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चलानी नं.:- १६१

नेपाल सरकार
खानेपानी मन्त्रालय
सिंहदरवार, काठमाडौं

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सिंहदरवार,
काठमाडौं, नेपाल ।

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श्री खानेपानी तथा ढल व्यवस्थापन विभाग,
पानीपोखरी, काठमाडौं ।

खानेपानी तथा पा. आयोजना
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दर्ता नं.: ४६६
मिति: ०६६/६/६

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 काठमाडौं, प्रस्तावक रहेको चरीकोट दोलखा नगर सहरी खानेपानी तथा सरसफाई आयोजना (दोलखा)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,
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पानीपोखरी, काठमाडौं ।

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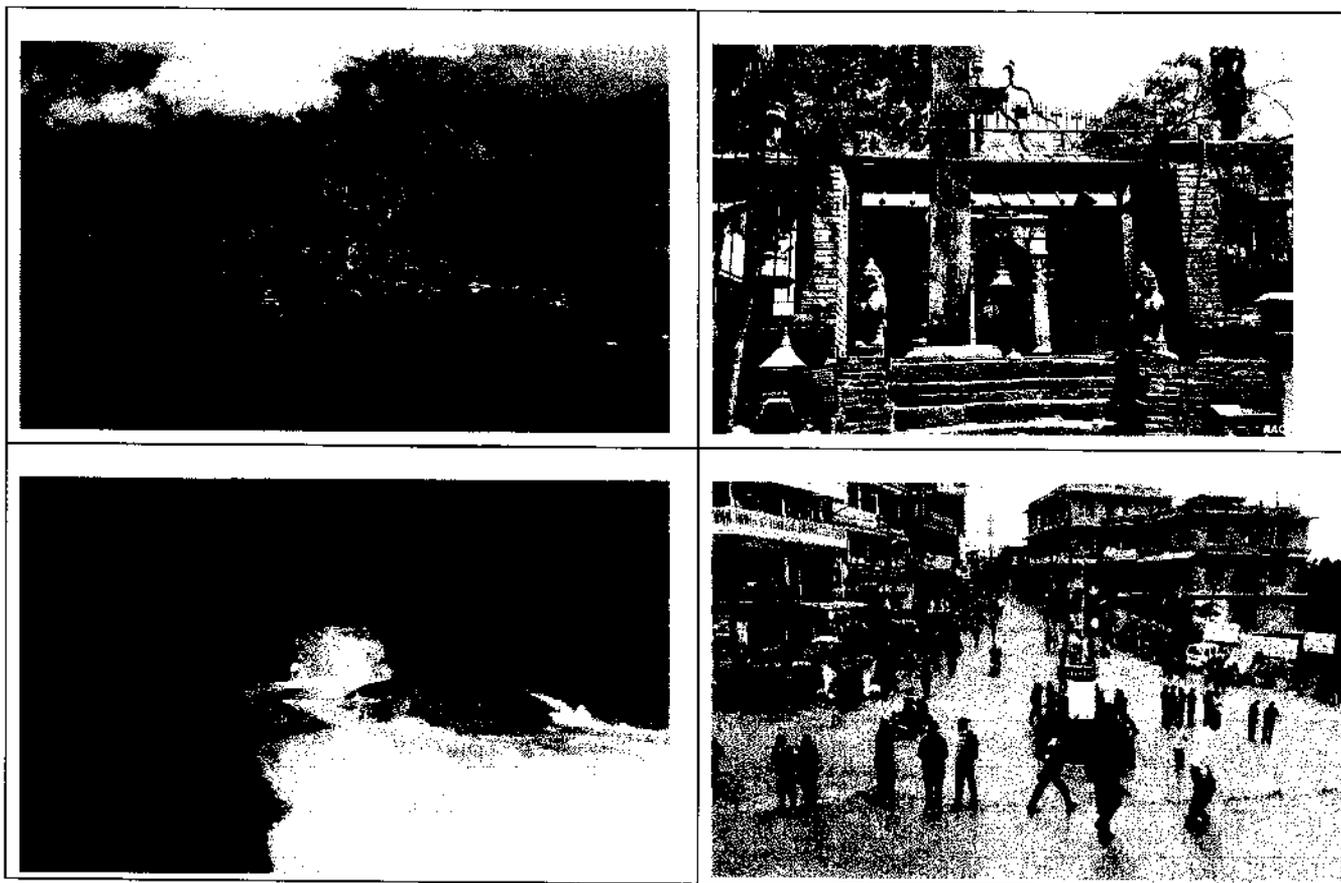
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आयोजना
४६६/६/६

अञ्जना महर्जन
(अञ्जना महर्जन)
इन्जिनियर



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

Initial Environmental Examination (IEE)
Of
Charikot Water Supply and Sanitation Project
Dolakha, 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

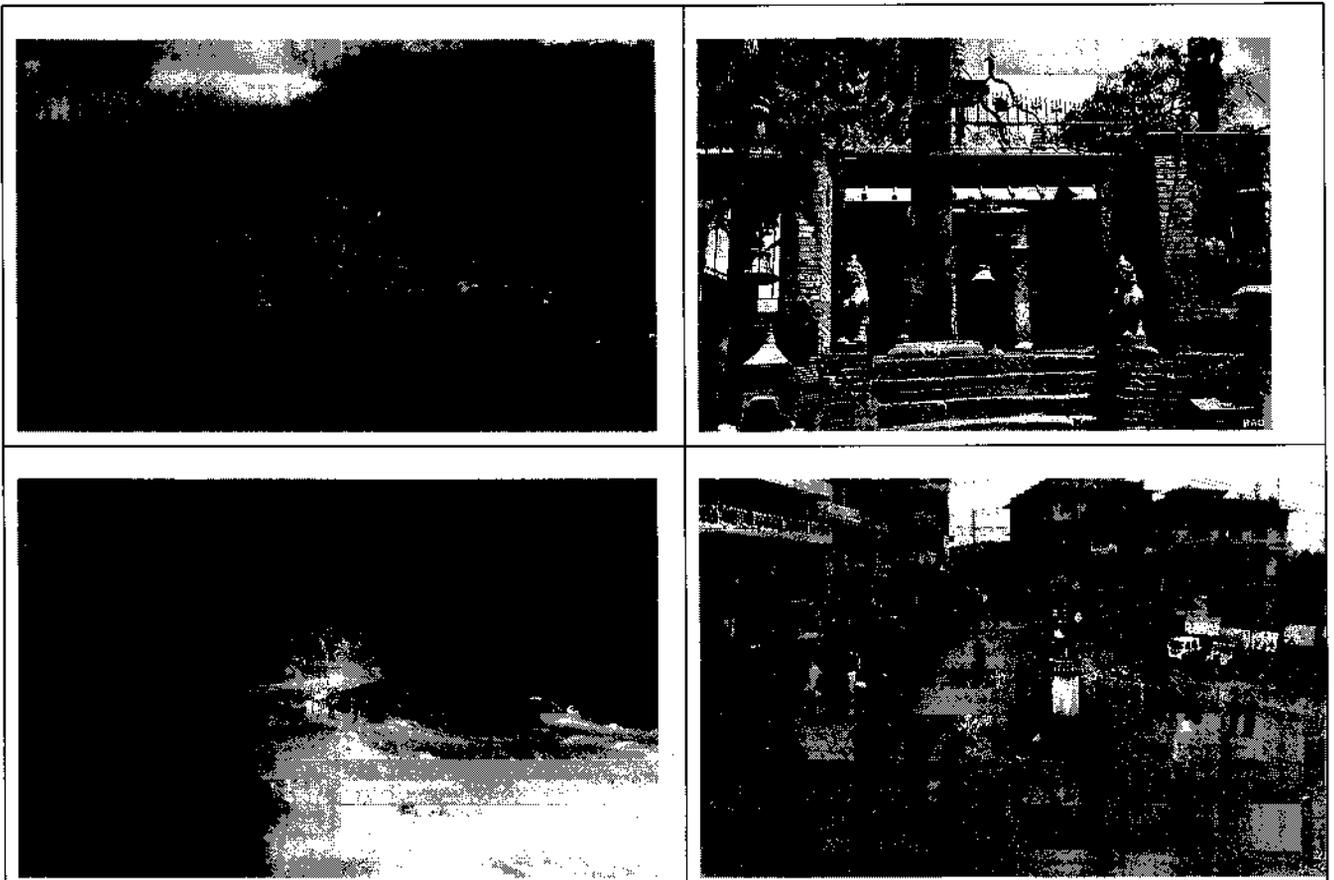
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ABBREVIATIONS

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



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

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



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PM ₁₀	Particulate Matter 10 micrometers
PMO	Project Management Office
PMQAC	Project Management and Quality Assurance Consultants
PN	Nominal Pressure Rating
PRO	Proposed
PPE	Personal Protective Equipment
PPTA	Project Preparation Technical Appraisal
PSC	Project Steering Committee
RCC	Reinforced Cement Concrete
RDSMC	Regional Design Supervision and Management Consultant
REA	Rapid Environmental Assessment
RL	Relative Level
RoW	Right of Way
RPMO	Regional Project Management Office
RRM	Random Rubble Masonry
RUDP	Regional Urban Development Project
RVT	Reservoir Tank
SB	Sedimentation Basin/Settling Basin
SDG	Sustainable Development Goal
SHG	Self Help Group
SO ₂	Sulphur Dioxide
SPS	Safeguard Policy Statement
SS	Site Specific
SSF	Slow Sand Filter
SSO	Social Safeguard Officer
ST	Short Term and Sedimentation Tank
STWSSSP	Small Towns' Water Supply and Sanitation Sector Project
TDF	Town Development Fund
ToR	Terms of Reference
TSP	Total Suspended Solids
TSTWSSSP	Third Small Town Water Supply & Sanitation Sector Project
USD	United States Dollar
UWSSSP	Urban Water Supply and Sanitation (Sector) Project
VDC	Village Development Committee
VU	Vulnerable
WGR	Weighted Growth Rate
WHO	World Health Organization
WN	Ward Number



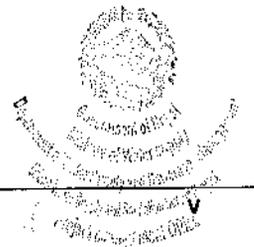
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WOV	Wash Out Valves
WS	Water Supply
WSP	Water Safety Plan
WSSDO	Water Supply and Sanitation Division Office
WTP	Willingness to Pay
WTP	Water Treatment Plant
WUA	Water Users' Association
WUSC	Water Users' and Sanitation Committee
Yr.	Year



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WEIGHTS AND MEASURES

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



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Engineer



TABLE OF CONTENTS

TABLE OF CONTENTS..... vii

EXECUTIVE SUMMARY..... xiv

1. INTRODUCTION1

 1.1. Background 1

 1.2. Name and Address of the Individual Institution Preparing the Report2

 1.2.1. Name of the Proposal2

 1.2.2. Name and Address of the Proponent2

 1.2.3. Consultant Preparing the Report2

 1.3. Purpose of IEE2

 1.4. Need for the Project.....3

 1.5. Rationale of the Project4

2 DESCRIPTION OF the PROJECT.....6

 2.1 Location & Accessibility6

 2.2 The Proposed Project8

 2.3 Salient Features of the Project..... 11

 2.4 Water Supply Project Components/Features..... 14

 2.4.1 Sources/Intakes..... 14

 2.4.2 Collection Chambers/Collection Tanks..... 16

 2.4.3 Transmission Mains..... 16

 2.4.4 Thrust Blocks, Saddle Blocks and Thrust Beam..... 17

 2.4.5 River & Stream Crossings 17

 2.4.6 Water Treatment Plant 18

 2.4.7 Service Reservoir 20

 2.4.8 Bulk Distribution Mains 21

 2.4.9 Distribution Mains 21

 2.4.10 House Connections 22

 2.4.11 Appurtenances 23

 2.4.12 Office Building, Guard House, Dosing House and Boundary Wall 24

 2.4.13 Miscellaneous Works 26

 2.4.14 DMA Establishment..... 26

 2.4.15 Construction Planning 27

 2.4.16 Project Area Delineation 31

 2.5 Project Activities..... 34

 2.5.1 Construction Activities 34

 2.5.2 Operation Activities 34

 2.6 Financial & Economical Aspects 35

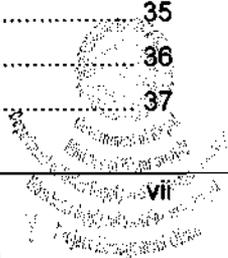
 2.6.1 Water Tariff Band 35

 2.6.2 Capital Cost Recovery..... 36

 2.6.3 Social Benefit Cost 37

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Engineer

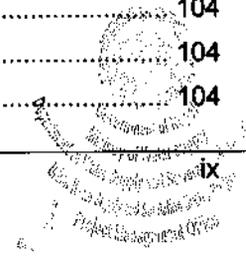


3. METHODOLOGY	39
3.1 Literature review	39
3.2 Impact Area Delineation	39
3.3 Field Study.....	40
3.3.1 Physico-Chemical Environment	40
3.3.2 Biological Environment.....	41
3.3.3 Socio-economic and Cultural Environment.....	41
3.4 Public Notice.....	43
3.5 Public Consultation.....	43
3.6 Collection of Muchulkas (Recommendation Letters).....	43
3.7 Impact Identification, Prediction & Evaluation Methods	44
4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK	46
4.1 Nepal's Environmental Policy and Legal Framework.....	46
4.2 Environmental Agreements	55
4.2.1 International Environmental Agreements (Conventions & Treaties).....	55
4.3 Environmental Standards	55
4.4 Environmental Assessment Requirements	59
4.4.1 Environmental Assessment Requirements of the ADB	59
4.4.2 Environmental Impact Assessment Requirements of Government of Nepal.....	62
5 EXISTING ENVIRONMENT	64
5.1 Existing Physical Environment	64
5.1.1 Landforms and Topography	64
5.1.2 Geology & Soil.....	64
5.1.3 Land use pattern	64
5.1.4 Water Resources	65
5.1.5 Climate	65
5.1.6 Water Quality.....	65
5.1.7 Air Quality.....	66
5.1.8 Acoustic Environment	66
5.1.9 Landslide Susceptibility.....	66
5.2 Existing Biological Environment.....	66
5.2.1 Flora	66
5.2.2 Fauna	67
5.2.3 Protected Area	69
5.2.4 Forest Area.....	69
5.3 Socio-economic and Cultural Environment	70
5.3.1 Demographic Features.....	70
5.3.1.1 Settlement pattern.....	70
5.3.1.2 Population Distribution.....	70
5.3.2 Caste/Ethnic Groups.....	72
5.3.2.1 Ethnicity and caste.....	72



5.3.3	Economic Features	72
5.3.3.1	Economic Activities	72
5.3.3.2	Monthly Income Details	73
5.3.3.3	Monthly Expenditure Details	74
5.3.3.4	Willingness to Pay	74
5.3.3.5	Affordability	75
5.3.4	Education & Skills	75
5.3.5	Health and sanitation	75
5.3.6	Community Infrastructure	76
5.3.6.1	Existing Drinking Water Condition	76
5.3.6.2	Existing Sanitation Situation	78
5.3.6.3	Local Institutions	80
6.	Analysis of Alternatives	82
6.1	With- and Without-Project Alternatives	82
6.1.1	Without-project' or 'do-nothing' alternative	82
6.1.2	With Project Alternative	83
6.1.2.1	Alternatives Relative to Planning and Design	84
7.	ANTICIPATED ENVIRONMENTAL IMPACTS	85
7.1	Beneficial Impacts	85
7.1.1	Impact on Socio-economic Environment	85
7.1.1.1	Construction Phase	85
7.1.1.2	Operation Phase	86
7.2	Adverse Impacts	90
7.2.1	Impact on Physical Environment	90
7.2.1.1	Design Phase	90
7.2.1.2	Construction Phase	90
7.2.2	Impact on Biological Environment	93
7.2.2.1	Construction Phase	93
7.2.2.2	Operation Phase	95
7.2.3	Impact on Chemical Environment	95
7.2.3.1	Construction Phase	95
7.2.3.2	Operation Phase	96
7.2.4	Impact on Socio-economic Environment	96
7.2.4.1	Design Phase	96
7.2.4.2	Construction Phase	97
7.2.4.3	OperationPhase	99
8.	MITIGATION & AUGMENTATION MEASURES	104
8.1	Mitigation Measures	104
8.1.1	Impact on Physical Environment	104
8.1.1.1	Design Phase	104
8.1.1.2	Construction Phase	104

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 Engineer



8.1.2	Impact on Biological Environment.....	108
8.1.2.1	Construction Phase.....	108
8.1.2.2	Operation Phase.....	109
8.1.3	Impact on Chemical Environment.....	109
8.1.3.1	Construction Phase.....	109
8.1.3.2	Operation Phase.....	110
8.1.4	Impact on Socio-economic Environment.....	111
8.1.4.1	Design Phase.....	111
8.1.4.2	Construction Phase.....	112
8.1.4.3	Operation Phase.....	114
8.2	Augmentation Measures.....	115
8.2.1	Impact on Socio-economic Environment.....	115
8.2.1.1	Construction Phase.....	115
8.2.1.2	Operation Phase.....	116
9.	INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION.....	117
9.1	Stakeholder Consultation & Participation.....	117
9.2	Major issues raised by the stakeholders.....	120
10.	GRIEVANCE REDRESS MECHANISM.....	124
10.1	Purpose of the Grievance Redress Mechanism.....	124
10.2	Proposed Set-Up.....	124
11.	ENVIRONMENTAL MANAGEMENT PLAN.....	128
11.1	Introduction.....	128
11.2	Institutional Arrangement.....	128
11.2.1	Executing and implementing agencies.....	128
11.2.2	Safeguard Implementation Arrangement.....	129
11.3	Environmental Management Plan (EMP) Matrix.....	134
11.4	Environmental Monitoring Program.....	151
11.5	Institutional Capacity Development Program.....	152
11.6	Staffing Requirement and Budget.....	153
12.	MONITORING AND REPORTING.....	161
13.	CONCLUSION.....	163
14.	LITERATURE REVIEWED.....	165

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 Engineer



LIST OF TABLES

Table 1: Criteria for Requirement of IEE for Drinking Water Supply Projects as per Schedule 1 (Clause H) of Environment Protection Regulation 1997 with Amendment 2007 & 2017 AD	5
Table 2: Bhimeshwore Municipality Ward Profile	8
Table 3: Proposed Sub-system and demand.....	9
Table 4:Salient features of the project	12
Table 5:Details of Transmission Pipes Sub-system wise	17
Table 6: Water Treatment Plant in Various Sub-systems.....	20
Table 7:Details of Service Reservoirs	21
Table 8:Details of Pipes Used in Distribution System (in meters)	22
Table 9:Proposed Buildingsand Boundary Type	25
Table 10: Land Requirement & Ownership Details for the project components	27
Table 11:Cash Flow & Financial Position together with WUSC tariff structure.....	36
Table 12: Social Benefit Cost	37
Table 13: Scoring of Impacts.....	45
Table 14: Significance of Impacts.....	45
Table 15 : Other Relevant Environmental Act, Rules, Plan, Policies, and Guidelines of Nepal	48
Table 16: Relevant Environmental Quality Standards.....	56
Table 17: Standards for Ambient Air Quality	57
Table 18: Standards for Ambient Noise Quality	58
Table 19: Standards for Drinking Water Quality.....	58
Table 20: National Diesel Generators Emission Standards, 2012.....	59
Table 21: SPS 2009 Safeguard Requirements	60
Table 22: The GoN IEE Report Preparation, Review, Approval and Implementation Process	62
Table 23: Existing Land Use Pattern	64
Table 24: Major Plant Life Forms of the Project Area.....	67
Table 25 : Mammals of the Project Area.....	68
Table 26: List of Birds in the project area.....	68

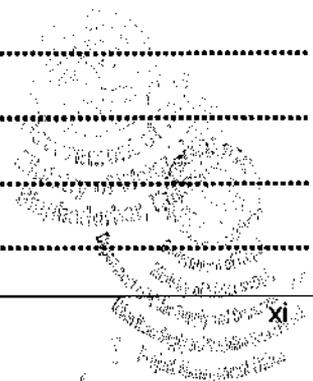


Table 27: List of Reptiles and Amphibians Found in the Project Area.....	69
Table 28: List of Fishes Found in the Project Area.....	69
Table 29: Project Components within Community Forests	70
Table 30: Population of the former BHimeshwore Municipality	70
Table 31: Population of the Project Town	71
Table 32: Households & Population of Beneficiaries	72
Table 33: Monthly Income Level of Households by Ward.....	73
Table 34: Monthly Expenditure Level of Households by Ward.....	74
Table 35: Name list of WUSC and Its Details	76
Table 36: Type of Toilets in use in Project Area.....	79
Table 37: Members of Charikot Water Supply and Sanitation Users Committee	81
Table 38: Summary of Impact Matrix of Beneficial Issues of the project.....	89
Table 39: Summary of Impact Matrix of Adverse Issues of the Proposed Project.....	101
Table 40: Stakeholder Analysis & Mapping	117
Table 41: Summary of Major Public Consultations carried out by Study Team.....	122
Table 42: Environmental Management Plan Matrix	134
Table 43: Environmental Monitoring Program	151
Table 44: Training Program for Environmental Management.....	152
Table 45: Indicative Cost of EMP Implementation	155
Table 46: Environmental Management Implementation Schedule.....	158
Table 47: Proposed Topics for Capacity Building/Training	159



