
8	Chapter 7	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, Sub Section 7.2.1.2 f), Page 87, h) & i) Page 88 Sub Section 7.2.3.2 b), Page 90	This has been incorporated.	
9	Chapter 7, Sub Section 7.2.4.3 c)	Mention of impacts due to increased generation of wastewater on account of reliable and sufficient	Chapter 7, Sub Section 7.2.4.3,Page 94	As per expert suggestion as this wastewater issue	

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
15	Chapter 11, Section 11.2, Table 32, Pages 88 to 94	Monitoring parameters should be selected based on source oriented monitoring approach rather than sink oriented monitoring approach to ensure a preventive rather than curative environmental monitoring of project implementation.	Chapter 11, Section 11.3, Table 41, Pages 125 to 140	This has been incorporated.	
b)	**Generic Comments received during other Presentations**				
1	All Chapters with tables	Sources are missing in many tables	All Chapters with tables	This has been incorporated.	
2	Annex 3	Unnecessary repetition of project location map and schematic diagrams of transmission/distribution systems of the project could have been avoided.	This has been omitted as per expert's suggestion	This has been incorporated.	
B.	**By Mr. Kamal Adhikari (Sociologist, DWSSM)**				
a)	**Comments received during Diktel WSSP Presentation**				
1	Executive Summary, Page xiii	Executive Summary • 68.6% population of what (XX) number	Executive Summary, Page xiii	This has been incorporated.	
		• List of policies (in bullet point) and methodology adopted is precisely presented: good		Sincere thanks for the appreciation	
2		Rationale of Alternative Selection Concretely spell out some pressing issues (e.g. hardship, willingness to pay, demand, water quality, public health impact, policy commitments and priority by local government	Chapter 1, Section 1.5, Page 4 Chapter 6, Section 6.1, Sub Section 6.1.1, Pages 78 & 79	This has been incorporated.	
3	Chapter 4, Section 4.1,	Policy		This has been	

Engineer

Government of Nepal
Ministry of Water supply
Department of Water Supply and Sewerage Management
Project Management Office

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
		water supply in para 194 clearly suggests that wastewater management is also within the scope of this IEE study. If it is so, all additional structural components required for wastewater drainage/management should be included as project components as well as part of mitigation measures.		does not fall within the scope of our IEE study, this part has been omitted.	
10	Chapter 3	A simple checklist or a simple interaction matrix could have been used as a standard tool for identification of issues/impacts during preparation of the ToR itself.	Chapter 3, Section 3.3, Page 37	This has been incorporated in the IEE report.	
11	Chapter 7, Sub Section 7.2.1.2 f), Page 58 & 59	Anticipated adverse impact on current land-use in terms of land-use change primarily due to placement of structural components of the project within the core area also needs to be explained.	Chapter 7, Sub Section 7.2.1.2 g), Page 87 & 88	This has been incorporated.	
12		Mitigation measures for preventing/arresting spilled/leaked fuel/chemicals are missing. Also, separate measures for management of two basic categories of solid wastes, viz. biodegradable SW and non-biodegradable/reusable/recyclable SW need to be provided	Chapter 8, Section 8.1, Sub Section 8.1.1.2 e) Page 99 & 100 and f), Page 100	This has been incorporated.	
13	Chapter 8, Section 8.4, Sub Section 8.4.2	Quick backfilling of excavated trenches accompanied by compaction without delay could avoid potential environmental/social nuisance due to stockpiled spoil especially in the service area	Chapter 8, Section 8.1, Sub Section 8.1.4.2 d), Page 105	This has been incorporated.	
14	Chapter 8, Section 8.1, Sub Section 8.1.2	MMs for preventing water and soil contamination due to accidental leakage/spillage of fuel/ chemicals both during their transportation and storage do not feature in the list of MMs.	Chapter 8, Section 8.1, Sub Section 8.1.1.2 f), Page 100	This has been incorporated.	