LIST OF FIGURES

Figure 1: Projection Location Map.....	7
Figure 2: The Schematic Layout of the Project.....	11
Figure 3: Project Impact Area Delineation	33
Figure 4: Grievance Redress Mechanism (Formal Approach).....	127

LIST OF ANNEXES

- Annex 1 : Approved Terms of Reference (TOR)
- Annex 2A : Rapid Environmental Assessment (REA) Checklist for Charikot WSSP and Preliminary Climate Risk Screening Checklist for Sample Project Towns
- Annex 2B : Relevant Environmental Quality Standards
- Annex 2C : Sample Grievance Redress Form
- Annex 2D : Sample Traffic Management Plan
- Annex 2E : Spoil Management Plan
- Annex 2F : Sample Semi-Annual Environmental Monitoring Report Template
- Annex 2G : Sample Environmental Site Inspection Report
- Annex 3 : Public Notice, Muchulka, Minutes of Meeting, Recommendation Letter, Consent Letter & Certificate of WUSC Registration
- Annex 4 : Sample Survey Questionnaire & Checklists
- Annex 5 : Chlorine Use Guidelines
- Annex 6 : Water Quality Test Reports
- Annex 7 : Photographs
- Annex 8 : Comments Incorporation Matrix



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EXECUTIVE SUMMARY

Introduction

1. Charikot WSSP is one of the projects proposed under UWSSSP which is currently being prepared to support further GoN's continuing efforts to provide water supply and sanitation services to selected urban municipalities of Nepal. In support of GoN's endeavor, the Asian Development Bank (ADB) funded this Urban Water Supply and Sanitation Sector Project (UWSSSP).
2. During field study, it has been identified that there are fifteen major existing water supply systems operated by 17 different WUSCs in the project area. In all these systems, the water supply service is only few hours a day. The supplied water is not sufficient to meet the increasing water demand of the service area. All these existing systems are independent and isolated. However, due to urbanization process in the core Charikot bazaar area and the vicinity of the few systems of Charikot Bazaar are overlapping in same service area. Hence, these fifteen WUSCs has been integrated and single WUSC i.e., Charikot WUSC has been formed to avoid this issue. This newly formed WUSC will take reign of all the former WUSCs and will take the responsibility of the proposed project. It has also been observed that some of these existing major systems used to carry out occasional disinfection. Hence, there is no provision of water treatment system in the existing systems. This proposed project expects to improve the existing water supply condition of the project town.
3. ADB and GoN require all projects to undergo environmental assessments. All projects funded by ADB must comply with the Safeguard Policy Statement (SPS) 2009 which will ensure the following mentioned points:
 - The projects are environmentally sound,
 - The projects are designed to operate in compliance with applicable regulatory requirements,
 - These projects are not likely to cause significant environmental, health, or safety hazards.
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 mainly the extension of the existing Charikot system. The proposed project will extend the distribution system to new areas of Bhimeshwore municipality (partial areas of wards 2, 4 5 & 7) which are not covered by the existing Charikot system. Similarly, five existing intakes will be rehabilitated and used in this proposed project. The field study shows that there is no proper provision of water treatment facility in the existing system. Likewise, the existing system has been providing water supply services only for few hours a day. The existing condition of the existing system will be improved by the proposed project through the provision of continuous 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 Distribution System (DS). The main system comprises of three sub systems that includes a) Sub System-1 (SS-1), b) Sub System-2 (SS-2) and Sub-system-3 (SS-3). Here, SS-1 comprises five distribution systems that includes Deurali System, Tower System, Existing Charikot System, Upper Dolakha System and Lower Dolakha System. Similarly, SS-2 comprises three distribution systems namely Makaibari System, Tindhare System and Charighyang System. Then, SS-3 comprises seven distribution systems namely Upper Matti System, Lower Matti System, Upper Dharamghar System, Lower Dharamghar System, Upper Jillu System, Middle Jillu System and Lower Jillu System.

Description of the Project

7. Six existing sources will be used for the proposed project that includes Jhapre Khola, Dund Khola, Gairi Khola, Kagate Khola, Odare 1 & Odare 2. Our study shows that out of these sources, the last two mentioned sources are spring sources while the rest are stream sources. All these existing sources are included in Sub System -1. Apart of these existing sources, four new sources have been proposed. Out of these four new sources, two sources that includes HC1 (Hattichhahara at the main course of Charnawati River) and HC1 (tributary of Charnawati River) are included in sub system 2. Similarly, the remaining two sources that includes Ghatte Khola & Pani Ghatta are included in sub system 3. In total, the project will have ten intakes. Among these ten intakes, two spring intakes and two stream intakes of SS-1 will be replaced by new ones while the other two stream intakes will be rehabilitated. Similarly, two stream intakes for both SS-2 & SS-3 have been proposed. According to the detailed design engineering report the cumulative amount of water that will be used from the sources of SS-1, SS-2 &

SS-3 are 10.60 lps, 31 lps & 11 lps respectively. Similarly, seven collection chambers have also been proposed for the proposed project.

8. Five water treatment plants have been proposed for this project. Among these five WTPs, SS-1 comprises three WTPs among which only one SSF (WTP-1) has been proposed for Deurali System while for other systems of SS-1, WTP-2 consisting SB, HRF & SSF has been proposed. Similarly, the third WTP is the existing WTP referred as WTP-E will be rehabilitated to improve its performance. Likewise, WTP-3 has been proposed for SS-2 that comprises SB and SSF only. Along with this, WTP-4 has been proposed for SS-3 that comprises SB, HRF & SSF in different area.
9. There are fifteen service reservoirs proposed for this project. The cumulative capacity for these reservoirs is about 1,650 cubic meters. The total length for the proposed transmission mains is 37.23 km. The total length of the proposed distribution pipeline is 158.849 km. 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 covers construction requirements like Land Requirement, Energy Requirement, Human Resource Requirement, Worker's Camp, and Stockpiling Site etc.

Methodology

10. The basic methodology for the preparation of IEE as per EPR includes **Literature Review** to collect information on the project area and **Field Study** to collect baseline information on physical, cultural, chemical, biological and social conditions of the project town. On the basis of literature review and field study, the **Impact Area Delineation** is carried out to determine the project area affected by the proposed project activities either as Core Area or Surrounding Area. 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.

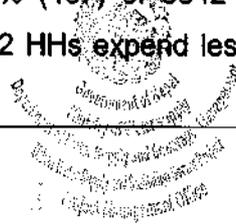
Policy, Legal and Administrative Framework

11. 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) National Forest Policy, 2075 B.S. (2019 A.D.); xi) Land Use Policy, 2072 B.S. (2015 A.D.) and xii) National Urban Development Strategy, 2074 B.S. (2017 A.D.)
- c) Laws & Acts:** i) Essential Goods Protection Act, 2012 B.S. (1955 A.D.); ii) Aquatic Animal Protection Act, 2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.)); iii) Town Development Act , 2045 B.S. (1988 A.D.); iv) Water Resource Act,2049 B.S. (1992 A.D.); v) Forest Act, 2049 B.S. (1993 A.D.) with amendments 2055 B.S. (1999 AD.); vi) Land Acquisition Act,2049 B.S. (1993 A.D.); vii) Child Labor Prohibition and Regulation Act, 2056 B.S. (2001 A.D.); viii) Water Supply Management Board Act, 2063 B.S. (2006 A.D.); ix) Solid Waste Management Act, 2068 B.S. (2011 A.D.); x) Labour Act, 2074 B.S. (2017 A.D.); xi) Local Government Operation Act, 2074 B.S. (2017 A.D.)
- d) Rules & Regulations:** i) Solid Waste (Management & Resource Mobilization) Rules, 2044 B.S. (1987 A.D.) & Amendments 2049 B.S. (1992 A.D.); ii) Water Resource Regulations, 2050 B.S. (1993 A.D.); iii) Drinking Water Regulations, 2055 B.S. (1998 A.D.); iv) Solid Waste Management Rules, 2070 B.S. (2013 A.D.); iv) Labor Rules, 2075 B.S. (2018 A.D.)
- e) Guidelines & Manuals:** i) National EIA Guideline, 2049 B.S. (1993 A.D.); ii) WHO Air Quality Guidelines, Global Update, 2061 B.S. (2005 A.D.); iii) WHO Guidelines for Drinking Water Quality, Fourth Edition 2073 B.S. (2017 A.D.); iv)

National Noise Standard Guidelines, 2068 B.S. (2012 A.D.); v) Guidelines for Community Noise by WHO, 2055 B.S. (1999 A.D.) and vi) "working procedure for the use of national forest for national priority projects, 2074"

Existing Environment

12. 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.
13. Regarding this, details on various physical environmental aspects like Landforms & Topography, Land Use Pattern, Geology & Soil, Water Resources, Climate, Air Quality, Acoustic Environment, Landslide Susceptibility etc and biological features like Flora, Fauna, Protected Areas & Community Forest Areas were collected through simple checklist, REA checklist, professional judgement and interaction with the locals & the concerned bodies during field study. No existence of protected areas was observed during the field study. However, some project components were observed to be located within some of the existing community forest areas.
14. Similarly, details on water quality were collected through sampling process followed by water quality tests on approved laboratory. The test result shows that the water samples taken from three sources viz; Hattichhahara, Odare and Jhapre Khola have all the required parameters within the permitted value of NDWQS.
15. During field study, details on the socio-economic environment that includes Demographic Features, Caste/Ethnic Groups, Economic Features, Education & Skills and Community Infrastructures were collected through simple questionnaire method followed by household survey and interaction with the locals. Regarding this, Willingness to Pay for Monthly Tariff, Willingness for Up-front Cash Contribution and Affordability has also been assessed. As per the sampled household survey, 100% of 192 sampled HHs expressed willingness to pay for Monthly tariff and to contribute for up-front cash contribution. This indicates their demand for the proposed project to get rid of their acute water shortage problem. The survey also shows that only 11.37% (437) of 3842 HHs fall under poor category and only 29.30% (1124) of 3842 HHs expend less than Rs. 7,500 per



month. Hence, this indicates the affordability of the community in terms of monthly income level and the expenditure level.

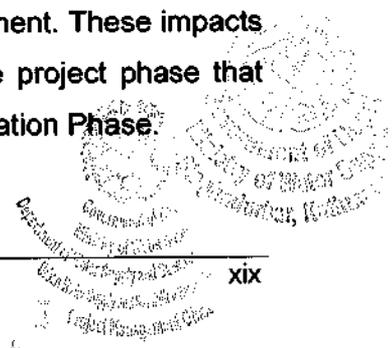
Analysis of Alternatives

16. 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 22,755 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 Charikot system.

Anticipated Environmental Impacts

17. 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.
18. 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.


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19. 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, Forest fire, Forest Encroachment, 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

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

Information Disclosure, Consultation & Participation

21. 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

22. 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

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

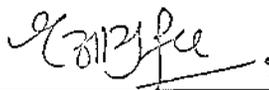
- (1) WUSC Secretary; (2) RPMO Engineer; (3) RPMO social /environmental (as relevant) officer, (4) representative of affected persons, (5) RDSMC's safeguards specialist (social/environment as relevant), (6) a representative of reputable and relevant CBO/SHG/organization working in the project area as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

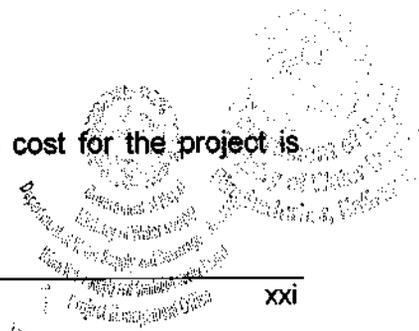
Environmental Management Plan

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

- (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site;
- (ii) guiding and controlling the implementation of findings and recommendations of the environmental assignment conducted for the project;
- (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impacts of the project; and
- (iv) ensuring that safety recommendations are complied with.

The total estimated local level monitoring and mitigation cost for the project is NRs. 1,800,000.00.


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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, 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.



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कार्यकारी सारांश

परिचय

१. यस चरीकोट खानेपानी आपूर्ति तथा सरसफाई आयोजना , छनौट गरिएका नेपालका शहरी नगरपालिकाहरूमा खानेपानी आपूर्ति तथा सरसफाई सेवा वितरणमा सुधार ल्याउने नेपाल सरकारको निरन्तर थप प्रयासलाई सहायता गर्ने हेतुले शुरु गरिएको शहरी खानेपानी तथा सरसफाई आयोजना अर्न्तगत प्रस्ताव गरिएको परियोजना मध्ये एक हो । नेपाल सरकारको यही प्रयासलाई समर्थन गर्दै एसियाली विकास बैंकले शहरी खानेपानी तथा सरसफाई आयोजनाका निम्ति लगानी गरेको छ ।
२. स्थलगत अध्ययनको क्रममा प्रस्तावित आयोजना क्षेत्रमा विभिन्न पन्ध्र वटा उपभोक्ता समितिहरूको अर्न्तगत पन्ध्र वटा नै वर्तमान खानेपानी आपूर्ति प्रणालीहरू सञ्चालनमा रहेको पहिचान गरिएको छ । यी सबै प्रणालीहरूमा खानेपानी आपूर्ति सेवा दैनिक केही घण्टाको लागि मात्रै रहेको छ । यी आपूर्ति गरिएको पानी सेवा क्षेत्रको बढ्दो माग पूरा गर्न पर्याप्त छैन । यी सबै अवस्थित प्रणालीहरू स्वतन्त्र एवं अलग छन् । तथापि, चरीकोट बजार क्षेत्रमा भइरहेको शहरीकरण प्रक्रियाको कारण चरीकोट बजारका केही प्रणालीहरूको सेरोफेरो एउटै सेवा क्षेत्रमा खण्टिएको अवस्था छ । यसैले, यो मुद्दाबाट उम्कन यी पन्ध्र वटा उपभोक्ता समितिहरूलाई एकीकृत गरी चरीकोट खानेपानी उपभोक्ता समिति नाम गरिएको एकल उपभोक्ता समितिको गठन गरिएको छ । यो नव गठित उपभोक्ता समितिले सबै पूर्व उपभोक्ता समितिहरूको सार्वभौमिकता ग्रहण गर्नेछ र प्रस्तावित आयोजनाको जिम्मेवारी वहन गर्नेछ । यी वर्तमान प्रमुख प्रणालीहरू मध्ये केहिले विरल डिस्ट्रिक्टक्सन प्रक्रिया अपनाउने गर्ने गरेको देखिएको छ । तसर्थ, वर्तमान खानेपानी आपूर्ति प्रणालीहरूमा पानी प्रशोधन प्रणालीको प्रावधान नरहेको देखिएको छ । यस प्रस्तावित आयोजनाले हाल अवस्थित खानेपानी आपूर्ति प्रणालीको अवस्था सुधार गर्ने अपेक्षा गर्दछ ।
३. एसियाली विकास बैंक तथा नेपाल सरकारको नीति अनुसार सबै परियोजनाहरूको वातावरणीय मूल्यांकन गर्न आवश्यक छ । एसियाली विकास बैंकद्वारा लगानी गरिएको आयोजनाहरूले सन् २००९ मा लागू गरिएको सुरक्षा नीति विवरण (SPS) को अनुपालन गरेको हुनुपर्छ जसले निम्न उल्लेखित बुँदाहरूको सुनिश्चितता तय गर्दछ :
 - यी आयोजनाहरू वातावरणीय पक्षको हिसाबले राम्रो अवस्थामा रहेको छ ।
 - यी आयोजनाहरूको सम्बन्धित नियामक आवश्यकताहरूको अनुपालन गर्दै सञ्चालन गर्नको लागि डिजाइन गरिएको छ ।
 - यी आयोजनाहरूले सम्भवतः कुनै उल्लेखनीय वातावरण, स्वास्थ्य वा सुरक्षा सम्बन्धि खतराहरू 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-२०५२, वातावरण संरक्षण नियमावली-२०५३ 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 आवश्यकताहरू पूर्ति गर्दछ ।

५. प्रस्तावित चरीकोट आयोजना मुख्यतय हाल सञ्चालन भइरहेको चरीकोट खानेपानी प्रणालीको विस्तारित रूप हो । वर्तमान चरीकोट प्रणालीको दायरा भित्र समावेश नभएका चरीकोट बजारको नयाँ क्षेत्रहरू (वडा नं २, ४, ५ र ७ का आंशिक क्षेत्रहरू)मा प्रस्तावित आयोजनाले आफ्नो वितरण प्रणाली विस्तार गर्नेछ । त्यस्तैगरी, यस वर्तमान प्रणालीका पाँच इन्टेकहरू प्रस्तावित आयोजनामा पुर्नस्थापना गरि प्रयोगमा ल्याइनेछ । वर्तमान प्रणालीमा पानी प्रशोधनको कुनै उचित प्रावधान नरहेको स्थलगत अध्ययनले देखाएको छ । त्यस्तैगरी, वर्तमान प्रणालीले हालसम्म त्यहाँका जनताका लागि दैनिक केही घण्टाका लागि मात्रै खानेपानी आपूर्ति सेवा प्रदान गर्दै आएको छ । निरन्तर खानेपानी आपूर्ति सेवाको प्रावधानको साथै उचित पानी प्रशोधनको व्यवस्था सहित प्रस्तावित आयोजनाले वर्तमान खानेपानी प्रणालीको अवस्थालाई सुधार गर्नेछ ।

६. यस प्रस्तावित चरीकोट आयोजना पूर्णरूपमा ग्रेभिटी प्रणालीको रूपमा परिकल्पना गरिएको हो । यस आयोजनाको वितरण प्रणाली अन्तर्गत थोक वितरण प्रणाली (BDS) र वितरण प्रणाली (DS) समावेश छन् । यस आयोजनाको मुख्य प्रणाली अन्तर्गत तीन उप-प्रणालीहरू समावेश छन् जस अन्तर्गत क) उप प्रणाली-१ (SS-1), ख) उप प्रणाली -२ (SS-2) र ग) उप प्रणाली -३ (SS-3) पर्दछन् । यसमा SS-1 अन्तर्गत देउराली प्रणाली, टावर प्रणाली, वर्तमान चरीकोट प्रणाली, माथिल्लो दोलखा प्रणाली र तल्लो दोलखा प्रणाली जस्ता पाँच वितरण प्रणालीहरू समावेश छन् । त्यस्तैगरी, SS-2 अन्तर्गत मकैबारी प्रणाली, तिनधारे प्रणाली र चरीघ्याङ प्रणाली जस्ता तीन वितरण प्रणालीहरू समावेश छन् । त्यसपछि, SS-3 अन्तर्गत माथिल्लो माट्टी, तल्लो माट्टी प्रणाली, माथिल्लो धरमघर प्रणाली, तल्लो धरमघर प्रणाली, माथिल्लो जिल्लु प्रणाली, मध्य जिल्लु प्रणाली र तल्लो जिल्लु प्रणाली जस्ता सात वितरण प्रणालीहरू समावेश छन् ।

आयोजनाको विवरण

७. वर्तमान प्रणालीमा प्रयोग भइरहेको भ्राप्रे खोला, डुङ खोला, गैरी खोला, कागते खोला, ओडारे १ र ओडारे १ गरी ६ वटा स्रोतहरू प्रस्तावित आयोजनामा प्रयोग हुनेछन् । यी ६ स्रोतहरू मध्ये पछिल्ला दुई स्रोतहरू छहरे स्रोतहरू हुन् भने बाँकी चार स्रोतहरू स्टीम स्रोत रहेको हाम्रो अध्ययनले देखाएको छ । यी सबै स्रोतहरू उप प्रणाली -१ अन्तर्गत समावेश छन् । यसको अलावा चार नयाँ स्रोतहरू प्रस्तावित आयोजनाको नयाँ स्रोतको रूपमा प्रस्ताव गरिएका छन् । यी चार स्रोतहरू मध्ये HC1 (चर्णावती खोलाको मुख्य गति पथमा रहेको) र HC2 (चर्णावती खोलाको शाखामा रहेको) यस आयोजनाको उप प्रणाली -२ का लागि प्रस्ताव गरिएको छ । त्यस्तैगरी, बाँकी पानी घट्टा र घट्टे खोला जस्ता दुई स्रोतहरू उप प्रणाली -३ का लागि प्रस्ताव गरिएको छ । समग्रमा यस आयोजनामा दशवटा इन्टेकहरू रहनेछन् । यी दशवटा इन्टेकहरू मध्ये उप प्रणाली -१ का दुईवटा छहरे इन्टेकहरू र दुईवटा स्टीम इन्टेकहरूलाई

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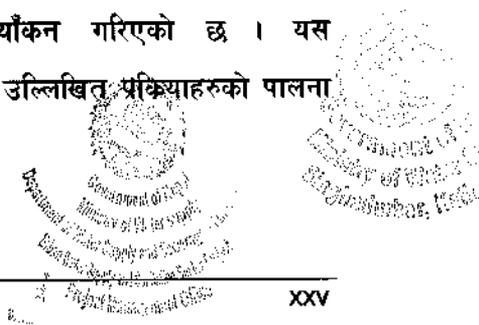
नयाँ इन्टेकहरूले प्रतिस्थापित गर्नेछ भने अरु दुई इन्टेकहरूको पुर्नस्थापना गरिनेछ । त्यस्तैगरी, दुवै उप प्रणाली -२ र ३ का लागि दुई- दुई वटा स्त्रीम इन्टेकहरू प्रस्तावित गरिएको छ । विस्तृत इन्जिनियरिङ डिजाइन रपोर्ट अनुसार उप प्रणाली -१, २ र ३ का श्रोतहरूबाट प्रयोग हुने पानीको मात्रा कमिक रूपले समग्रमा १०.६० लिटर प्रति सेकेण्ड, ३१ लिटर प्रति सेकेण्ड र ११ लिटर प्रति सेकेण्ड रहेको छ । त्यस्तैगरी, प्रस्तावित आयोजनामा सातवटा कलेक्सन च्याम्बरहरू पनि प्रस्ताव गरिएको छ ।

८. प्रस्तावित आयोजनाका लागि पाँच वटा पानी प्रशोधन केन्द्रहरू प्रस्ताव गरिएको छ । यी पाँच पानी प्रशोधन केन्द्रहरू मध्ये SS-1 अर्न्तगत तीनवटा प्रशोधन केन्द्रहरू समावेश छन् जसमध्ये देउराली प्रणालीको लागि एउटा स्लो स्यान्ड फिल्टर (WTP-1) मात्र प्रस्ताव गरिएको छ भने SS-1 का अरु प्रणालीहरूमा SB, HRF & SSF समावेश भएको WTP-2 प्रस्ताव गरिएको छ । यसैगरी, WTP-E भनिने तेस्रो WTP विद्यमान WTP हो जसलाई यसको प्रदर्शनमा सुधार गर्न पुर्नस्थापित गरिनेछ । त्यस्तैगरी, SS-2 को लागि SB & SSF समावेश भएको WTP-3 प्रस्ताव गरिएको छ । यसका साथै, SS-3 को लागि WTP-4 प्रस्ताव गरिएको छ जसअर्न्तगत SB, HRF र SSF समावेश छन् ।
९. यस आयोजनाका लागि पन्ध्रवटा रिजर्भोयर (पानी टेंकी)हरू प्रस्ताव गरिएको छ । यी रिजर्भोयर (पानी टेंकी)हरूको समग्र क्षमता लगभग १,६५० घ.मि. रहेको छ । प्रस्तावित ट्रान्समिसन मेन्सको कुल लम्बाई ३७.२३कि. मी. रहेको छ । प्रस्तावित वितरण पाइपलाइनको कुल लम्बाई १५८.८४९ कि. मी. रहेको छ । इन्टेक,कलेक्सन च्याम्बर, ट्रान्समिसन पाइपहरू, पानी प्रशोधन केन्द्र, पानी टेंकी, वितरण पाइपहरू, निजी धारा, पाले घर आदि यस आयोजनाका मुख्य खानेपानी संरचनाहरूका रूपमा समावेश छन् । त्यस्तैगरी, यस आयोजनाले जमिन, उर्जा, मानव संसाधन, श्रम शिविर, निर्माण सामग्री सञ्चय क्षेत्र जस्ता निर्माणाधीन आवश्यकताहरूका विषयलाई पनि महत्व दिइएको छ ।

पद्धति

१०. वातावरण संरक्षण नियमावली अनुसार यस प्रारम्भिक वातावरणीय परीक्षणका आधारभूत पद्धतिमा आयोजनास्थलबारे जानकारी हासिल प्राप्त गर्न लेख-रचनाहरूको समीक्षा र आयोजना क्षेत्रको भौतिक, साँस्कृतिक, रासायनिक, जैविक र सामाजिक अवस्थाहरूबारे आधारभूत जानकारी एकत्रित गर्न स्थलगत अध्ययन समावेश छन् । यहीं लेख-रचनाहरूको समीक्षा र स्थलगत अध्ययन को आधारमा प्रस्तावित आयोजना गतिविधिहरूबाट प्रभावित आयोजना क्षेत्र निर्धारण गर्न यस पद्धतिमा सरोकारवालाबाट सल्लाह सुझाव प्राप्त गर्न कुनै पनि राष्ट्रिय अखबार दैनिकमा पन्ध्र दिने सार्वजनिक सूचना प्रकाशन पनि समावेश छन् । त्यसपछि, इच्छुक सरोकारवालाबाट सुझाव एकत्रित गर्न सार्वजनिक परामर्श कार्यक्रम सञ्चालन गरिएको छ । यसका साथै प्रत्याशित प्रभावहरूको प्रतिकूलता निर्धारण गर्नको लागि साधारण चेकलिस्ट प्रक्रियामार्फत प्रभावहरूको पहिचान, पुर्वानुमान र मूल्यांकन गरिएको छ । यस प्रारम्भिकवातावरणीय परीक्षणले अनुमोदित सन्दर्भका सर्तहरू (ToR) मा उल्लिखित प्रक्रियाहरूको पालना गरेको छ ।

[Signature]
Engineer



नीति, कानूनी र प्रशासनिक रूपरेखा

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

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

ख) योजना, नीति तथा रणनीतिहरू : i) राष्ट्रिय वातावरणीय नीति तथा कार्य योजना, वि.सं २०५० (ई.स. १९९३); ii) जलस्रोत रणनीति, वि.सं २०५९ (ई.स. २००२); iii) ग्रामीण खानेपानी तथा सरसफाई नीति, तथा ग्रामीण खानेपानी तथा सरसफाई रणनीति, वि.सं २०६० (ई.स. २००४); iv) ग्रामीण खानेपानी तथा सरसफाई क्षेत्रीय रणनीतिक नीति, वि.सं २०६० (ई.स. २००४); v) राष्ट्रिय जल योजना, वि.सं २०६२ (ई.स. २००५); vi) राष्ट्रिय शहरी नीति, वि.सं २०६३ (ई.स. २००७) ; vii) राष्ट्रिय शहरी खानेपानी तथा सरसफाई क्षेत्रगत नीति, वि.सं २०६५ (ई.स. २००९); viii) साना शहर खानेपानी तथा सरसफाई क्षेत्रका लागि परिमार्जित पन्ध्र वर्षे विकास योजना, वि.सं २०६६ (ई.स. २००९ तथा २०१५ मा गरिएको संशोधन); ix) राष्ट्रिय खानेपानी आपूर्ति तथा सरसफाई नीति (ड्राफ्ट), वि.सं २०७१ (ई.स. २०१४); x) राष्ट्रिय वन नीति, वि.सं २०७५ (ई.स. २०१९); xi) भू-उपयोग नीति, वि.सं २०७२ (ई.स. २०१५)

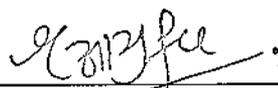
ग) कानून तथा ऐनहरू : i) आवश्यक वस्तु संरक्षण ऐन, वि.सं २०१२ (ई.स. १९५५); ii) जलचर संरक्षण ऐन, वि.सं २०१७ (ई.स. १९६१) तथा संशोधन वि.सं २०५५ (ई.स. १९९७); iii) शहरी विकास ऐन, वि.सं २०४५ (ई.स. १९९८); iv) जल स्रोत ऐन, वि.सं २०४९ (ई.स. १९९२); v) वन ऐन, वि.सं २०४९ (ई.स. १९९३); vi) भू-अतिक्रमन ऐन, वि.सं २०४९ (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 नियमावलीहरू : 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)

ड) निर्देशिका तथा पुस्तिका : i) राष्ट्रिय वातावरणीय प्रभाव मूल्यांकन दिशानिर्देश, वि.सं २०४९ (ई.स. १९९३); ii) विश्व स्वास्थ्य संस्थाको वायु गुणस्तर दिशानिर्देश, वि.सं २०६१ (ई.स. २००५); iii) खानेपानी गुणस्तरका लागि विश्व स्वास्थ्य संस्थाको दिशानिर्देश, चौथो संस्करण, वि.सं २०७३ (ई.स. २०१७); iv) राष्ट्रिय ध्वनि मानक दिशानिर्देश, वि.सं २०६८ (ई.स. २०१२); v) सामुदायिक ध्वनिका लागि विश्व स्वास्थ्य संस्थाको दिशानिर्देश, वि.सं २०५५ (ई.स. १९९९) र vi) "राष्ट्रिय प्राथमिकता प्राप्त योजनाको लागि राष्ट्रिय वन क्षेत्र प्रयोग गर्ने सम्बन्धी कार्यविधि-२०७४"

वर्तमान वातावरण

१२. प्रस्तावित आयोजनाका प्रत्यासित वातावरणीय प्रभावहरुप्रति यस आयोजना शहरका वातावरणीय पक्षहरुको संवेदनशीलताको पहिचान गर्न यस आयोजना शहरको वर्तमान वातावरणीय अवस्थाबारे जानकारी लिन आवश्यक पर्दछ । यसै सन्दर्भमा, डेस्क अध्ययनको क्रममा साहित्य समीक्षाको माध्यममार्फत वर्तमान वातावरणको दोश्रो तहको जानकारी प्राप्त गरिएको छ । यद्यपि, प्रारम्भिक वातावरणीय परीक्षणका लागि यी द्वितीयक जानकारी पर्याप्त छैन । तसर्थ, वर्तमान वातावरणीय अवस्थाबारे प्राथमिक तहको जानकारी एकत्रित गर्न स्थलगत अध्ययन गरियो ।
१३. स्थलगत अध्ययनको क्रममा क) भौतिक वातावरणीय पक्ष अन्तर्गत स्थलाकृति, भूमि प्रयोगका ढाँचा, 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 अर्न्तिक्रिया मार्फत संकलन गरियो । आयोजना क्षेत्रभित्र कुनै पनि संरक्षित क्षेत्र नरहेको स्थलगत अध्ययनको क्रममा देखिएको छ । तथापि, आयोजनाका केही संरचनाहरु त्यहाँ अवस्थित केही सामुदायिक वन क्षेत्रहरुभित्र रहेको देखिएको छ।
१४. त्यस्तैगरी, पानीको गुणस्तरबारे विवरण संकलन गर्न पानीको नमुना संकलन गरी स्वीकृति प्राप्त प्रयोगशालामा परीक्षण गरियो । यस परीक्षणले हात्तीछहरा, ओडारे र भ्राप्रे खोलाबाट संकलित पानीको नमुनामा सबै आवश्यक प्यारामिटरहरु राष्ट्रिय खानेपानी गुणस्तरको मापदण्ड भित्र रहेको देखाएको छ ।
१५. स्थलगत अध्ययनको क्रममा, सामाजिक आर्थिक वातावरण अन्तर्गत जनसांख्यिक विशेषताहरु, जाति/जातिय समूह, आर्थिक विशेषताहरु, शिक्षा तथा सीप, सामुदायिक पूर्वाधारहरु इत्यादि सम्बन्धि विवरणहरु साधारण प्रश्नावली प्रक्रिया हुँदै घरधुरी सर्वेक्षण र स्थानिय सँगको अर्न्तिक्रिया मार्फत संकलन गरियो । यसै सन्दर्भमा पानीको मासिक महसुल तिर्ने सम्बन्धि इच्छुकता, अग्रिम नगद योगदानका लागि इच्छुकता र तिर्ने सक्ने क्षमता बारे पनि मूल्यांकन गरियो । नमुना घरधुरी सर्वेक्षण अनुसार १९२ घरधुरी मध्य १००% ले नै पानीको मासिक महसुल तिर्ने र अग्रिम नगद योगदान दिने इच्छा व्यक्त गरेको देखाएको छ । यसले विद्यमान पानीको गंभीर समस्याबाट छुटकारा पाउनका लागि यस आयोजना



Engineer

शहरका बासिन्दाहरूको प्रस्तावित आयोजनाको चाहनालाई संकेत गर्दछ । त्यस्तैगरी, सर्वेक्षणले ३८४२ घरधुरी मध्य ११.३७% (४३७) विपन्न वर्ग अर्न्तगत रहेको देखाएको छ भने २९.३०% (११२४) 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

१६. प्रस्तावित आयोजनाको वैकल्पिक विश्लेषण, यस प्रारम्भिक वातावरणीय परीक्षणको अर्को मुख्य प्रक्रिया हो जसले प्राविधिक, वातावरणीय तथा सामाजिक पक्षहरूको सन्दर्भमा यस आयोजनाको सम्भाव्यताको परीक्षण गर्न मद्दत पुर्याउँछ । मुख्यतय, यस प्रक्रिया अर्न्तगत “आयोजना विना” विकल्प र “आयोजना सहित” विकल्प जस्ता दुई विकल्पहरू समावेश गरिएका छन् । निरन्तर खानेपानी प्रणाली, प्रशोधन प्रणाली तथा पानीजन्य रोगप्रतिको संवेदनशीलताको सन्दर्भमा “आयोजना विना” विकल्पको सीमितताले “आयोजना सहित” विकल्पको छनौट तर्फ उन्मुख गराएको छ । प्रस्तावित आयोजनाका सम्भावित फाइदाहरूको मनन मार्फत “आयोजना सहित” विकल्पको विश्लेषण गरिएको छ । आधार वर्ष २०१८को अनुसार २२,७५५ 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 मुल्यांकन समावेश छन् । यस वैकल्पिक विश्लेषणको अवधिमा प्रस्तावित आयोजनाका लागि कुनै अन्य विकल्पहरू सम्भव नरहेको पहिचान गरिएको छ । प्रस्तावित आयोजना एक अद्वितीय प्रणाली भएको र विद्यमान चरीकोट प्रणालीको विस्तारीत रूप भएको यस वैकल्पिक विश्लेषणले देखाएको छ ।

पूर्वानुमानित वातावरणीय प्रभावहरू

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

१८. यी पूर्वानुमानित वातावरणीय प्रभावहरूलाई मुख्यतय यिनका नकरात्मक र सकारात्मक महत्वको आधारमा दुई भागमा वर्गीकृत गरिएको छ : क) लाभदायी प्रभाव र ख) प्रतिकूल प्रभाव । यी वर्गीकृत गरिएको प्रभावहरूलाई वर्तमान वातावरणमा पर्ने असरहरूको आधारमा थप चार प्रभावहरूमा वर्गीकृत गरिएको छ: क)भौतिक वातावरणीय प्रभाव ख) जैविक वातावरणीय प्रभाव ग) रासायनिक वातावरणीय प्रभाव र घ)सामाजिक आर्थिक वातावरणीय प्रभाव । यी चार प्रभावहरूलाई आयोजनाको चरण अनुसार पुन तीन

भागमा विभाजन गरिएको छ, जस अर्न्तगत क) डिजाइन चरण, ख) निर्माण चरण र ग) सञ्चालन चरण समावेश छन् ।

१९. यहाँ लाभदायिक प्रभावहरु अर्न्तगत रोजगार श्रृजना, कौशल वृद्धि, 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 ढाँचामा 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, जलीय जीवनमा पर्ने प्रभाव, वन डढेलो, वन अतिकमन, नजिकैको नदीनालाको पानीको गुणस्तरमा पर्ने प्रभाव, रिजरभोयरमा भण्डारण गरिएको पानीको गुणस्तरमा पर्ने प्रभाव, संरचनात्मक अस्थिरता, सामुदायिक स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरु, हाल प्रदान भइरहेको सुविधाहरुमा हुनसक्ने क्षति, ट्राफिक जाम, स्थानिय विक्रेताको व्यवसायमा अवरोध, पेशागत स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरु, असुरक्षित खानेपानीको वितरण, आयोजनाका कार्यहरुको दिगोपनमा पर्ने प्रभाव इत्यादि जस्ता प्रभावहरु प्रतिकूल प्रभाव अर्न्तगत समावेश छन् ।

न्यूनिकरण तथा वृद्धि-विकासका उपायहरु

२०. माथि उल्लिखित प्रत्येक प्रत्याशित प्रतिकूल वातावरणीय प्रभावहरुको न्यूनिकरण तथा लाभदायिक प्रभावहरुको वृद्धि-विकासका 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 अभै माथि उकास्नको निम्ति विभिन्न उपयुक्त वृद्धि-विकासका उपायहरुको पनि प्रस्ताव गरिएको छ ।

सूचना प्रवाह, परामर्श तथा सहभागिता

२१. उपभोक्ताहरु सँगको परामर्श तथा सामुदायिक सहभागिता यस आयोजनाको तयारीको क्रममा अपनाइने महत्वपूर्ण प्रक्रिया हो। यो सरोकारवाला तर्फ प्रभावित व्यक्तिहरुलाई संलग्न गराउने प्रक्रिया हो । यस प्रक्रियामा प्रमुख सूचनादातासँगको अर्न्तवार्ता सम्बन्धित उपभोक्ता समितिसँगको स्थलगत छलफल तथा

उपभोक्ताहरु सँग गरिने स्थलगत छलफल जस्ता प्रक्रियाहरु समावेश छन् । उपभोक्ताहरु सँगको परामर्श अघि सम्भावित हितग्राहीहरु र आयोजना कार्यान्वयनप्रति यिनको भूमिकाको पहिचान गर्नको निम्ति उपभोक्ता विश्लेषण र म्यापिङ्ग (चित्रण) गरिन्छ । यसपश्चात् आयोजना सम्बन्धि सूचना प्रवाह गर्न, उपभोक्ताहरुको सुझाव तथा सल्लाह संकलन गर्न र आयोजनाप्रति उनीहरुले देखाएका चासोका विषयहरुलाई जोड दिन यी सम्भावित उपभोक्ताहरुलाई परामर्शमा संलग्न गराइन्छ । उपभोक्ताहरु सँगको परामर्शका प्रक्रियाहरु 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 कायम गर्नेछ ।

गुनासो सुनवाई संयन्त्र

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

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

➤ ती व्यक्तिहरुको समस्यालाई समयमै प्रभावकारी ढंगले सम्बोधन गर्ने

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

क) उपभोक्ता समितिको सचिव

ख) क्षेत्रिय आयोजना व्यवस्थापन कार्यालयको इन्जिनियर

ग) क्षेत्रिय आयोजना व्यवस्थापन कार्यालयको सामाजिक/वातावरण अधिकारी

घ) पीडित पक्षका तर्फबाट एक प्रतिनिधि

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

च) अतिथिको रूपमा आयोजना क्षेत्रमा सक्रिय कुनै प्रतिष्ठित एवं प्रसांगिक समुदायमा आधारित संस्था(CBO)/स्वयं सहायता समूह (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

Engineer

जिम्मेवार ढङ्गले 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 गर्न 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 निर्मूलिकरणको कूल अनुमानित लागत रु.१,८००,०००.०० रहेको छ ।

अनुगमन तथा रिपोर्टिङ

२४. यस आयोजनाको वातावरणीय गतिविधिको निगरानी र रिपोर्टिङका 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 चालेछ । यस पश्चात् PMO ले एसियाली विकास बैंक समक्ष अर्द्ध वार्षिक निगरानीको प्रतिवेदन पेश गर्नेछ । कानूनी कागजातमा सम्भौता 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 मन्त्रालय र वन तथा वातावरण 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 क्रममा 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) वर्षौदेखि निरन्तर खानेपानी आपूर्तिकालागि भोग्नुपरेको कठिनीई, बाट मुक्ति र
- घ) परिणामको स्वरुप परिरस्कृत सामुदायिक स्वास्थ्य सुधारिएको जीवन स्तर र सुरक्षित समुदाय

२६. निष्कर्षमा, यस आयोजनाले कुनै उल्लेखनीय नकरात्मक प्रभावहरु ननिम्त्याएको र एसियाली विकास बैकद्वारा गरिएको वर्गीकरण अनुसार प्रस्तावित आयोजना Category 'B' अर्न्तगत पर्ने र वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको अनुसुचि-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 ।



[Handwritten Signature]
Engineer



1. INTRODUCTION

1.1. Background

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

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

1.2.1. Name of the Proposal

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

1.2.2. Name and Address of the Proponent

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

Name of Proponent

Project Management Office

Urban Water Supply and Sanitation (Sector) Project

Department of Water Supply and Sewerage Management (Implementing Agency)

Ministry of Water Supply (Executive Agency)

Government of Nepal

Address of the Proponent:

Panipokari, Kathmandu

Tel: 977 1 442388, 977 1 4412348

Fax: 977 1 4413280

E-mail: info@stwssp.gov.np

Website: www.sstwssp.gov.np

1.2.3. Consultant Preparing the Report

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

1.3. Purpose of IEE

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



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

8. The IEE Report primarily: (i) provides information on the Project and its environmental requirements; (ii) provides the necessary baseline conditions of the physical, ecological, cultural and socio-economic environments and/or resources in and surrounding the Project's area of influence; (iii) identifies and assesses potential impacts arising from the implementation of the Project on these environments and/or resources; (iv) recommends measures to avoid, mitigate, and compensate for the adverse impacts; (v) presents information on stakeholder consultations and participation during Project preparation (vi) recommends a mechanism to address grievances on the environmental performance of the Project; and (vii) 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. The present water supply is intermittent and is limited to only certain parts of the city area. The current systems serve only about 90% of the service area population. The existing water supply system has not been able to meet the growing demand for water. Hence, there is a demand for supply of regular potable water to the consumers from other parts of the Municipality. 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 prone to bacteriological contamination specially during monsoon season.
11. The Charikot Bazaar area that falls within the ward 3 and partial area of ward 5 of Bhimeshwore municipality, is densely populated and is facing acute water shortage problem. Similarly, various governmental & non governmental offices that includes schools, health institutions, temples, commercial shops, army barracks, police posts, hotels & lodges, factories etc. exist in this area. This has

awakened the need to facilitate the reliable water supply system in Charikot Bazaar Area. Regarding this, as per the detailed design of the proposed project, domestic consumption at ultimate demand i.e., 100 lpcd has been considered as the proposed project aims to provide safe & reliable water to each HH. This nodal demand also includes the institutional demand, commercial demand and wastage & leakage. Here, the institutional demand consists of water demand pertaining to institutions like schools & colleges. Similarly, the commercial demand consists of water demand pertaining to army barracks, police posts, hotels, lodges, factories, government and non-government offices. Hence, all the parts that includes Residential, Commercial, Institutional along with anticipated wastage & leakage issues within the service area has been covered under the scope of the proposed project.