Engineer

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
	Table 7, Pages 26 to 29	Review key WASH sector policies and omit draft one.	Chapter 4, Section 4.1, Table 12, Pages 45 to 51	incorporated.	
4	Chapter 9, Section 9.2, Page 73 & 74	Local Level Issues Analyze core raised by public and study team with proper mitigation measures. Still, issues are generic.	Chapter 9, Section 9.2, Pages 111 to 114 Also Refer Annex 4- Checklists for FGD	This has been incorporated.	
5	Annex 7-Water Quality Test Reports	Value of Ca, NO_2, SO_4 It is high so assess if water treatment technology is appropriate	Annex 6-Water Quality Test Reports	The values for Ca, NO_2, SO_4 are within the NDWQS. Please refer Annex 6.	
b)	**Generic & Relevant Comments received during other Presentations**				
1	Chapter 4	Rural Water Supply and Sanitation National Policy, Strategy and Sectoral Strategic Action Plan 2004: insert pertinent IEE related issues	Chapter 4, Section 4.1,Table 12- 1 no., 3rd & 4th row, Page 45	This has been incorporated.	Ilam Presentation
2	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 213, Page 81	This has been incorporated.	Ilam Presentation
3	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), Line 218 to 221,Page 83 & 84	This has been revised.	Ilam Presentation
4	Chapter 9, Section 9.1	Critical roles of wide range of stakeholders: other than what is mentioned in the report (e.g. palikas, security personnel, forest office personnel....)	Chapter 9, Section 9.1, Table 39, Page 109-111.	This has been incorporated.	Ilam Presentation
5	Chapter 12,Page 104	What about site/field monitoring by central team?	Chapter 12, Line 347,Page 150	This has been incorporated.	Ilam Presentation
6	Chapter 6, Line 177,	With and Without project alternatives and without		This has been	Katahariya

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	**Description of change**	**Remarks**
	Page 52 & 53	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 78 & 79	incorporated.	Presentation
7	Chapter 2. Section 2.4, Sub Section 2.4.5, Page 13 & 14	Delineate linkage between water quality and treatment system adopted	Chapter 2, Section 2.4, Sub Section 2.4.5, Pages 16 & 17	This has been incorporated	Diktel Presentation
8	Chapter 2, Section 2.4, Sub Section 2.4.14 h), Page 19	Soil Disposal Site: away (where?)	Chapter 2, Section 2.4, Sub Section 2.4.14 h), Page 28 & 29	This has been incorporated	Diktel Presentation
9	Chapter 4, Section 4.1, Table 7, Pages 26 to 29	Policy: WSS policies in chronological order	Chapter 4, Section 4.1, Table 12, Pages 45 to 51	This has been incorporated	Diktel Presentation
10	Chapter 5, Section 5.1, Sub Section 5.1.6, Page 39	WQ: dig out basis of categorization by people (ggod/satisfactory?)	Chapter 5, Section 5.1, Sub Section 5.1.6, Page 61	This has been incorporated	Diktel Presentation
11	Chapter 1, Section 1.4, Page 3 & 4	What about water supply & sanitation demand of schools, health center, temples	Chapter 1, Section 1.4, Line 14,Page 4	This has been incorporated	Diktel Presentation
12	Chapter 7, Section 7.1 & 7.2 Pages 54 to 63	Impact/Benefit: Specify target groups	Chapter 7, Section 7.1 & 7.2, Pages 81 to 96	This has been incorporated	Diktel Presentation
C.	**By Ms. Jwala Shrestha(Under Secretary, MoFE) in Bhojpur**				
1		Recommendation letter of Bhojpur Municipality is missing. Without this document IEE shouldn/t be approved. As the location of source Tin Bhangale is Tyamkemaiyung Rural Municipality, it also falls	Please Refer Annex 3	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
		under impact area. So, recommendation letter from this rural municipality is also needed.			
2	Chapter 3, Section 3.2, Page 21	It would be better to add the list of team members involved in the study of IEE.	Please Refer Chapter 3,Section 3.3, Line 100,Page 37	This has been incorporated.	
3	• "List of Abbreviations, Page ii • Chapter 14-Literature Reviewed	Correct "Forest" as "Forests" in the name of Ministry of Forests and Environment throughout the report.	• Please Refer "List of Abbreviations, Page iii • Chapter 14-Literature Reviewed	This has been incorporated.	
4	Executive Summary in English & Nepali	In both Nepali and English executive summary, the amount of water that will be used from the sources should be added.	Please refer Executive Summary in English; Page xiv and Executive Summary in Nepali; Page xxiii	This has been incorporated.	
5	Executive Summary in English Line 6; Page xiv	In English executive summary, in bullet 6, remove " and ToR" from first line	Please refer Executive Summary in English under Methodology Section, Line 9; Page xv	This has been incorporated.	
6	• Chapter 2, Section 2.1, Line 17, Page 5 • Chapter 2, Section 2.3, Table 4, SN.4,Page 10 • Chapter 5, Section 5.1.1, Line 103, Page 38	Remove "Koshi Zone" throughout the report	• Chapter 2, Section 2.1, Line 19, Page 6 • Chapter 2, Section 2.3, Table 4, S No. 4Page 12 • Chapter 5, Section 5.1.1, Line 139, Page 60	This has been incorporated.	
7	Chapter 2, Section 2.3, Table 4, SN.8,Page 10	In salient features table 4, add the names of existing sources as well and mention the safe yield from each sources, along with their location, measured	Chapter 2, Section 2.3, Table 4, SN.8,Page 12 & 13	This has been incorporated.	