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

1.5 Rationale of the Project

13. 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 commitments and various other aspects. This all will be discussed in the following chapters.
14. With regard to IEE study, the proposed project requires to be studied from the environmental point of view as per EPA 1997 AD and EPR 1997 AD, 2054 BS (Amendments 1999 AD, 2007 AD & 2017 AD). The Proposed Water Supply and Sanitation Project is intended to serve drinking water in partial area of wards 2, 4 & 5 and complete areas of wards 3 & 7. The project is expected to benefit a base year population of about 22,755 populations (2018) & the design population of 34,610 (2038) by providing a reliable and adequate supply of safe & potable water along with the promotion of good hygiene and sanitation practices.
15. The proposed project shall use surface water sources. The Project does not involve any tunnels' construction; relocation of people or households, settlement plan above the gravity source and construction of river training works. As the proposed project falls within the definitions provided in the EPR 1997 (Amendments 1999, 2007 & 2017 AD) Schedule 1 (Clause H) for drinking water projects; only an IEE should be done. The regulation stated in Schedule 1

(Clause H) shall only be applicable if the proposal does not fall under the categories "A" through (Clause H) of Schedule 2.

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

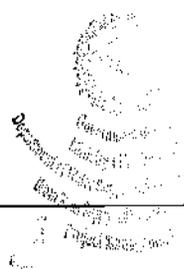
Table 1: Criteria for Requirement of IEE for Drinking Water Supply Projects as per Schedule 1 (Clause H) of Environment Protection Regulation 1997 with Amendment 2007 & 2017 AD

S.N.	Condition described in the Act and Regulations	IEE Required as per the Regulation Schedule 1 (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 old sub system SS-1 has safe yield of 10.6lps while other tow sub systems have safe yield of 6 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 51.3lps.)
3	Connection of New Source to supply water to existing water supply system for a population of	10,000 – 100,000	About 21,909 populations (2016) & design populations of 34,610 populations (2038).

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



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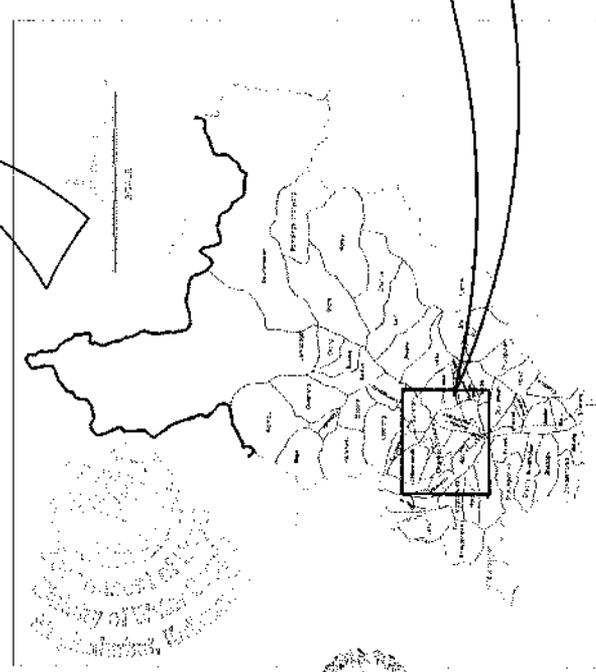
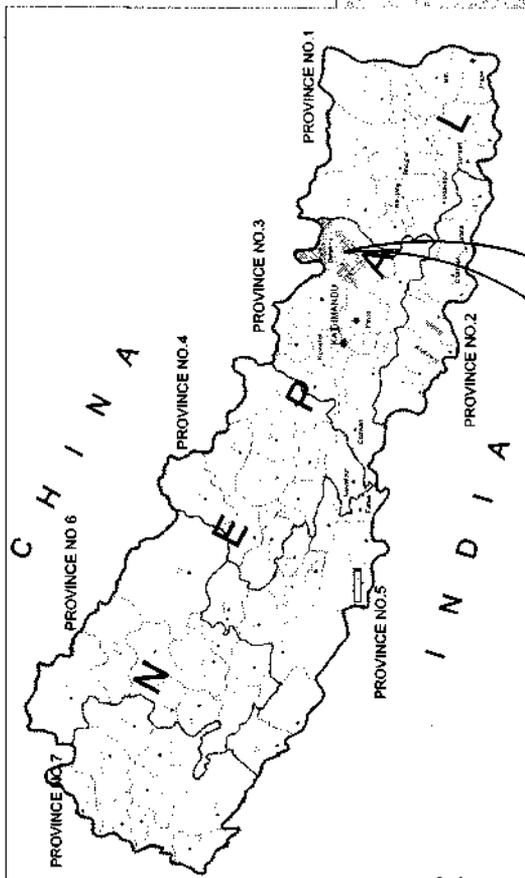
2 DESCRIPTION OF THE PROJECT

2.1 Location & Accessibility

17. The Project area of Charikot Water Supply and Sanitation Subproject lies in Bhimeshwore Municipality, Dolakha District, a hilly district in the Province 3 of Eastern Nepal. The proposed project covers partial area of wards 2, 4 & 5 and complete areas of wards 3 & 7 of Bhimeshwore Municipality.
18. Geographically, the project area lies in the hilly region lies between 27°37' 58" N to 27°44' 42" N latitude to 85°5' 12" E to 85° 59' 31" E longitude with altitudes ranging between 950 to 2560 m above mean sea level (amsl) with an average altitude of 1554 meters.
19. This *Figure 1* given below shows that the project area belongs to Bhimeshwore Municipality of Dolakha District of Province 3 of Nepal. Bhimeshwore Municipality is bounded by Kalinchowk Rural Municipality in the north, Baiteshwore Rural Municipality in the east, Sailung Rural Municipality in the south and Sinshupalchowk District (Tipura Sundari Rural Municipality & Lisangkhu Pakhar Rural Municipality) in the west. The region is bordered by the Sunkoshi River on the west and the Khimti Khola River on the east. It is divided unequally by the River Tama Koshi, proportionately two-thirds to the west of the river and one-third to the east. To the north east lies the impressive Rolwaling Himal to the western edge of which are such peaks as Gauri Shankar and Melungtse. Gauri Shankar is synonymous with the god Shiva and his consort Parvati.

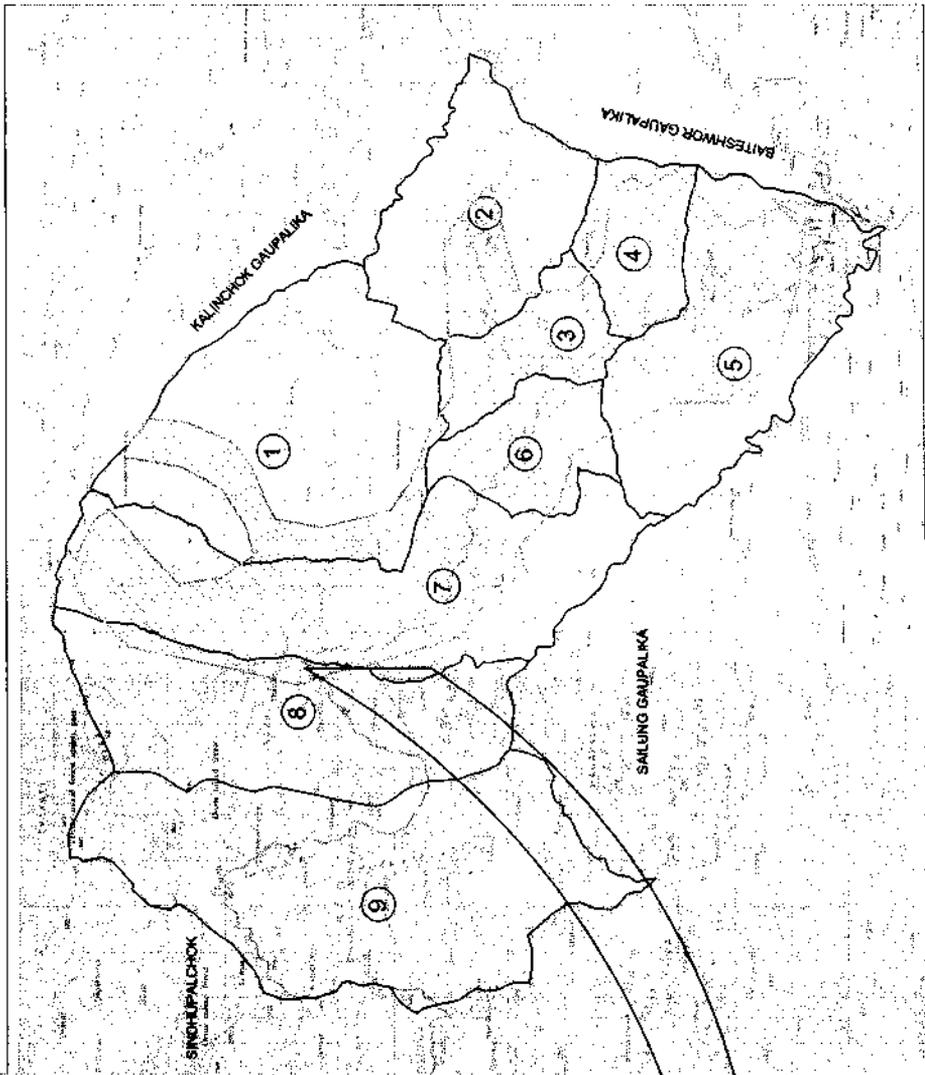

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LEGEND

SN	SYMBOL	LEGEND NAME
1.	[Symbol]	PROJECT AREA
2.	[Symbol]	PROJECT DISTRICT
3.	[Symbol]	WARD BOUNDARY
4.	[Symbol]	NEPAL BOUNDARY
5.	[Symbol]	DISTRICT BOUNDARY
6.	[Symbol]	PROVINCE BOUNDARY
7.	[Symbol]	PLACE BOUNDARY
8.	[Symbol]	RIVER
9.	[Symbol]	ROAD



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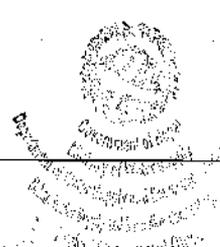


Figure 1: Project Location Map

20. This new Bhimeshwore municipality was reformed on March 10, 2017 merging former VDCs namely Suspachhemawati, Boch, Lakuridanda and former Bhimeshwore municipality.

Table 2: Bhimeshwore Municipality Ward Profile

Present Ward Municipality	Former VDC/Municipality	Former Ward No.
1	Supuspachhemawati	WN 1 to 9
2	Bhimeshwore Municipality	WN 2 to 4
3	Bhimeshwore Municipality	WN 1
4	Bhimeshwore Municipality	WN 5 & 7
5	Bhimeshwore Municipality	WN 6, 8 & 9
6	Bhimeshwore Municipality	WN 10
7	Bhimeshwore Municipality	WN 11 to 13
8	Boch VDC	WN 1 to 9
9	Lakuridanda VDC	WN 1 to 9

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

21. The **Table 2** shows that the reformed Bhimeshwore municipality has been divided into 9 wards. The current wards 1 of the municipality belongs to wards 1 to 9 of the former Supuspachhemawati VDC. Similarly, the current ward 2 belongs to wards 2 to 4, ward 3 belongs to ward 1, ward 4 belongs to former wards 5 & 7, ward 5 belongs to wards 6, 8 & 9, ward 6 belongs to ward 10 and ward 7 belongs to ward 11 to 13 of former Bhimeshwore municipality. Likewise, the current wards 8 & 9 belong to wards 1 to 9 of former Boch VDC and Lakuridanda VDC respectively.
22. The Lamosanghu-Jiri road passes through the Bhimeshwor Municipality. Lamosanghu is located on the Arniko Highway (also referred as Kodari Rajmarga). The project area is approximately 139 km from Kathmandu. Regular local and express bus services are available from Kathmandu. The project area is in a hilly region.
23. The project municipality has a subtropical to a temperate climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of about 1710 mm.

2.2 The Proposed Project

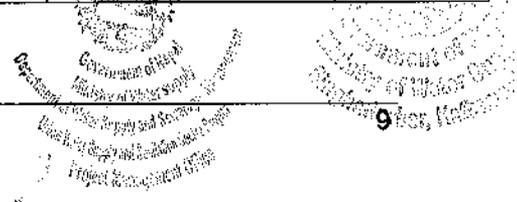
24. The proposed project is the extension of the existing water supply system. This Project has been conceptualized as a totally gravity surface water system. The system is a combination of rehabilitation of old system and amalgamation of proposed water supply components required for upgrading the system.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

25. The overall concept has been developed with distribution system comprising of Bulk Distribution System (BDS) and Distribution System (DS). In this concept, the whole service area will be divided in number of service area with dedicated storage reservoir, also referred as sub-system, for that particular service area. Therefore, the main system comprises of number of sub-system. The service area will be divided on the basis of elevation difference and proximity. Altogether, the proposed project comprises of three sub systems. The service area has been divided based on elevation difference and proximity of households in a distribution system. At the same time, it will reduce pipe cost considerably, provides flexibility to operate the system, avoid excessive large number of break pressure tanks and follow principles of DMA.
26. As the service area is very scattered and stretched in 15 to 20 km with very high elevation difference within the service area (in the range of 1000 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.
27. Each service reservoir will have control mechanism with bulk meter so that it will support the principles of DMA. The entire distribution network is to be supplied from multiple (fifteen) 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 fifteen reservoirs in order to manage RVT wise demand. The demand of 2018 and 2038 of every sub-system has been calculated and shown below.

Table 3: Proposed Sub-system and demand

TL SS	DMAs	HHs	Population			Demand	
			2016	2018	2038	2018	2038
SS-1	Deurali	18	90	94	152	11,938	19,184
	Tower Area	77	379	397	639	50,272	80,785
	Existing Charikot Bazaar	497	2,791	2,852	4,703	360,794	594,907
	Upper Dolakha	415	2,197	2,304	3,702	291,421	468,295
	Lower Dolakha	353	1,634	1,693	2,416	214,156	305,608
SS-2	Charighang	831	4,473	4,689	7,515	593,156	950,605
	Tindhare	483	2,660	2,787	4,441	352,522	561,813
	Makai Bari	570	2,864	2,960	4,124	374,486	521,631
SS-3	Upper Jillu	92	420	438	663	55,385	83,928
	Middle Jillu	266	1,353	1,400	1,972	177,086	249,420
	Lower Jillu	44	194	200	269	25,283	34,052
	Upper Matti	270	917	948	1,327	119,947	167,884

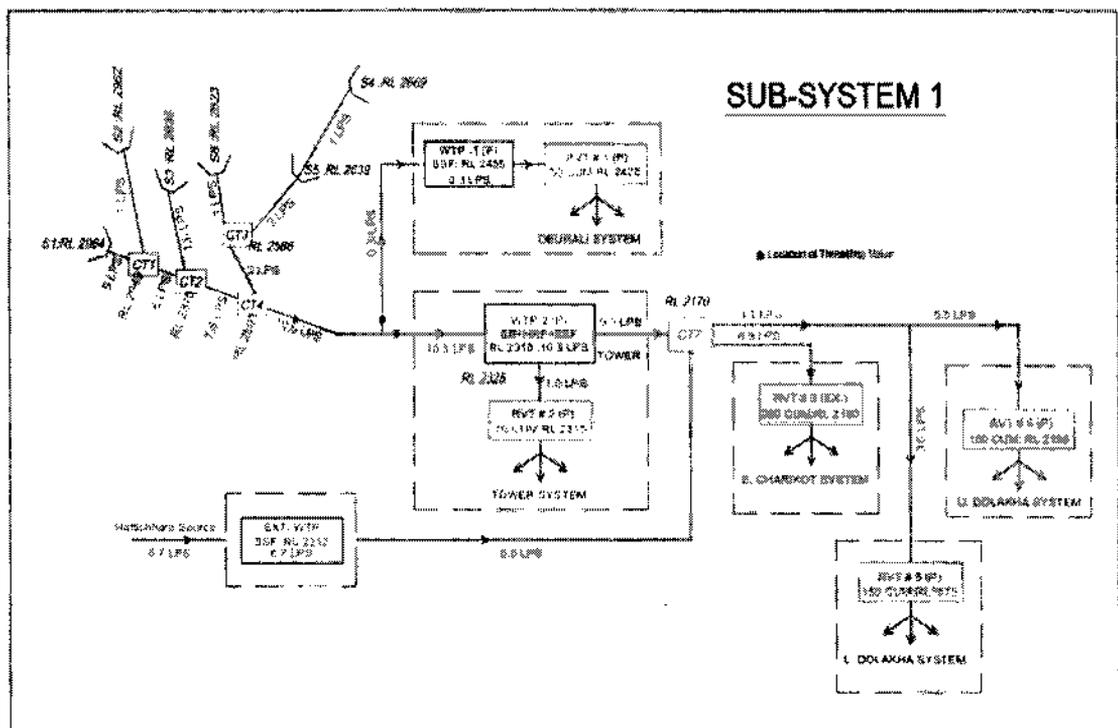
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TL SS	DMAs	HHs	Population			Demand	
			2016	2018	2038	2018	2038
	Lower Matti	88	367	378	509	47,829	64,418
SS-3	Upper Dharmaghar	162	711	732	987	92,660	124,800
	Lower Dharmaghar	182	859	885	1,192	111,948	150,778
	TOTAL	4,348	21,909	22,758	34,610	2,878,883	4,378,107

Source: Detailed Engineering Design Report, 2018

28. All the sub-systems can be operated independently. The fifteen distribution sub systems are also inter linked, at possible extent, and water from neighboring sub systems 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.
29. The schematic diagram of the proposed project is presented sub-system wise in the figure given below:



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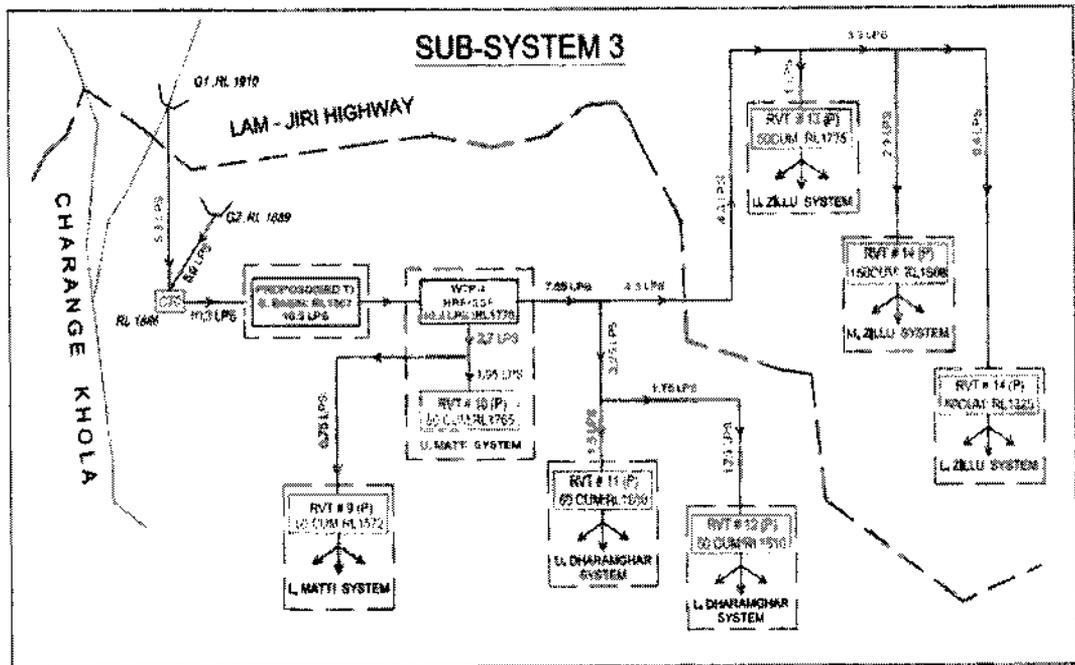
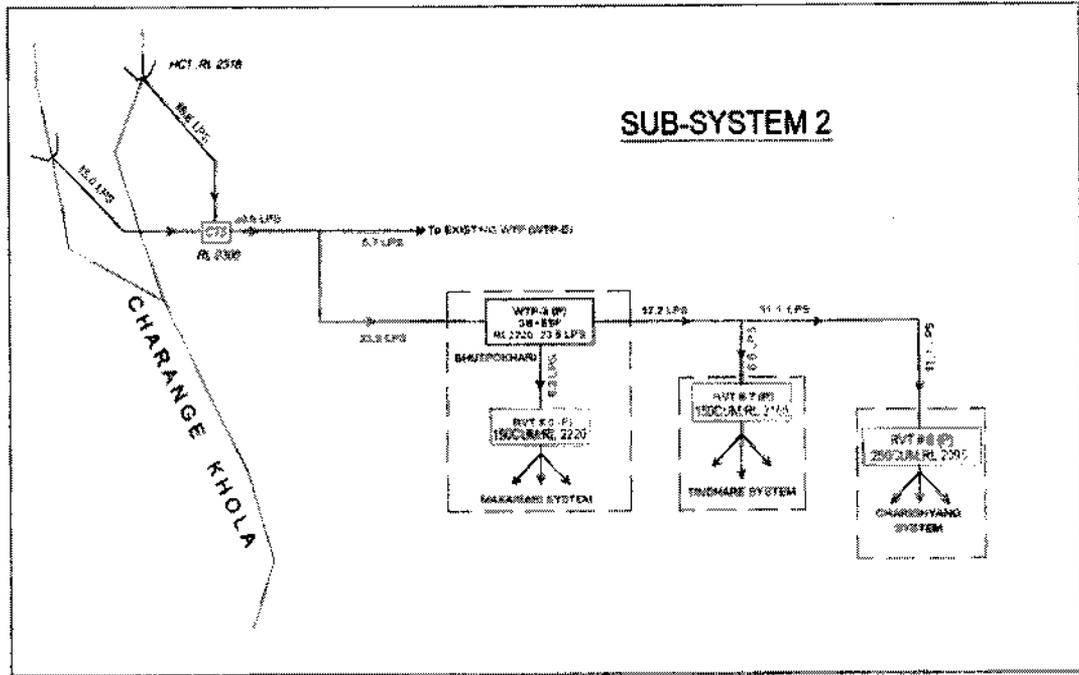


Figure 2: The Schematic Layout of the Project

2.3 Salient Features of the Project

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

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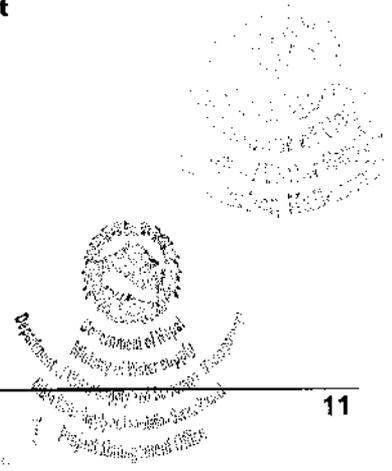


Table 4: Salient features of the project

SN.	Items	Description
1	Name of Project	Charikot Water Supply and Sanitation Project
2	Type	Gravity
3	Study Level	Detailed Engineering Design
4	Location Area	
	Province	3
	District	Dolakha
	Rural Municipality/Municipality	Bhimeshwor Municipality
	Ward	Complete area of Ward 3 & 7 and partial areas of wards No. 2, 4 & 5
5	Available Facilities	
	Road	Lamoshanghu- Jiri Highway
	Supply Water System	17 Major Systems
	Electricity	Available
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
6	Social Status	
	Present HHs Numbers (2016)	3842
	Present Population (2016)	21,909
	Base Year Population (2018)	22,755
	Design Year Population (2038)	34,610
	Average HHS size	5.7
	Weighted Growth Rate % (WGR)	2.1
	Projected HHs in Design Year (based on WGR)	~ 6070
7	Water Demand (MLD)	
	Base Year (2018)	2.878
	Design Year (2038)	4.378
8	Source Characteristics	
	Source Name	a) SS-1: S1 (Jhapre Khola), S2 (Dund Khola), S3(Gairi Khola), S4(Kagate), S5 (Odare 1) & S6 (Odare 2) b) SS-2: HC1 (Hattichhahara Source) & HC2 (Hattichhahara Source-Nigale Khola) c) SS-3: Ghatte Khola & Pani Ghatta
	Source Type	a) SS-1: S1, S2, S3 & S6: Stream Sources S5 & S6: Spring Sources b) SS-2: HC1 & HC2: Stream Sources c) SS-3: G1 & G2: Stream Sources
	Source Location	a) SS-1: S1-WN 7, S2-WN 7, S3-WN 7, S4-WN 1, S5-WN 1 & S6-WN 1 b) SS-2: HC1: WN 7 & HC2: WN 8 c) SS-3: Ghatte Khola (G1)- WN 7 & Pani Ghatta (G2)- WN 8

Engineer

SN.	Items	Description
	Safe Yield	a) SS-1: Cumulative -10.6lps b) SS-2: Cumulative -31lps c) SS-3: Cumulative -11lps
9	Type of Structures	
	Proposed intakes	Total: 10 nos. SS-1: 2 nos (New) and 4nos.(Rehabilitated) SS-2: 2 nos.(New) SS-3: 2 nos. (New)
	Collection Chambers/Collection Tanks	SS-1: 5 nos. SS-2: 1 no. SS-3: 1 no.
	Water treatment plant	WTP-1: SSF-0.3lps WTP-2: SB+HRF+SSF-10.3 lps WTP-E: SSF-6.7 lps WTP-3: SB+SSF-23.9 lps WTP-4: SB +HRF+SSF-10.3lps
	Ground Reservoir (No and Capacity in CUM)	a) SS-1 i) Deurali RVT -50cum ii) Tower RVT-50cum iii) Existing Charikot RVT-250cum iv) Upper Dolakha RVT-150cum v) Lower Dolakha-150cum b) SS-2 i) Makaibari RVT-150cum ii) Tindhare RVT-150cum iii) Charighyang RVT-250cum c) SS-3 i) Upper Matti RVT-50cum ii) Lower Matti RVT-50cum iii) Upper Dharamghar RVT-50cum iv) Lower Dharamghar RVT-50cum v) Upper Jillu RVT-50cum vi) Middle Jillu RVT-150cum vii) Lower Jillu RVT-50cum
	Valve Chamber (Bricks/RCC)	Bricks:70 nos. RCC:25 nos.
	Office Cum GH (O1) /Guard House (G1) / Small Guard House (G2) /Dosing Pump House (DPH)	1-O1 / 3-G1 / 3-G2 / 9- DPH
	Household Connection	3,842
	Fire Hydrant	14 set
	Protection Works	<ul style="list-style-type: none"> Barbed Wire Fencing-60 m & 180m (Deurali RVT), 266m (Makaibari System), 180m (Upper & Lower Dharamghar), 160m (Upper & Lower Jillu System), 216m (Intakes, IC,CC & BPT) Fencing by galvanized chain link-288 m²(Tower System), 154 m²(Upper Dolakha System), 140 m²(Lower Dolakha System), 127 m²(Charighyang System), 167 m²(Tindhare System), 288 m²(Upper Matti System), 127 m²(Lower Matti System), 154 m²(Middle Jillu System), 181 m²(Proposed Office Premises) and 261 m²(Existing Charikot System)

SN.	Items	Description
	Approach Roads (Gravel)	200m
	Approach Roads (PCC)	100 m ²
	Reinstatement of PCC/RCC pavements	2000 m ²
	Re-sealing of Blacktopped Roads	2000 m ²
	Re-sealing of Gravel Roads	5000 m ²
	Total Length of pipe in transmission and Bulk Distribution	44,674 m (with 1351 m of BDS)
	Total Length of pipe in Distribution	143,321 m
10	Total Cost of WS Component (Inclusive of all) NRs.	972,446,154.80
11	Cost Sharing Arrangement	
	GON Component (75 %)	724,461,491.33
	TDF Loan (25 %)	241,487,163.78
12	WUSC's Commitment for O&M as upfront (Cash)	19,318,973.10
13	Tariff	
	Up to 6 cum/monthly (NRs)	210
	7 to 10 cum/monthly (NRs)	53
	11 to 20 cum/monthly (NRs)	79
14	EIRR (Base case) %	31.05
15	Per Capita Cost for W/S component	
	Per Capita Cost (for base year pop.)	42,736
	Per Capita Cost (for design year pop.)	28,098
16	Environment	
	ADB Category	B, Only IEE necessary
	IEE finding	No significant adverse impact.

Source: Detailed Engineering Design Report, 2018

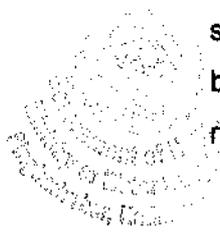
2.4 Water Supply Project Components/Features

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

2.4.1 Sources/Intakes

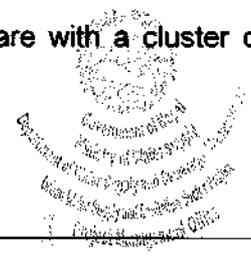
32. Altogether, there are ten intakes. The first sub-system, SS-1 or OLD system comprise six numbers of intake and other two sub-systems, SS-2 and SS-3, each comprises of two-stream intakes.

33. Out of these six intakes in the old system, two are spring intake, and four are stream intakes. As they are drawing water from these sources in the past with a cumulative safe yield of 11 lps, the safe yield of the transmission system of this sub- system has been adopted as 10.6 lps. Collected water from two streams will be collected at collection chamber. This are with a cluster of intakes are in the range of 2669 m to 2964 m.



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34. In sub-systems (SS-2) two streams intake have been proposed. One intake has been proposed at the main course of Charnawati River and other intake is from its tributary. Both of these intakes are about 400 m u/s from the Tallo Dovan of Hattichahara. As the tributary of Charnawati River flows in very steep gradient at intake area of SS-2 Sub-system, temporary type of weir by Rip-Rap has been recommended (TYP-3). A single orifice type intake with minimal sill height has been provided to divert river water to intake filter chamber in a main river.
35. However, simple bottom trash rack has been proposed (TYP-5) on the hard bedrock at the Hattichahara (Charnawati River near waterfall). The bed is of hard rock as stilling basin in this waterfall area. An appropriate simple Bottom Rack Intake has been proposed in this river. A gravel trap at the end the bottom rack, in the form of chamber, has been provided to trap the heavy sediment, which enter from the bottom rack and rolled in the gallery. The gravel trap shall be cleaned occasionally by manual means. Diverted water from two streams will be collected at collection chamber. In totality cumulative discharge of about 31 lps have been proposed. Relative Level (RL) of these intakes is around 2318 m amsl.
36. As the main course of Charnawati River flows in very steep gradient at intake area of SS-3 Sub-system, temporary type of weir by Rip-Rap has been recommended. A single orifice type intake with minimal sill height has been provided to divert river water to intake filter chamber in the main river. As rigid structure like concrete or masonry weir is not found suitable for the river of mid hill with wider river width. A temporary weir formed by heaping of Rip-Rap for 0.5 to 1 m high across 20m wide river has been provided for the diversion structure of this system. Moreover, such flexible structure is easy for operation and maintenance. A single orifice type of intake has been provided to capture the design flow even during the lean season. To make simple design and simple operation, no gates and scour sluice at intake are provided. To control heavy discharge in the canal during flood time in the river, a control orifice is provided immediately after the gravel trap.
37. A simple RCC chamber intake (TYP-4) has been proposed to divert water from the tailrace of the watermill (Ghatta) in Sub-system (SS-3). This place of existing Ghatta is very close to Lamosangu - Jiri Road. The Ghatta is drawing water from the tributary of the Charnawati near Highway. Relative Level (RL) of this intake is around 1889 m amsl. This tributary have safe yield of 6 lps. In totality cumulative discharge of 11 lps have been proposed from these two branch (SS-3).

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2.4.2 Collection Chambers/Collection Tanks

38. Altogether, seven collection chambers have been proposed. The sub system-1 comprises five collection chambers, the sub system -2 comprises one collection chamber and SS-3 comprises one collection chamber.
39. In sub system-1, the first collection chamber (CT1) will collect water tapped from sources S1 & S2. Along with the water tapped from the source S3, the water collected at CT1 will be collected at second collection chamber (CT2). Similarly, the water tapped from the sources S4, S5 & S6 will be collected at the third collection chamber (CT3). The water collected at CT3 will further be collected at the fourth collection chamber (CT4) where the water from CT2 will also be collected. Then, the water from CT4 will be conveyed to two distribution systems i.e., Deurali & Tower System. In case of tower system, apart of Tower RVT, water from water treatment plant (WTP-2) will also be transported to collection chamber (CT7) where water from the existing WTP will also be collected. The water from CT7 will be conveyed to three distribution systems viz., Existing Charikot System, Upper Dolakha System and Lower Dolakha System.
40. In sub-system-2, the water tapped from two proposed sources viz; HC1 & HC2 will be collected at the the collection chamber CT-5. Likewise, in sub-system-3, the water tapped from Ghatte Khola & Pani Ghatta will be collected at the collection chamber CT-6.

2.4.3 Transmission Mains

41. There are three different transmissions for different sub-system. The total length of transmission main of Old System (SS-1) is about 13.300 km. This Transmission System transfer water to WTP-2 of SS-2 at Tower area. As the pipe used in existing transmission line is of sub standard in terms of pressure rating, it is not recommended to incorporate in the proposed transmission system.
42. The transmission length of the Hattichahara Transmission system (SS-2) is about 9.941 km. The valley crossing and pipeline along river gorge in steep terrain are the main reason to provide DI pipe. In one stretches (about a 1500m wide) of transmission line at valley the pressure on this transmission line exceed 160 m and below 250m. Therefore, a higher PN rating fittings including flanged pipe has been recommended. Similarly, transmission line of Ghatta Transmission system (SS-3) is about 13.990 Km. The brief details of the proposed transmission system are tabulated below:

Table 5: Details of Transmission Pipes Sub-system wise

Sub-System	Length (m)	Pipes
Existing System (SS-1)	13,300	PE (50-140mm)
Hattichahara System (SS-2)	9,941	DI(150 -200mm) PE(125-200mm)
Ghatta System (SS-3)	13,990	PE(110-200mm)

Source: Detailed Engineering Design Report, 2018

2.4.4 Thrust Blocks, Saddle Blocks and Thrust Beam

43. 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 30 kg/sq. cm and 20 kg/sq. cm for transmission and distribution line, respectively.
44. Similarly, Thrust Beam and Saddle Blocks are proposed for DI Pipes laid up in the sloppy area and unburied portion. All saddle block are proposed to be anchored with concrete at the center of each pipe to prevent movement. This type of support in the initial stretches of Hattichahara Transmission system. 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.
45. A special thrust block and beams for 25 PN rating has been designed and recommended in 1500 m long stretches of the valley crossing in Hattichahara Transmission system (SS-2).

2.4.5 River & Stream Crossings

46. There is a number of a river crossing in all three-transmission system. There are two major crossings, one is in SS- 1, and another is in SS-2. MS truss Pipe Crossing for a span of 25 m and span of 20 m have been proposed in the Transmission line of SS-2 and SS-3, respectively. These truss crossings are triangular in shape comprising of tuber Mild Steel sections and braced by welded tubular sections to form composite light section which is economical than the traditional angle and channel sections.
47. A simple crossing by providing SP-4 type concrete Saddle Blocks are recommended for the small crossing for DI pipes. This type of crossing is used only when the span of crossing is less than 6 m. There are about five numbers of this type of crossings in all three-transmission systems. There is provision of pipe clamps for the crossing near existing bridge and culverts.

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2.4.6 Water Treatment Plant

48. The study shows that in most of the existing systems, water is supplied directly from the sources without the treatment. Only few WUSCs carry out occasional disinfection with bleaching powder during wet season. This indicates the need of provision of water treatment system for the proposed project. To ensure this requirement, water sampling from the three point sources has been conducted which includes one major source i.e., Hattichhahara and two minor sources i.e., Odare and Jhapre Khola. The water quality test reports (**Refer Annex 6**) of the proposed sources for physical & chemical parameters show that the water sample collected from all three sources has the value for the turbidity, hardness and iron within the prescribed NDWQS (Turbidity: 5-10 NTU, Hardness: 500mg/L and Iron: 0.30-3mg/L). 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, five water treatment plants have been proposed for this project.
49. As the DMA-1 (Deurali System) is drawing water from the existing sources, a small WTP-1 comprises of the only slow sand filter (SSF) with a filtration rate of 0.25 m/hour has been proposed. This service area is at a higher elevation than the proposed big water treatment plant WTP-2 at Tower. This Deurali area is introduced during detail engineering design, and this area is presently served directly by the existing Charikot transmission system. Therefore, separate WTP has been proposed for this SS-1. The capacity of the SSF is 0.3 lps. Two circular RCC unit of SSF with 1.8 m diameter and height of 3.4m have been proposed.
50. Excluding one separate slow sand filter in WTP-1 for DMA-1, the Charikot water supply system will have major four number of water treatment plants. Out of four major water treatment plants, one water treatment plant is existing treatment plant referred as WTP-E, which will be rehabilitated to improve its performance. The design capacity of existing WTP worked out to be 6.6 lps. As the elevation allows for the Hattichhahara Transmission System (SS-2), discharge of 6.6 lps has been diverted from this Transmission System. This WTP will be referred as WTP-E from now on. The elevation of this area is about 2222 m. This WTP-E comprises of SSF only.



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51. The proposed water treatment plant near the tower referred as WTP-2 for old transmission system (SS-1), has been proposed at elevated area to treat 10.3 lps water. This location has been identified as a command location for the reservoir to serve elevated settlement along old transmission line, which is presently receiving water from the transmission mains. Elevation of this WTP area is about 2326 m.
52. Similarly, another water treatment plant has been proposed for the partial treatment of (23.9 lps) discharge from Hattichahara Transmission system ((SS-2). It is situated at 2220 m and referred as WTP-3. This consists of Settling Basin/Sedimentation Tank and SSF.
53. The fourth water treatment plant (WTP-4) has been proposed for Ghatta Transmission system to treat 10.3 lps water. Sedimentation Tank has been proposed near the intake as pre treatment unit while WTP-4 comprises Horizontal Roughing filters and Slow sand filter right after this sedimentation tank.
54. Plain sedimentation has been provided as a pre-treatment unit in all main proposed WTP. Where settling process of coarse and heavy suspended particles such as sand, silt, etc. will settle through the force of gravity. In every setting tank, the retention period is more than 4 hours.
55. All setting basin are rectangular settling basin with a longitudinal flow. A Setting basin with two identical chambers of the size of 2.6 m x 9 m has been adopted for 10.3 lps with a design load of 0.8 cum/sq. m /hour. In case of 23.9 lps design discharge, the two identical chamber of tentative size 4 m x 14 m has been adopted with same design load.
56. Horizontal roughing filters have been proposed in WTP-2 and WTP-4 before corresponding SSF. The filtration rate of 2.0 cum/sq.m/hr has been adopted for design. Inlet and outlet chambers each of 90 cm wide has been provided in the unit. Each unit comprises of three chamber for fill filter material in graduation fashion (coarse to fine). The HRF provides superior treatment to basic sedimentation methods for suspension with particulates. Moreover, it is primarily used to separate water from fine solids that are only partly retained, or not at all, by sedimentation tanks. In addition to this, it partly improve bacteriological water quality and to minor extent, it improves some water quality parameters like Color and Dissolved Organic Matters.
57. Both roughing filters for WTP2 and WTP-4 have been designed for a discharge capacity of 10.3 lps. The required number of chamber in a unit is four. The flow width of each unit is 4m and height of the unit is 1.7

58. Slow Sand Filter as main filtration unit has been proposed in every major treatment plant. The filtration rate of 0.2 cum/sq.m/hr has been adopted for design. All SSF will have a depth of 2.8 m including free board of 50 cm. Three chambers each 6 m x 12 m has been proposed to filter design discharge of 10.2 to 11 lps capacity as a unit. Similarly, the same size of two units has been proposed to filter design discharge of 23.9 lps. This SSF will improve the water quality by removing water borne parasites, bacteria and suspended solids that are not effectively removed by the preceding treatment units.
59. The brief details on the proposed water treatment plants is given in the following table:

Table 6: Water Treatment Plant in Various Sub-systems

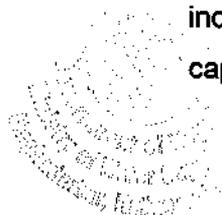
Description	WTP-1(P)	WTP-E (Existing)	WTP-2 (Proposed)	WTP-3 (Proposed)	WTP-4 (Proposed)
T. Sub-system	SS-1 (Old)	SS-2 (Hattichahara)	SS-1 (Old)	SS-2 (Hattichahara)	SS-3 (Ghatta)
Design Discharge	0.3 lps	6.8 lps	10.3 lps	23.9 lps	10.3 lps
Units	SSF	SB+HRF+SSF	SB+HRF+SSF	SB+SSF	SB+HRF+SSF

Source: Detailed Engineering Design Report, 2018

60. All the WTPs have dosing system before distributing water to the service reservoirs. The dosing system comprises of electronic dosing pump with FRP tank and stirring device. As the pump is automatic dosing pump of the electronic type, close housing is recommended.
61. The dosing system at each WTP comprises of electronic dosing pump with FRP tank and stirring device. As the pump is automatic dosing pump of the electronic type, close housing has been recommended. This will effectively remove bacteriological content that are only partly removed by SSF.

2.4.7 Service Reservoir

62. Altogether, there are fifteen service reservoirs proposed for this project. The cumulative capacity of all fifteen reservoirs proposed in the Charikot water supply sub-project is about 1,650 cubic meters. A minimum of 50 cum capacity have been provided for all reservoirs. An existing tank of 250 cum capacity has been incorporated from the existing system. The table given below gives details on the capacity & status of the reservoirs of this proposed project:



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Table 7: Details of Service Reservoirs

TL SS	DMAs	Reservoir	
		Capacity (lit)	Status
SS-1	Deurali	50,000	Proposed
	Tower Area	50,000	Proposed
	Existing Charikot Bazaar	250,000	Existing
	Upper Dolakha	150,000	Proposed
	Lower Dolakha	150,000	Proposed
SS-2	Charighyang	250,000	Proposed
	Tindhare	150,000	Proposed
	Makaibari	150,000	Proposed
SS-3	Upper Jillu	50,000	Proposed
	Middle Jillu	150,000	Proposed
	Lower Jillu	50,000	Proposed
SS-3	Upper Matti	50,000	Proposed
	Lower Matti	50,000	Proposed
	Upper Dharmaghar	50,000	Proposed
	Lower Dharmaghar	50,000	Proposed
	TOTAL	1,650,000	

Source: Detailed Engineering Design Report, 2018

2.4.8 Bulk Distribution Mains

63. All of the storage reservoir of the Sub-system will get required water from the corresponding water treatment plants. The total cumulative length of BDS is about 22,046 km. All three types of pipe, PE pipe (50- 140 mm OD), GI pipe (65 mm ND) and DI pipe 125 mm ND, have been used in BDS system. All three series pipes, 6 PN, 10 PN and 16 PN, have been used in PE pipes

2.4.9 Distribution Mains

64. 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 200 mm and 150 mm. To proper saddle arrangement at the household connection in distribution pipe, the minimum diameter of distribution pipe has been adopted as 50mm.

65. Three types of pipes have been used in the distribution network; Ductile Iron (DI), Galvanized Iron Pipe and PE pipes. However, the uses of GI pipes have been limited. The total pipe length of various diameters is given in the table above. The total pipe length of the proposed distribution system works out to 158.849 km. The details are briefly given below:

Table 8:Details of Pipes Used in Distribution System (in meters)

A	PE Pipes	Length of PN 6 Pipe (m)	Length of PN 6 Pipe (m)	Length of PN 16 Pipe (m)
	50 OD PE Pipe		54,969	43,885
	63 OD PE Pipe		18,434	4,808
	75 OD PE Pipe	5,218	5,896	1,489
	90 OD PE Pipe	7,247	1,190	1,740
	110 OD PE Pipe	3,142	1,696	3,738
	125 OD PE Pipe	1,228	189	335
	140 OD PE Pipe	1,226	925	22
	160 OD PE Pipe	507	119	
	Sub Total	18,568	83,418	56,017
B	METTALIC PIPE	Length of GI Pipe	Length of DI Pipe (m)	
	50 ND	-		
	65 ND	-		
	80 ND	-	26	
	100 ND	-	18	
	125 ND	-	12	
	150 ND	-	111	
	200 ND	-	679	
	Sub Total	-	846	
	Total		158,849	

Source: Detailed Engineering Design Report, 2018

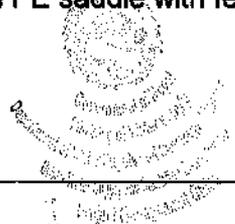
66. The pipelines will be laid along both sides of the wider roads and paved roads to avoid the pavement demolition and long house connection.

2.4.10 House Connections

67. There are about 499 numbers of household connections through GI mains from distribution chambers in core Bazaar area. Similarly, there about 3303 number of house connections from PE pipes out of which about 576 HHs connections require drain-crossing provision. Provision of 38 numbers of household connections has been allocated from DI pipe. This will make the total household connections of 3,843 in the project area. All of the connection will be private.
68. The house connection shall comprise about 12 m pipe PE or GI Pipe (as per requirement) and water meter. The house connection pipe shall be PE-80 or 100, 20 mm OD diameter pipe rating PN-16. 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 ferrule without touching DI pipe by ferrule. Tapping from GI pipes has been proposed from PE saddle with ferrule



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

2.4.11 Appurtenances

a) *Line or Sectional Valves*

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

b) *Air (Release) Valves*

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

c) *Wash Out Valves*

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



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d) Flow Meters

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

e) Fire Hydrant

75. Fire hydrants are provided at major road junctions. These fire hydrants shall also be used for flushing of the system as required. Fire hydrants, namely, stand post type, conforming to IS908 is recommended.

f) Chambers

76. Two type of Chambers has been proposed in the project. A Chamber constructed by brick masonry wall has been provided in non-vehicular areas and rural area. Despite of easy availability of stones in such rural areas, bricks are proposed because it is cost effective, it occupies less area in narrow road sections. and our study also shows that the stones of the rural area of this town do not possess good quality. In other vehicular carriageway and city area chambers constructed with RCC has been provided.

77. The concrete chambers shall serve as housing, protection and convenient access to these pipe appurtenances. Inside the concrete chambers, necessary concrete supports shall be provided for pipes and valves at appropriate locations.

78. Access to the concrete chamber will be given via lockable cast iron covers with frames. Manhole covers of the heavy-duty type have been recommended in these RCC chambers. Covers for manholes in paths has been proposed of medium duty type.

2.4.12 Office Building, Guard House, Dosing House and Boundary Wall

79. 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.



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80. A two bay two storeyed building for office (OFF-1) is proposed at Charighyang Area. The building comprises of big meeting hall, water quality laboratory, administrative rooms, store for household meter and other small gadgets in addition to the guardroom, kitchen and bathroom for a guard.
81. Three numbers of single storeyed Guard House (GH-1) are proposed at three WTP locations (WTP-2, WTP-3, and WTP-4). The Guard House building comprises of residence facilities for guard and a room for tools for repair and maintenance.
82. Similarly, four numbers of small Guard House (GH-3) are proposed at three reservoir locations. The Guard House comprises of two rooms. As the location is very nearby village, only guardroom is proposed. Another room has been proposed as a tool room.
83. 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 nine numbers of Dosing Pump House have been proposed.
84. As the system comprises of many RVTs and other structures to be protected and operated, different size of building structures and different type of boundary has been discussed with the WUSC and proposed in the project. The table given below summarizes the details of the above mentioned components :

Table 9: Proposed Buildings and Boundary Type

Location	Component	Building	Boundary Type
Charighyang	Main Office	OFF-1	GI Chain link with B/W
Deurali	WTP-1+ RVT #1	DPH	Fencing by Barbed Wire
Tower	WTP-2+ RVT #2	GH-2 + DPH	GI Chain link with B/W
WTP-E (Existing)	Existing WTP	DPH	Exist
Bisuna (Ex. Charikot)	RVT- #3 + Existing Office	DPH	Exist
Upper Dolkha	RVT #4	GH3	GI Chain link with B/W
Lower Dolkha	RVT #5	GH3	GI Chain link with B/W
Bhutpokhari	WTP-3 + RVT- #6 (Makaibari)	GH-2 + DPH	GI Chain link with B/W
Tindhare	RVT # 7	GH-3	GI Chain link with B/W
Simpani	RVT # 8 (Charighyang)	GH-3	GI Chain link with B/W
Ghatta	SB of WTP-4		Fencing by Barbed Wire
Upper Matti	WTP-2 (HRF+SSF) + RVT # 10	GH-2 + DPH	GI Chain link with B/W
Lower Matti	RVT # 9		Fencing by Barbed Wire
Upper Dharamghar	RVT # 11		Fencing by Barbed Wire

Location	Component	Building	Boundary Type
Lower Dharamghar	RVT # 12		Fencing by Barbed Wire
Upper Jlllu	RVT # 13		Fencing by Barbed Wire
Middle Jlllu	RVT # 14	GH-2	GI Chain link with B/W
Lower Jlllu	RVT # 15		Fencing by Barbed Wire
Various Locations	Intakes, IC, CC and BPTs		Fencing by Barbed Wire

Source: Detailed Engineering Design Report, 2018

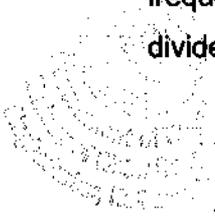
2.4.13 Miscellaneous Works

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

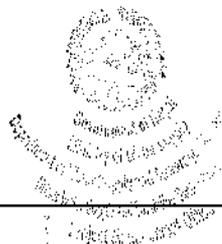
2.4.14 DMA Establishment

86. One increasingly common principle of managing a large water network is to subdivide it into a number of areas, typically of 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 on the inlet that is capable of accurately measuring flow into the area. In this way, it is possible to quantify the leakage level in each DMA so that the leakage location activity is always directed to the worst parts of the network.

87. 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 15 DMAs according to serving reservoir.



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2.4.15 Construction Planning

88. 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**

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

Table 10: Land Requirement & Ownership Details for the project components

S. No.	Project Components	Land Requirement (m ²)	Land Type	Reirement Type	Ownership
1.	Deurali System (Proposed RVT 50cum, WTP 1-0.3lps, DPH)	1528.16	Barren	Permanent	WUSC
2.	Tower System(Proposed RVT-50cum, GH-2, DPH & WTP 2)	1528.16	Barren	Permanent	WUSC
3.	Upper Dolakha System (Proposed RVT 150cum, Guard House)	1526.22	Barren	Permanent	WUSC
4.	Lower Dolakha System (Proposed RVT 150cum, Guard House)	1526.22	Barren	Permanent	WUSC (No objection letter received from Municipality)
5.	Makaibari System+ Bhootpokhari (Proposed RVT-150cum, WTP 3, GH DPH)	1528.16	Barren	Permanent	Public Land
6.	Tindhare System(Proposed RVT-150cum & GH)	1219.00	Barren	Permanent	WUSC
7.	Charighyang (Proposed RVT 250cum, GH& Main Office Building)	1830.00	Barren	Permanent	WUSC
8.	Upper & Lower Matti System (Proposed RVT 50 cum, WTP 4- 10.3 lps, Guard House, DPH)	2034.96	Barren	Permanent	Barkhedanda Community Forest (No Objection Letter already provided)
9.	Upper Jillu System (Proposed RVT-50cum & GH)	1017.48	Barren	Permanent	WUSC
10.	Middle Jillu System (Proposed RVT-150cum & GH)	1528.00	Barren	Permanent	WUSC
11.	Lower Jillu System (Proposed RVT-50cum)	127.185	Barren	Permanent	WUSC

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S. No.	Project Components	Land Requirement (m ²)	Land Type	Reuirement Type	Ownership
12.	Upper Dharamghar System(Proposed RVT-50cum)	1017.48	Barren	Permanent	No Objection Letter already provided from Budhabhimsen Community Forest User's Group
10.	Lower Dharamghar (Proposed RVT 50cum)	1017.48	Barren	Permanent	No Objection Letter already provided from Budhabhimsen Community Forest User's Group

Source:Due Diligence Report, 2018

90. Provision of 3842 house connections, about 158.85 km long distribution network and 62.71 km transmission pipelines will be laid along the public road within rights of way. Out of this total 62.71 km of transmission mains, about 4 km will pass through the Thangsa Deurali Community Forest and around 15km will pass through the Khorthali Community Forests. The "No Objection" letter had already been provided by the concerned community forest user's group. Please refer **Annex 3** for this.

91. As per the table given above, it has been identified that various Community Forest Area will be required for the construction of the proposed project components as mentioned above. As per Section 68 (1) of Forest Act 2049 (1993), it states that " Not withstanding anything contained in this Act, in case there is no alternative except to use the Forest Area for the implementation of the plan having national priority and if there shall be no significant adverse effect in the environment while conducting such plan, Government of Nepal may give assent to use any part of the Government Managed Forest, Community Forest, Lease hold Forest or Religious Forest for the implementation of such plan". Our study also shows that there are no other alternatives for the location of the above mentioned project components. Similarly, our study also shows that the construction of those project components within those forest areas may not be an environmental issue because only clearing of bushes around the construction areas is required and it will not have significant impact on the flora & faunas. Hence, the prerequisite of community forest area for the proposed project is as per Section 68 (1) of Forest Act 2049 (1993).

b) Energy Requirement

92. 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

93. 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 105,049 and 405,186 respectively. Similarly, during operation phase, human resources for operation & maintenance should be mobilized by the concerned WUSC.

d) Construction Materials

94. 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. Similarly, there are no local brick kilns. So, bricks will be brought from the brick kilns of either Bhaktapur (168km from Dolakha via Lamasaghu Ramechhap Highway) or Terai (via Bardibas Highway which is about 209km from Dolakha).

95. While other major construction materials like Cement, Reinforced Bars etc. will be purchased from the nearest market in accordance to the availability. Similarly, wood will also be brought from the nearest market.

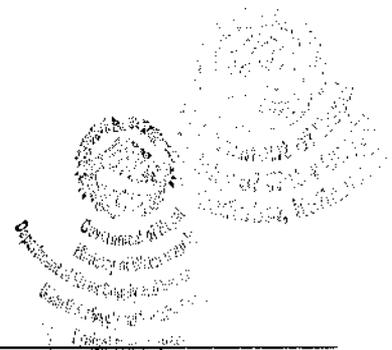
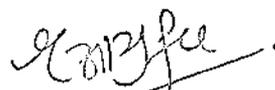
96. As per the detailed design estimate, the total quantity of these major construction materials required for the overall project construction activities will be around as follows:

Stone: 2946 m³

Sand: 3976 m³

Aggregate: 4847 m³

Cement: 2371 tonnes



Bricks: 79,647 nos.

Reinforcement Bars: 436 tonnes

97. 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 9784m, b) PE pipes is 214,490m and c) GI pipes is 1,158m.

e) Camp Site

98. The proposed project has provision of worker's camp site to ensure worker's safety & rights during construction phase. The contractor will temporarily facilitate the construction workers with well equipped worker's camp. The camp site will be located nearby the construction sites at various tentative locations that includes for SS-1; (i) Near S2 Intake; (ii) Between sources S5 & S6, (iii) Between CT2 & CT4, (iv) CT3 & CT4, (v) Deurali RVT, (vi) Between CT4 & WTP-2, (vii) Tower RVT, and (viii) Upper Dolakha & Lower Dolakha RVTs area . For SS-2, the area includes (i) Near CT-5, (ii) Between CT-5 & WTP-3 (2 nos.), (iii) Makaibari RVT; (iv) Tindhare RVT & (v) Charighyang RVT. Similarly, for SS-3, the area includes (i) Ghatte Khola Source; (ii) WTP-4 area where only settling basin has been proposed; (iii) Between WTP-4 where SB has been proposed and where HRF & SSF has been proposed (3 nos.); (iv) Upper Matti RVT; (v) Upper Jillu; (vi) Upper Dharamghar and (vii) Middle Jillu RVT. This is 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.

f) Stockpiling Site

99. There is also provision of the stockpiling site which will be located nearby the construction site so that the stockpiled construction materials would be readily available. Various locations for this stockpiling site have been proposed that is same as that of the location of camp site which has been clearly described in the above section. This is depicted clearly in the *Figure 3* given below. This location ensures that the proposed stockpiling sites do not interfere any natural drainage courses, drain inlets or concentrated flows of storm water. This ensures the control of blockage problems to these features that may be caused by some materials like soil, cement, rubbles etc. These locations are adjacent to worker's camp site so that the stockpiled materials will be under proper supervision of the workers. To



control wind erosion, water or dust palliative will be applied to stockpiles and the bagged materials will be placed on ballets under cover.

g) Cut and Fill Volume of Muck

100. 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 134,282 m³ and of fill volume of muck is 122,639 m³. Hence, the remaining volume of muck after backfilling will be 11,643 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.

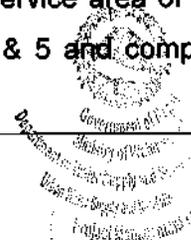
h) Spoil Disposal Site

101. There will be also provision of Spoil Disposal Site at various tentative locations that includes (A) For SS-1; i) Between S3 & CT2; (ii) Between S5 & S6 ;(iii) Between CT2 & CT4; (iv) Between CT3 & CT4; (v) Deurali RVT area, (vi) Between CT4 & WTP-2; and (vii) Between Upper Dolakha & Lower Dolakha RVTs area; (B) For SS-2; (i) Between CT5 & WTP-3 (2 nos.); (ii) Between Makaibari RVT & Tindhare RVT; (C) For SS-3; (i)Ghatte Khola Source; (ii) Between WTP-4 where SB has been proposed and where HRF & SSF has been proposed (3 nos.); (iii) Between WTP-4 where HRF & SSF has been proposed and Lower Matti RVT; (iv) Between Upper Jillu & Lower Jillu near Suplun and (v)Near Upper Dharamghar. The location of each Spoil Disposal Site is depicted in the Figure 3 given below. Each location of this Spoil Disposal Site ensure environmental safety.Each of this location is nearby the existing roads so that it will be easy to transport the excess spoil and to dispose off to the approved landfill sites of the project town .

2.4.16 Project Area Delineation

102. 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.

103. Here, the Core Project Area indicates the area required permanently as well as temporarily for the proposed project. It includes the service area of the proposed project which comprises partial areas of ward 2, 4 & 5 and complete areas of



ward 3 & 7. This also includes the construction area where the proposed project components that includes Intakes, WTPs, Collection Chamber, Transmission Mains and various other structures will be constructed. Hence, this covers partial areas of wards 1 ,2, 4, 5 ,6 ,7 & 8 and complete area of ward 3.

104. The Surrounding Project Area indicates the area within the immediate surroundings of the proposed project. It includes the area of the project town which is closely associated with the core area of the project. It involves partial areas of ward 1, 2 , 4, 5, 6, 7 & 8.

105. The Core Area & Surrounding Area of the proposed project is depicted in Figure given below:



Copy
Engineer





SN	SYMBOL SHAPE	LEGEND NAME
1	●	CAMP SITE
2	⊙	SHOULDER DISPOSAL SITE
3	⊙	STOCKPILING SITE
4	⊙	SOURCE
5	⊙	RVT
6	⊙	WATER TREATMENT PLANT (WTP)
7	⊙	COLLECTION CHAMBER/TANK(CT)
8	⊙	SCOPE AREA
9	⊙	SURROUNDING AREA
10	⊙	TRANSMISSION MAIN OF SS-1
11	⊙	TRANSMISSION MAIN OF SS-2
12	⊙	TRANSMISSION MAIN OF SS-3
13	⊙	WAREHOUSE BOUNDARY

Figure 3: Project Impact Area Delineation

[Signature]

Engineer



2.5 Project Activities

106. 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

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

2.5.2 Operation Activities

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

2.6 Financial & Economical Aspects

109. 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. Similarly, 70% of the project 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

110. 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.