Engineer

Government of Nepal
Ministry of Water supply
Urban Water Supply and Sanitation Sector Project
Project Management Office

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
		flow and source type.			
8	Chapter 2, Section 2.3, Table 4, SN.8,Page 10	Unit of safe yield is missing in Table 4.	Chapter 2, Section 2.3, Table 4, SN.8,Page 12 & 13	This has been incorporated.	
9	Chapter 2, Section 2.3, Table 4, SN.9,Page 10	Include the information in detail about guard house in Salient features table.	Chapter 2, Section 2.3, Table 4, SN.9,Page 13	This has been incorporated.	
10	Chapter 2, Section 2.4.14 (a), Page 17	The information regarding the ancillary facilities of the project is too generic in the report. In 2.4.14(a), the land requirement data should be given in detail. Area, type and ownership of the land should be clearly mentioned project component wise. Whether the land needed is temporary or permanent should be clearly addressed. Should give the data of temporary and permanent land needed.	Chapter 2, Section 2.4.14 (a), Table 7, Page 22 to 24	This has been incorporated.	
11	Chapter 2, Section 2.4.14 (c), Page 18	In 2.4.14 (c), number of skilled and unskilled workers should be mentioned clearly.	Chapter 2, Section 2.4.14 (c), Page 25	This has been incorporated.	
12	Chapter 2, Section 2.4.14 (d), Page 18	In 2.4.14 (d), clearly mention about the construction materials quantity, types that is needed for the proposed project. Clarify whether the project itself quarry the construction materials from the place mentioned in the report?? If yes then give the co-ordinates of quarry site, mention the quantity of daily excavation, mode of excavation and also mention in detail about crusher. The information, impact and mitigation measures related to crusher are	Chapter 2, Section 2.4.14 (d), Page 25	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
		completely missing.			
13	Chapter 2, Section 2.4.14 (e), (f) & (h), Page 19	In camp site, stockpiling site, spoil disposal site section of page 19, at least mention about the tentative locations for these components, (give options).	Chapter 2, Section 2.4.14 (e), Page 26 (f) ; Page 28 & (h), Page 28 & 29	This has been incorporated.	
14	Chapter 2, Section 2.4.14 (g), Page 19	In cut and fill volume of muck section, definition is not needed, Estimated volume of cut and fill volume of muck should be clearly mentioned.	Chapter 2, Section 2.4.14 (g), Page 28	This has been incorporated.	
15	Chapter 3, Section 3.7, Page 24	3.7. Impact area delineation topic should be completely rewritten explaining the basis of delineation. Bullet 87 should be removed, Bullet 88 and 89 should be revisited and completely rewritten.	Chapter 2, Section 2.4.15, Page 29	This has been incorporated.	
16	Chapter 3, Section 3.2,Page 21 & 22	Elaborate the data collection method separately in terms of physical, biological and social environment. Add the data collection method as per approved ToR.	Chapter 3, Section 3.3, Sub Section 3.3.1 Page 37 & 38, Sub section 3.3.2 Page 38, Section 3.3.3, Page 38, 39 & 40.	This has been incorporated.	
17	Chapter 2, Section 2.2, Page 7	It would be better to mention the total duration for project construction.	Chapter 2, Section 2.2, Line 26,Page 9	This has been incorporated.	
18	Chapter 4, Table7, Page 26 to 29	Table 7 should be completely reshuffled. Place in the order of Constitution, Plan, Policy, Strategy, Act, Rules, Guidelines, Standards, and Conventions.	Chapter 4, Section 4.1, Table 12, Page 45 to 51	This has been incorporated.	
19	Chapter 4, Table 7, Page 27	Table 7-Replace Forest Policy with National Forest Policy, 2075 and if the proposed project is going to use forest land then "working procedure for the use	Chapter 4, Section 4.1, Table 12-1 no., Page 47	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
		of national forest for national priority projects, 2074" should be reviewed.			
20	Chapter 5, Section 5.1.3, Page 38	In existing environment section, give the project specific data regarding land use pattern.	Chapter 5, Section 5.1.3, Page 60	This has been incorporated.	
21	• Chapter 2, Section 2.4,Sub Section 2.4.14, Bullet 63,Page 18 • Chapter 5, Section 5.2, Sub Section 5.2.4, Bullet 119, Page 42	In 5.2.4, Forest area section, no forest areas will be acquired has been written but in bullet 63, use of government land has been mentioned so it seems to be contradict, clarify what kind of government land is going to be used by the project.	Chapter 2, Section 2.4,Sub Section 2.4.14, Table 7, Page 22 to 24	This has been incorporated.	