111. 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 100 lpcd or 15.40 cum for fully plumbed tap connection depending upon the household size. The water tariff has been set at NRs.210 for first band HH consuming water up to 6 cum,

NRs. 53 per cum for 7 to 10 cum per month and NRs. 79 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.

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

113. 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.

114. 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

115. 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 11: Cash Flow & Financial Position together with WUSC tariff structure

Year	3	5	7	9	11	13	15	17	19	21
B.S.	2075	2078	2081	2084	2087	2090	2093	2096	2099	2102
Water Sale	35,641,104	37,153,748	39,543,933	42,087,883	44,795,492	47,677,287	50,744,475	52,898,121	52,898,121	52,898,121
New connection	916,300	940,100	999,600	1,071,000	1,142,400	1,201,900	1,285,200	1,344,700	1,344,700	1,344,700
Total Income	36,557,404	38,093,848	40,543,533	43,158,883	45,937,892	48,879,187	52,029,675	54,242,821	54,242,821	54,242,821
Personnel	4,537,000	5,002,043	5,790,489	6,703,215	7,759,810	8,982,950	10,398,887	12,038,012	13,935,503	14,632,278
Energy	58,400	64,386	74,535	86,283	99,884	115,628	133,854	154,953	179,377	188,346
Spare & Other	3,250,000	3,583,125	4,147,915	4,801,730	5,558,603	6,434,778	6,434,778	6,494,176	6,690,790	6,762,989

Chemicals	200,000	220,500	255,256	295,491	342,068	395,986	395,986	395,986	395,986	395,986
Total Cost	8,045,400	8,870,054	10,268,196	11,886,720	13,760,364	15,929,342	17,363,505	19,083,126	21,201,657	21,979,599
Tariff Band Cum										
0-6	210	231	254	280	307	338	372	409	450	450
7-10	53	58	64	70	77	86	93	102	113	113
11-20	79	87	95	105	115	127	140	153	169	169
21-30	118	130	143	157	173	190	209	230	253	253
>30	177	195	214	236	259	285	314	345	380	380
Cash in Hand with Users	21,729,538	65,804,333	110,593,340	105,406,186	106,852,607	108,870,643	116,104,838	130,403,620	145,021,941	149,730,972
Installment	22,729,537	22,729,537	22,729,537	22,729,537	22,729,537	22,729,537	22,729,537	22,729,537	22,729,537	22,729,537
# of Taps	3,884	4,044	4,210	4,383	4,564	4,753	4,949	5,154	5,477	5,704

Source: DEDR, 2018

2.6.3 Social Benefit Cost

116. 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 31.05 percent, which is greater than EOCC of 12 percent. The details are tabulated below:

Table 12: Social Benefit Cost

Years of Operation	1	5	10	15	20	25
Direct Benefit						
Private Taps						
- Full Plumbing	26,451,827	28,744,757	31,892,411	35,384,744	39,259,501	39,259,501
-Yard Taps	9,189,277	9,985,833	11,079,318	12,292,543	13,638,621	13,638,621
Community Taps						
Institutional	-	-	-	-	-	-
Subtotal - Water Sales	35,641,104	38,730,590	42,971,729	47,677,287	52,898,121	52,898,121
Connection Charge		975,800	1,082,900	1,201,900	1,344,700	1,344,700
Total Revenue	30,294,938	33,896,802	37,608,870	41,727,594	46,308,103	46,308,103
Expenses						
O&M	8,565,400	10,411,297	13,287,747	16,958,906	16,990,852	17,359,835
- Fixed O&M	8,307,000	10,097,210	12,886,883	16,447,292	16,447,292	16,775,503
- Variable O&M	258,400	314,087	400,863	511,614	543,560	584,332
- Variable O&M/m3	0.39	0.44	0.50	0.58	0.56	0.60
- Variable O&M/m3 - Adjusted for Losses	0.44	0.49	0.56	0.65	0.62	0.66
Total O&M - Adjusted for Losses	8,594,111	10,446,196	13,332,287	17,015,752	17,051,248	17,424,761
Net Operating Income	21,729,538	23,485,505	24,321,123	24,768,688	29,317,251	28,948,268

Years of Operation	1	5	10	15	20	25
CAPEX, of which:						
- Loan						
- Grant						
Additional Connections		975,800	1,082,900	1,201,900	1,344,700	1,344,700
Meter Replacement	-	-	121,500	135,000	148,500	165,000
Debt						
Principal Balance	-	-	246,337,485	188,800,950	115,368,131	21,647,178
Principal Paid	-	-	10,412,663	13,289,490	16,961,131	21,647,178
Cumulative of Principal Paid	-	-	47,335,450	107,748,812	184,853,271	283,260,272
Interest Paid	-	-	12,316,874	9,440,047	5,768,407	1,082,359
Total Debt Service	-	-	22,729,537	22,729,537	22,729,537	22,729,537
Annual Payment						
Annual Cash Flow	21,729,538	22,509,705	387,186	702,251	5,094,514	4,709,031
Cumulative Cash Flow						
Opening Balance	-	88,132,692	105,406,186	108,168,392	120,284,368	145,021,941
Surplus/Deficit	21,729,538	22,509,705	387,186	702,251	5,094,514	4,709,031
Closing Balance	21,729,538	110,642,397	105,793,372	108,870,643	125,378,883	149,730,972
NPV of Loan	21,729,538	22,509,705	23,116,723	23,431,788	27,824,051	27,438,568
NPV of Project	21,729,538	22,509,705	23,116,723	23,431,788	27,824,051	27,438,568

Source: DEDR, 2018

117. 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.



K. B. J. P.
 Engineer



3. METHODOLOGY

118. 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 Charikot Water Supply and Sanitation Project (*Refer Annex 1*). The IEE study has followed basically the procedures outlined in the approved ToR.
119. The IEE study has been conducted as per provisions of the Environmental Protection Rules (1997,2007 & 2017) following the provision of Rules 5, 7, 10 & 11 in compliance with the schedule 1, 3 & 5.
120. 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

121. 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

122. 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.

123. *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.
124. *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

125. 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

126. An extensive physico-chemical environment survey was carried out by delineating the project impact area to collect the baseline information through simple checklist method. Topographic and geomorphological features were observed and documented. Physical features such as topography, air quality, erosion and land stability & land use pattern were also observed and recorded. These data on physico-chemical environment were collected through literature review, field survey & investigation by the team of experts, expert's judgement and stakeholder consultations.
127. The data regarding Climate & Rainfall of the project town was collected from Department of Hydrology & Meteorology, Kathmandu. Similarly, the baseline information regarding water quality was collected by sampling process that involved water sample collection from the proposed source followed by water quality testing at the certified laboratory i.e., Aastha Scientific Research Service Pvt. Ltd. located at Dillibazar, Kathmandu for further analysis. Also, information on

air quality and noise quality condition has been collected through field observation and expert's judgement . 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**.

128. 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

129. 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 4**), 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

130. 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 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**.

131. 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

132. 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

133. 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.
134. This 10% sampling survey confirms reliability and authenticity 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
135. Household surveys were conducted through interviews by simple questionnaire method to obtain information on the socio-economic & cultural environment that

includes demography, ethnicity, education, health & sanitation, drinking water condition of the project area, irrigation facility, local traditions, religions, land use patterns, incomes & expenditures and to acquire their perception towards the proposed project, etc. Information on Migratory patterns of the local people and the Impact of river on settlements & agriculture were also collected. The survey covered 100% of the total HHs whereas only 10% of the total HHs was surveyed in detail for this study. The sample of Survey Questionnaire that has been filled up during field study has been included in **Annex 4**.

136. 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

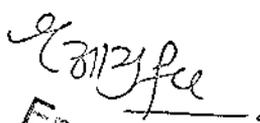
137. A public notice of 15 days was published in Arthik Abhiyan Dainik, a national daily newspaper on 2075/08/23. The main aim of the notice is to seek written opinions from the concerned people and institutions regarding the possible impacts that may result from the implementation of the proposal. Copies of the Public Notice has been pasted at the Municipality office, Division Forestry Office (Dolakha), District Coordination Committee and District Administration Office. This has been included in **Annex 3**.

3.5 Public Consultation

138. The public consultation program was conducted at the premises of Bhimeshwore Municipality Office. No such kind of disssatisfaction regarding the proposed project were noted during this consultation program.

3.6 Collection of Muchulkas (Recommendation Letters)

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


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3.7 Impact Identification, Prediction & Evaluation Methods

140. 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 study. These checklists explain the environmental features or factors that need to be addressed when identifying the impacts of projects and activities.
141. Once all the important impacts had been identified, their potential characteristics 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.
142. 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).
143. 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.
144. 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.
145. The scoring of impacts as per *National EIA Guidelines 1993* is tabulated below:

Table 13: 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
		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

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

Table 14: Significance of Impacts

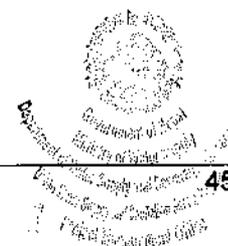
S. No.	Scoring as per National EIA Guidelines,1993	Level of Significance as per National EIA Guidelines,1993
1.	Less than 50	Insignificant
2.	50 to 75	Significant
3.	More than 75	Very Significant

Source: National EIA Guidelines 1993

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



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4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Nepal's Environmental Policy and Legal Framework

Constitution of Nepal

148. 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.

149. 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.)

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

- (i) sets out the review and approval process of IEE and EIA Reports, that involve informing and consulting stakeholders;
- (ii) stipulates that no one is to create pollution that would cause significant adverse impacts on the environment or harm to public life and health, or to generate pollution beyond the prescribed standards;
- (iii) specifies for the Ministry in charge of environment (currently the MoFE) to conduct inspection of approved projects to ensure that pollution prevention, control or mitigation is carried out according to the approved IEE or EIA Report;
- (iv) provides for the protection of objects and places of national heritage and places with rare plants, wildlife and biological diversity; and
- (v) states that any person/party affected by pollution or adverse environmental impact caused by anybody may apply to the prescribed authority for compensation to be recovered from the polluter/pollution generator.

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

151. 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.
152. Other environmental policies, laws, rules, conventions & standards that provide general context in the environmental assessment of water supply & sanitation works are presented in *Table 15*.



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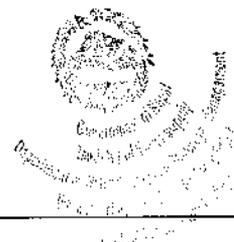


Table 15 : Other Relevant Environmental Act, Rules, Plan, Policies, and Guidelines of Nepal

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
1.Plans, Policies & Strategies			
National Environmental Policy & Action Plan (NEPAP)	2050 B.S. (1993 A.D.)	Of its five objectives, most relevant to the Project are to (i) mitigate adverse environmental impacts; and (ii) safeguard national & cultural heritage & preserve biodiversity, within & outside protected areas.	<ul style="list-style-type: none"> The subproject will not encroach any physical & cultural heritage areas and will not affect biodiversity. EMP provides measures to mitigate anticipated adverse impacts.
Water Resources Strategy	2059 B.S. (2002 A.D.)	Among the ten strategic outputs of this strategy, third output focusses on Adequate Supply of and access to potable water and sanitation & hygiene awareness provided.	This provision will strengthen implementation capacity for the proposed project.
Rural Water Supply and Sanitation National Policy and Rural Water Supply and Sanitation National Strategy	2060 B.S.(2004 A.D.)	Recognizes that all people have a right to access to basic water supply and sanitation services and that these services are necessary for socio economic development and to combat waterborne diseases.	The proposed project ensures easy access to safe, reliable & potable water.
Rural Water Supply and Sanitation Sectoral Strategic Action Plan (Unofficial Translation)	2060 B.S.(2004 A.D.)	<ul style="list-style-type: none"> 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.)	<ul style="list-style-type: none"> This includes subsector-wise action programmes in water induced disasters, environmental action plan on management of watershed and aquatic ecosystem, water supply, sanitation and hygiene, irrigation for agriculture, hydropower development, industries, tourism, fisheries, and navigational uses, water-related information systems (Decision Support System for River Basin Planning and Management), legal frameworks, and institutional mechanisms This also includes Environment Management Plan, a strategic document for the implementation of environmental protection measures (including 	This has been considered in IEE study.

Act/Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
National Urban Policy	2063 B.S. (2007 A.D.)	downstream water pollution and groundwater quality, erosion/landslide and sedimentation, water pollution and sanitation, effect on aquatic life and wetland ecosystem), monitoring (baseline, impacts, and compliance), environmental auditing and institutional and procedural arrangements. The policy gives importance to environment conservation while carrying out urban development works and natural resource use; thus, supporting the required environmental conservation and protection in donor-assisted development projects.	The IEE study will meet the provisions of this policy.
National Urban Water Supply & Sanitation Sector Policy (Final Draft)	2065 B.S. (2009 A.D.)	The Policy requires the IEE or EIA of proposed WSS projects by the EPA/EPR to (i) incorporate consultations with key stakeholders, including endpoint users; & (ii) specify measures to mitigate environmental impacts before, during construction & operation, as well as corrective measures.	The IEE study will meet the provisions of this policy.
Updated 15-yr Development Plan for Small Towns Water Supply and Sanitation Sector	2066 B.S. (2009 A.D. Amendments in 2015A.D.)	The Plan emphasizes monitoring and evaluation as an important component of a project to determine the overall impact of a project.	EMP prescribes performance monitoring & evaluation to minimize the anticipated environmental impacts.
National Water Supply & Sanitation Policy (Draft)	2071 B.S. (2014 A.D.)	The goal of this Policy is to reduce urban and rural poverty by ensuring equitable socio-economic development, improving health and the quality of life of the people and protection of environment through the provision of sustainable water supply and sanitation services.	<ul style="list-style-type: none"> The proposed project is solely for provision of sustainable water supply service to Bhimeshwore Municipality residents. The IEE study ensures the protection of the environment from the construction activities of the proposed project.
National Forest Policy	2075 B.S. (2019 A.D.)	<ul style="list-style-type: none"> 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

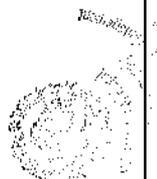
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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Land Use Policy	2072 B.S. (2015 A.D.)	<ul style="list-style-type: none"> The strategy 3 of Policy 2 has taken into account to maintain a balance between physical infrastructure development 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. 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. 	<p>construction.</p> <ul style="list-style-type: none"> 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	2074 B.S. (2017 A.D.)	<ul style="list-style-type: none"> 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. 	<p>The IEE study has duly followed this.</p>
2.Laws & Acts			
Essential Goods Protection Act	2012 B.S. (1955 A.D.)	<ul style="list-style-type: none"> Deems drinking water an essential commodity and strictly protects drinking water. Prohibits any unauthorized use or misuse, stealing, damaging etc. of drinking water. 	<p>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.</p>
Aquatic Animal Protection Act	2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.))	<p>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.</p>	<ul style="list-style-type: none"> Information of this act will be delivered to the construction workers, as they may get involved in fishing during construction period. This issue has been covered by this IEE study.
Town Development Act	2045 B.S. (1988 A.D.)	<p>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.</p>	<p>The proposed project is solely for provision of continuous water supply facilities as per the increasing demand of water of the increasing</p>

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Water Resource Act	2049 B.S. (1992 A.D.)	<ul style="list-style-type: none"> The umbrella Act governing water resource management. Provides for the formation of water user associations and establishes a system of licensing. Prohibits water pollution. 	population of Rupakot Majhuwagadhi town.
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.	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. No trees will be cut. EMP stipulates no quarrying of natural aggregate materials.
Land Acquisition Act	2049 B.S. (1993 A.D.)	It guides the compulsory acquisition of land. It also describes that GoN can acquire land at any place and in any quantity by giving compensation pursuant to the act for the land acquired for any public purposes or for operation of any development project initiated by GoN.	There is no requirement of land acquisition of private land. All the land required are under the ownership of GoN.
Child Labor Prohibition and Regulation Act	2056 B.S. (2001 A.D.)	The section 3 of the Act prohibits a child from engaging in work, sub-clause 1 of the clause 3 states "Nobody shall engage in work a child who has not completed fourteen years of age as a labor and subclause 2 states "Nobody shall engage a child in a risk full occupation or work set forth in the Schedule". The section 4 states "Child not to be engaged in work against his will by temptation or fear or pressure or by any other means.	This provision has been stated in EMP.
Water Supply Management Board Act	2063 B.S. (2006 A.D.)	It guides to prevent the misuse of potable water and prevent pollution of potable water	The proposed project has followed this as it has provision of protection works at the intake site,WTP & RVT sites that will prevent pollution of water.
Solid Waste Management Act	2068 B.S. (2011 A.D.)	Article 4 provides that the management of hazardous,	EMP prescribes eco-friendly

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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
	A.D.)	<p>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.</p> <ul style="list-style-type: none"> 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 accumulated during production process and prevention of dust, fume, vapor and other waste materials, which adversely affect the health of workers. It specifies the provision of controlling the communicable diseases at the construction site. It also prohibits mobilization of child as a labor. It emphasizes on the provision of temporary camp, safe drinking water and necessary food supplies to the workers. 	<p>management of solid and hazardous wastes.</p> <p>These provisions are stated in EMP.</p>
<p>Labour Act</p> 	2074 B.S. (2017 A.D.)		
<p>Local Government Operation Act</p> 	2074 B.S. (2017 A.D.)	<p>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.</p>	<p>Provides a basis for Local Government to monitor the environmental performance of the projects. EMP provides the responsibilities of LGs in EMP implementation.</p>
<p>3. Rules & Regulations Solid Waste (Management & Resource Mobilization), Rules</p> 	2044 B.S. (1987 A.D.) & Amendments 2049 B.S. (1992A.D.)	<ul style="list-style-type: none"> This act focusses on the management of solid waste and mobilization of resources related. These also ensure the health convenience of the common people by controlling the adverse impact on 	<ul style="list-style-type: none"> This act needs to be reviewed during construction phase. EMP covers the

Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Water Resource Regulations	2050 B.S. (1993 A.D.)	<p>pollution from solid waste.</p> <ul style="list-style-type: none"> 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. 	<p>requirement of this rule for the proposed project.</p> <p>The proposed project has followed these provisions.</p>
Drinking Water Regulations	2055 B.S. (1998 A.D.)	<ul style="list-style-type: none"> 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. 	<p>The proposed project has followed all these provisions.</p>
Solid Waste Management Rules	2070 B.S. (2013 A.D.)	<ul style="list-style-type: none"> 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. 	<p>EMP for this proposed project covers this matter focused by this rule.</p>
Labor Rules	2075 B.S. (2018 A.D.)	<ul style="list-style-type: none"> 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. 	<p>EMP for this proposed project covers this matter focused by this rule.</p>
4.Directives, Guidelines & Manuals National EIA Guidelines	2049 B.S. (1993 A.D.)	<p>This guidelines aims to assess the environmental impacts likely to be caused by a project, and promote its positive impacts and mitigate or eliminate adverse impacts by undertaking preventive and other effective measures after integrating the environmental impacts in the planning cycle of all the projects to be initiated in Nepal, prior to their initiation, so as to make the economic benefits from development projects sustainable.</p>	<p>This has been followed for evaluation of the anticipated environmental impacts.</p>

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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
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.
Working procedure for the use of national forest for national priority projects, 2074	2074 B.S. (2017 A.D.)	It emphasizes on the management regarding the use of national /community forests for the implementation of national priority project.	During construction activities within the community forest area, this will be followed.

Source: IEE Study, 2018/019



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4.2 Environmental Agreements

4.2.1 International Environmental Agreements (Conventions & Treaties)

153. Nepal is a signatory to many international agreements and conventions related to environmental conservation. However, all of those conventions are not interrelated to the proposed project. The conventions related to the proposed project are as follows:

- a) The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973
- b) International Covenant on Economic, Social and Cultural Rights (ICESCR), 1976
- c) Worst Forms of Child Labour Convention, 1999

154. 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.

155. The Charikot Water Supply & Sanitation Project does not and will not break or go against Nepal’s commitment to these international agreements.

4.3 Environmental Standards

156. 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 16* and their details on the acceptable level criteria of these standards are featured in **Annex 2B**.