22	Chapter 7, Section 7.1, Sub Section 7.1.1, Page 54	In beneficial impact section, mention the number of people that will be benefitted by the employment in this project.	Chapter 7, Section 7.1, Sub Section 7.1.1, Line 213, Page 81	This has been incorporated.	
23	Chapter 7, Section 7.2, Sub Section 7.2.2.1, Page 59	Revisit this impact chapter; some impact bullet also includes mitigation measures.	Chapter 7, Section 7.2, Sub Section 7.2.2.1, Page 89	This has been incorporated.	
24	Chapter 7, Section 7.2, Sub Section 7.2.2.1, Page 59	In Impact on Flora and Fauna section, clearly mention the number of trees that is going to be cut down and also mention the name of the species that is going to be fell down. (if those trees falls under government land, then it has to be planted in the ratio 1:25 for mitigation)	Chapter 7, Section 7.2, Sub Section 7.2.2.1, Page 88	This has been incorporated.	
25	Chapter 1, Section 1.5, Page 4 & 5	Instead of "relevancy of the project" of page 3,"rationality" should be written and it should be clearly mentioned that due to which clause of EPR,	Chapter 1, Section 1.5, Page 4 & 5 and Table 1 Page 5	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
		this IEE is necessary (a complete sentence of that should be written).			
26	Chapter 11, Section 11.5, Table 35, Pages 99 to 100.	Cost for each mitigation measures should be allocated.	Chapter 11, Section 11.5, Table 44, Pages 145 to 147	This has been incorporated.	
27	Chapter 11, Section 11.1,Page 82	EMP not only talks about the adverse impact but also about the enhancement measures of beneficial impacts.	Chapter 11, Section 11.1, Line 322, Page 120 and Section 11.3, Table 41, Page 139 & 140 Also refer Chapter 8, Section 8.2, Pages 107 & 108	This has been incorporated.	
28	Chapter 12, Page 146	MoFE should also be included in monitoring institution.(MoWS as well)	Chapter 12, Line 347, Page 150	This has been incorporated.	
29	Chapter 13, Page 104 & 105	Conclusion of report should incorporate a reason of why IEE is sufficient for this project.	Chapter 13, Page 152 & 153	This has been incorporated.	
30		Deed of Inquiry(Muchulka) is missing	Please refer Annex 3	This has been incorporated.	
D.	**Other Comments from MoWS**				
1	List of Abbreviations i, ii, & iii	Include all abbreviation used in report.	Please refer List of Abbreviation, Page i to iv	This has been incorporated.	
2	Chapter 11, Section 11.2,Sub Section 11.2.1, Page 82	Remove WSSDO from executive and implementing agencies section.	Chapter 11, Section 11.2, Sub Section 11.2.1,Page 120	This has been incorporated.	
3	Chapter 7, Section 7.2, Sub Section 7.2.4.2 e), Page 62	Seismic Data is hypothetical correct it with some reference data.	Chapter 7, Section 7.2, Sub Section 7.2.4.2 f), Page 93	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
4	Annex 7	How to address calcium carbonate, test report shows this values excessive higher than standard values	Annex 6	The values of calcium carbonate & color has been interchanged. Now, this has been incorporated.	
5	Annex 1	Approved ToR is not clearly readable it is blur in this report, correct it.	Annex 1	This has been incorporated.	
6	Chapter 2, Section 2.3, Table 4, SN 8, Page 12	In salient feature, safe yield data is different and where safe yield of source is measured, mention it.	Chapter 2, Section 2.3, Table 4, SN 8, Page 12 & 13	This has been incorporated.	
7	Chapter 2, Section 2.3, Table 4, SN 13, Page 13	Tariff rate is higher than Kathmandu, why?	Chapter 2, Section 2.6, Sub Section 2.6.1, Page 31 & 32	This section has been added in this report as per requirement of the comments provided.	
8	Chapter 2, Section 2.3, SN 15, Page 11	Design Year Population and Base Year Population overhead project cost is different why?	Chapter 2, Section 2.3, Table 4, SNo. 16, Page 14, Also refer SN. 6, Page 12 for population.	Design Year Population & Base Year Population is different as per growth rate; Accordingly, the overhead project cost for each of them will be different.	
9		What is the cost recovery plan i.e., what surplus cost is after considering O & M cost?	Chapter 2, Section 2.6, Sub Section 2.6.2 & Table 8, Page 33	This has been incorporated.	
10		Include all social benefit cost of this project	Chapter 2, Section 2.6, Sub Section 2.6.3 & Table 9, Page	This has been incorporated.	

Engineer

Project Management Office

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant		
			In chapter/ section/ paragraph no. / page no.	Description of change	Remarks
			34.		
E.	Beside these comments, some other changes within the report were made as per the report requirement that was felt necessary during the report incorporation.				

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Urban Water Supply and Sanitation Sector Project
Project Management Office

Engineer