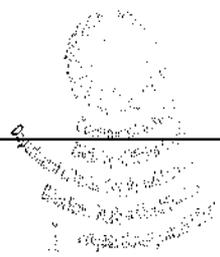
Table 16: Relevant Environmental Quality Standards

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

157. As shown in the above Table 14, *National Ambient Air Quality Standards, for Nepal, 2003* is enforced by GoN that has set quality standards for seven parameters TSP, PM₁₀, Sulphur Dioxide(SO₂), Nitrogen Oxide(NO₂), Carbon Mono-oxide (CO), Lead (Pb) and Benzene at national level. Similarly, *WHO Air Quality Guidelines, Global Update, 2005* enforced by WHO has set quality standards for four parameters PM₁₀, PM_{2.5}, SO₂ and NO₂ at international level. Both standards provide guidelines to follow and comply the set standards for the ambient air quality during construction period. The acceptable level criteria for ambient air quality as per both standards are given below:



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Table 17: Standards for Ambient Air Quality

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

Source:

- * National Ambient Air Quality Standards for Nepal, 2003. Obtained from Environment Statistics of Nepal 2011, Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal.
- ** Environmental, Health and Safety General Guidelines, 2007. International Finance Corporation, World Bank Group.
- [^] Air Quality Guidelines for Europe, Second Edition, 2000. WHO Regional Office for Europe, Copenhagen.
- Parameter that either has no national standard value for 24-hour observation or with WHO guideline value for 24-hour observation as more stringent than that specified in the national standards.

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

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Table 18: 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 _{eq} 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.

159. 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 19: Standards for Drinking Water Quality

Group	National Drinking Water Quality Standards, 2005			WHO Guidelines for Drinking-water Quality, 4th Edition, 2011*
	Parameter	Unit	Max. Concentration Limits	
Physical	Turbidity	NTU	5 (10)**	-
	pH		6.5 - 8.5	none
	Color	TCU	5 (15)	none
	Taste & Odor		Would not be objectionable	-
	TDS	mg/l	1000	-
	Electrical Conductivity	µS/cm	1500	-
	Iron	mg/l	0.3 (3)	-
	Manganese	mg/l	0.2	-
	Arsenic	mg/l	0.05	0.01
	Cadmium	mg/l	0.003	0.003
	Chromium	mg/l	0.05	0.05
	Cyanide	mg/l	0.07	none
	Fluoride	mg/l	0.5 - 1.5 [†]	1.5
	Lead	mg/l	0.01	0.01
Chemical	Ammonia	mg/l	1.5	none established
	Chloride	mg/l	250	none established
	Sulfate	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
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

160. 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, NO_x, and PM. This is given in detail below:

Table 20: 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.

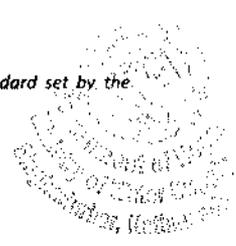
2. Emissions Limits (g/kWh) for In-use DG Sets

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



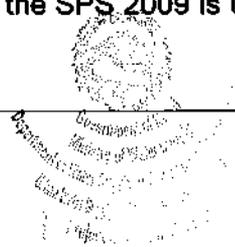
4.4 Environmental Assessment Requirements

161. 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

162. 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

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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.

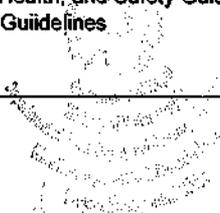
163. ADB's Environmental Safeguards policy principles are defined in SPS (2009), Safeguard Requirements as per Table 19 and the IEE is intended to meet these requirements.

Table 21: 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 7 & 8). 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	An EMP has been prepared to address this requirement.

¹New 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>

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SPS 2009 - Safeguard Requirements	Remarks
requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.	
Carry out meaningful consultation with affected people & facilitate their informed participation. Ensure women's participation. Involve stakeholders, including affected people & concerned NGOs, early in the project preparation process & ensure that their views & concerns are made known to & understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to EA. Establish a GRM to receive & facilitate resolution of affected people's concerns & grievances on project's environmental performance.	Key informant and random interviews have been conducted. A grievance redress mechanism for the resolution of valid Project-related social and environmental issues/concerns is presented in Section VIII.
Disclose a draft EA (including the EMP) promptly, before project appraisal, in an accessible place & a form & language(s) understandable to affected people & other stakeholders. Disclose the final EA, & its updates if any, to affected people & other stakeholders.	The draft IEE will be disclosed on ADB's website before Project appraisal. 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	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

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SPS 2009 – Safeguard Requirements	Remarks
<p>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.</p>	<p>sludge disposal from water supply and sanitation structures. The Project will not involve hazardous materials subject to international bans/phase-outs.</p>
<p>Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.</p>	<p>EMP provides measures to mitigate health and safety hazards during construction and operation.</p>
<p>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.</p>	<p>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.</p>

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

4.4.2 Environmental Impact Assessment Requirements of Government of Nepal

164. 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 20 given below.

Table 22: The GoN IEE Report Preparation, Review, Approval and Implementation Process

Steps in the Process	Remarks
<p>Proponent refers to EPR Schedules 1 & 2 for the required environmental assessment (IEE or EIA) to carry out.</p>	<p>The project requires an IEE.</p>
<p>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.</p>	<p>The project has secured an approved ToR.</p>
<p>Proponent carries out IEE according to the approved work schedule/ToR and prepares an IEE Report following the format prescribed in EPR</p>	<p>The project carried out IEE and prepared the IEE Report</p>

Steps in the Process	Remarks
Schedule 5 and incorporating stakeholders' feedback applying the consultation procedure specified in the EPR.	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.	
<ul style="list-style-type: none"> ➤ If thereview reveals project implementation to have no substantial adverse impact on the environment, CSA approves within 21 days from receipt of thereport. 	
<ul style="list-style-type: none"> ➤ 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



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5 EXISTING ENVIRONMENT

5.1 Existing Physical Environment

5.1.1 Landforms and Topography

165. The project area is located in Bhimeshwor Municipality, which is situated in Dolakha district of Province 3 of Nepal. It lies between 27°37' 58" N to 27°44' 42" N latitude to 85°05' 12" E to 85°59' 31" E longitude. The municipality is in a hilly region with an altitude ranging between 950 to 2560 m above mean sea level with an average altitude of 1554 meters.

166. The project area comprises of extensive terraces and steep gorges. Gorges occur where the Seti flows close to the outliers or cuts across buried hills. Terraces are the result of the lateral erosion of gravels by the meandering Seti.

5.1.2 Geology & Soil

167. Dolakha District is characterized by Ulleri and Seti formations of the Midland Group. In the project area, rocks of the Ulleri Formation are represented by augen gneiss and feldspathic schist whereas the rocks of the Seti Formation are mainly composed of grey to greenish-grey phyllites and quartzite. Colluvial deposits and rocks are predominantly found on the surface. The project area also has weathered rocks of phyllite to gneiss and colluvium to alluvium deposits. Thickness of colluvial range 2 to 5 m and alluvial deposits more than 5 m.

5.1.3 Land use pattern

168. The municipality covers 58.59 sq. km out of which most of the land is covered by forest & agricultural land. About 53% of land is covered by forest while 40% of land is covered by agricultural land. The land in this project town is in moderate to very steep slope. More than 50% of land in the municipality is steeper than 30°. The land use pattern is determined by topography, climate and soils. Generally, lands with gentle slopes are used for settlements. The following gives details on the existing land use pattern:

Table 23: Existing Land Use Pattern

S. N.	Land use	Area (km ²)	Area (%)
1	Agriculture	23.06	39.63
2	Forest	30.56	52.52
3	Residential	2.75	4.72
4	Others	1.82	3.13
Total		58.19	100

Source: Feasibility Study Report, 2016


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5.1.4 Water Resources

169. The project district, Dolakha is rich in water resources, particularly on account of the existence of TamaKoshi River and other various rivulets. Hence, this area has been used by various hydropower development projects like Upper Tamakoshi, Second Tamakoshi and other hydro projects. Similarly, people of the project area have been consuming water from the various existing water supply system that has been using water from various water resources like Hattichhahara, Odare, Jhapre Khola, Kagate Khola, Dund Khola, Gairi Khola, Pani Ghatta etc. Apart of these resources, Charnawati River (Chharange Khola) is also one of the important water resources of the project area which has been proposed as the major source of this proposed project.

5.1.5 Climate

170. The Municipality has a subtropical to a temperate climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of about 1710 mm.

171. The average temperature in Charikot, Dolakha ranges from 7.5 degree celsius during January (the coldest month of a year) and 19.3 degree celsius during July (the hottest month of a year). Similarly, the average rainfall in Charikot, Dolakha ranges from the most dry month of January with 10mm to the most wet month of July with 543 mm.

5.1.6 Water Quality

172. During the survey, the respondents were asked about the existing water quality in the project area. The survey revealed that out of 3842 respondents, about 21.21% (815) of respondents referred to as Good quality where as large numbers 77.90% (2993) referred to as Satisfactory or Moderate in terms of water quality. Likewise, only 0.88% (34) of the respondents referred to as Bad in terms of water quality. Their response is categorized as good, satisfactory or bad in terms of their sensitivity to the taste, colour, visibility (turbidity) and incidence of water borne diseases.

173. During field survey, water samples collected from the proposed sources that includes Hattichhahara, Odare and Jhapre Khola were tested for various physical and chemical parameters. The test reports show that all parameters of water

quality of the sample collected are within the permitted value of NDWQS. These water quality test reports are included in **Annex 6**.

174. 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

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

5.1.8 Acoustic Environment

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

5.1.9 Landslide Susceptibility

177. 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

178. Dolakha District is blessed with natural beauty of floral diversity. The site specific vegetation types are described below. The major plant life forms available in the project area are given in *Table 24*.



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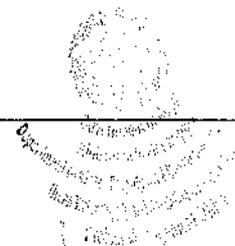


Table 24: Major Plant Life Forms of the Project Area

S.No.	Scientific Name	Local Name	Species
1	<i>Rubus ellipticus</i>	Ainselu	Shrub
2	<i>Emblica officinalis</i>	Amala	Tree
3	<i>Pieris ovalifolia</i>	Angeri	Shrub
4	<i>Lagerstroemia reginae</i>	Ashare phul	Shrub
5	<i>Adhatoda vasica</i>	Asuro	Shrub
6	<i>Melia azedarach</i>	Bakaino	Tree
7	<i>Ficus bengalensis</i>	Bar	Tree
8	<i>Terminalia bellirica</i>	Barro	Tree
9	<i>Aegle marmelos</i>	Bel	Tree
10	<i>Rhus wallichii</i>	Bhalayo	Tree
11	<i>Populus ciliate</i>	Bhote Pipal	Tree
12	<i>Lagerstroemia parviflora</i>	Bot Dhayaro	Tree
13	<i>Schima wallichii</i>	Chilaune	Tree
14	<i>Bassia butyracea</i>	Chyuri	Tree
15	<i>Berberis aristata</i>	Chutro	Shrub
16	<i>Debregeasia salicifolia</i>	Daar	Shrub/Small Tree
17	<i>Garuga pinnata</i>	Dabdabe	Tree
18	<i>Mussaenda macrophylla</i>	Dhobeni	Tree
19	<i>Colebrookea oppositifolia</i>	Dhasure	Shrub
20	<i>Dioscorea bulbifera</i> L.	Githa	Vine
21	<i>Callicarpa macrophylla</i>	Guyanlo	Shrub
22	<i>Lannea coromandelica</i>	Hallunde	Tree
23	<i>Terminalia chebula</i>	Harro	Tree
24	<i>Syzygium cumini</i>	Jamun	Tree
25	<i>Phoebe lanceolata</i>	Jhankri syaula	Tree
26	<i>Ficus lacor</i>	Kabro	Tree
27	<i>Anthocephalus chinensis</i>	Kadam	Tree
28	<i>Myrica esculenta</i>	Kafal	Tree
29	<i>Adina cordifolia</i>	Karam	Tree
30	<i>Acacia catechu</i>	Khayar	Tree
31	<i>Ficus semicordata</i>	Khanayo	Tree
32	<i>Sapium insigne</i>	Khirro	Tree
33	<i>Morus alba</i>	Kimbu	Tree
34	<i>Litsea monopelata</i>	Kutmiro	Tree
35	<i>Duabanga grandiflora</i>	Laampate	Tree
36	<i>Engelhardtia spicata</i>	Mauwa	Tree
37	<i>Erythrina stricta</i>	Phaledo	Tree
38	<i>Ficus religiosa</i>	Pipal	Tree
39	<i>Pinus roxburghii</i>	Sallo	Tree
40	<i>Terminalia tomentosa</i>	Saj	Tree
41	<i>Bombax ceiba</i>	Simal	Tree
42	<i>Vitex negundo</i>	Simali	Tree
43	<i>Mallotus philippensis</i>	Sindure	Tree
44	<i>Albizia chinensis</i>	Siris	Tree
45	<i>Dalbergia sisoo</i>	Sisoo	Tree
46	<i>Bauhinia vareigata</i>	Tanki	Tree
47	<i>Cedrealla toona</i>	Tuni	Tree
48	<i>Alnus nepalensis</i>	Uttis	Tree

Source: IEE Field Visit Survey, 2015

5.2.2 Fauna

179. 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 25 : Mammals of the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Felis Chaus/Prionailurus Bengalensis</i>	Jungle cat	Ban Dhade	LC
2	<i>Macaca Assamensis</i>	Assam Macaque	Bandar	NT*
3	<i>Hipposideros cineraceus</i>	Least Leaf Nosed Bat	Chamero	LC
4	<i>Panthera Pardus</i>	Common Leopard	Chituwa	VU*
5	<i>Hystrix Hodgsoni (Brachyura)</i>	Malayan Porcupine	Dumsi	LC
6	<i>Vulpes Bengalensis</i>	Bengal Fox	Fyauro	LC
7	<i>Funambulus Pennantii</i>	Five Stripped Palm Squirrel	Paanch Dharke Lokharke	LC
8	<i>Semnopithecus schistaceus</i>	Nepal Grey Langur	Dhedu	LC
9	<i>Martes Flavigula</i>	Yellow Throated Marten	Malsapro	LC
10	<i>Mos hosmour</i>	Hill Mouse	Musa	LC
11	<i>Gangetica Canis Aureus</i>	Golden Jackal	Syaal	LC

Source: IEE Field Visit Survey, 2015

180. Some of the birds reported in the forest areas are listed in Table 26. The status of these birds are as per IUCN & IBAT reports.

Table 26: List of Birds in the project area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Tyto alba</i>	Common Barn Owl	Gothe Latokosero	LC
2	<i>Ictinaetus malaiensis</i>	Black Eagle	Dronak Chil	LC
3	<i>Psilopogon asiaticus</i>	Blue Throated Barbet	Basanta	LC
4	<i>Eudynamis scolopaceus</i>	Common Koel	Koili	LC
5	<i>Arborophila torqueola</i>	Common Hill Partridge	Piura	LC
6	<i>Acridotheres tristis</i>	Common Myna	Dangre Rupi	LC
7	<i>Coturnix coturnix</i>	Common Quail	Battai	LC
8	<i>Streptopelia sp</i>	Dove	Dhukur	LC
9	<i>Bubo bubo</i>	Eurasian Eagle Owl	Hapsilo	LC
10	<i>Psilopogon (Megalaime) Virens</i>	Great Barbet	Nyauli	LC
11	<i>Cuculus micropterus</i>	Indian Cuckoo	Kafal Pakyo	LC
12	<i>Corvus Macrorhynchus</i>	Large Billed Crow	Kaalo Kaag	LC
13	<i>Caprimulgus macrurus</i>	Large Tailed Night Jar	Lapuchhre Chaite Chara	LC
14	<i>Psittacula cyanocephala</i>	Plum Headed Parakeet	Tuisi Suga	LC
15	<i>Passer domesticus</i>	Sparrow	Bhangera	LC
16	<i>Bubo nipalensis</i>	Spot Bellied Eagle Owl	Mahakaushik	LC
17	<i>Lophura Leucomelanos</i>	Kalij Pheasant	Kalij	LC
18	<i>Pellomeum ruficeps</i>	Puff Throated Babbler	Thople Bhyakur	LC

Source: IEE Field Visit Survey, 2015

181. The commonly found reptiles and amphibians observed in the project area are presented in Table 27. The status of these reptiles & amphibians are as per IUCN & IBAT reports.

Table 27: List of Reptiles and Amphibians Found in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Calotes versicular</i>	Garden lizard	Chheparo	LC
2	<i>T. albolabris</i>	Green Pit Viper	Haryau	LC
3	<i>Hemidactylus brookii</i>	Common lizard	Mausuli	LC
4	<i>Bufo melanostictus/Duttaphrynus Himalayanus</i>	Common toad	Bhyaguto	LC
5	<i>Ovophis monticola</i>	Mountain Pit Snake	A(a)ndho Sarpa/Gurube/Chhirbire Sarpa	LC
6	<i>Ptyas mucosus</i>	Rat Snake	Dhaman	
7	<i>Rana cyanophylectis</i>	Stream Frog	Bhyaguto	LC*

Source: IEE Field Visit Survey, 2015

182. Similarly, the commonly found fishes in the project area are given in Table 28. These species are found in the nearby water bodies of the project area that includes Chharange Khola, Hattichhahara Khola and Other minor water bodies like Odare, Jhapre Khola, Dund Khola etc. The status of these fishes are as per IUCN & IBAT reports.

Table 28: List of Fishes Found in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Schizothoraichthys sp</i>	Trout	Asala	LC
2	<i>Garra annandalei</i>	Annandale Garra	Chuche Buduna	LC
3	<i>Barilius vagra</i>	Vagra Baril	Faketa	LC
4	<i>Neolissocheilus hexagonolepis</i>	Copper mahseer	Katte	LC
5	<i>Glyptothorax Indicus</i>	Catfish	Mungri	LC
6	<i>Heteropneustes fossilis</i>	Stinging Catfish	Singhi	LC
7	<i>Nemacheilidae(Schistura Multifasciata)</i>	Stone Loach	Gadela	LC
8	<i>Psilorhynchus pseudecheneis</i>	Stone Carp	Tite	LC
9	<i>Channa gachua</i>	Dwarf Sankehead	Hile	LC
10	<i>Tor tor</i>	Tor Mahseer/Tor barb	Sahar	Not Known

Source: IEE Field Visit Survey, 2015

5.2.3 Protected Area

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

5.2.4 Forest Area

184. There are various community forests nearby the project area. Some of the project components have been proposed within the community forest areas. Those community forests are mentioned below along with the details of proposed water supply components.

Table 29: Project Components within Community Forests

SN	Project Components	Community Forests
1	Matti System (RVT-250, GH,WTP)	Bichaur Community Forests
2	Barkhedanda (RVT-250,WTP,GH)	Barkhedanda Community Forests
3	Budhabhimsen System	Budhbhimsen Community Forests
4	Transmission Mains	Shree Chandrawati Community Forests
5	Transmission Mains	Shree Thangsa Deurali Community Forests

Source: IEE Field Visit Survey, 2015

185. The concerned WUSC has already got written consent from the concerned Community Forest Users Groups (CFUGs) and Bhimeshwore Municipality.

5.3 Socio-economic and Cultural Environment

5.3.1 Demographic Features

5.3.1.1 Settlement pattern

186. Our field observation shows that the spatial distribution pattern of settlements in Bhimeshwor Municipality is found to be scattered in the agricultural village areas and agglomerated in the accessible commercial areas, tended to be clustered in the main road area. There is a dense linear settlement in the main Charikot Bazaar. The rural area of the project area is gradually shifting towards the urban area with emerging market along the main roads and settlements, however such urban growth has been hindered by limited population growth and steep terrain of the area. Most of the government and non-government offices are located in wards 9 & 10, which is the most densely populated area of the service area. Nevertheless, the settlement pattern of the other wards is scattered.

5.3.1.2 Population Distribution

187. As the all of the service area lies in the former municipality boundary, total population of historical time of former municipality had been used for the population assessments of the area.

Table 30: Population of the former BHimeshwore Municipality

Year	Population
1981	16,761
1991	19,261
2001	21,916
2011	22,537

Source: DEDR, 2018

188. However, the Municipality has increased its judiciary boundary more than double folds during March 2017 by incorporating adjoining former VDCs. The formation of

the new municipality has been described in earlier (section 1.2). Therefore, the present population assessment of newly formed municipality has been carried out by summing up neighboring VDCs' population data. The ward wise population of the project town according to the census, 2001 and 2011 has been presented below:

Table 31: Population of the Project Town

Ward	W. Area Ha	Census 2001			Census 2011			Growth Rate
		HHs	Pop	P. Densities	HHs	Pop	P. Densities	
1	2,178	746	3547	1.63	864	3437	1.58	-0.31
2	1,189	1123	4672	3.93	984	3571	3.00	-2.65
3	499	662	3036	6.08	1134	4330	8.68	3.61
4	501	397	1861	3.71	644	2448	4.89	2.78
5	1,629	925	4216	2.59	1140	4198	2.58	-0.04
6	533	854	3559	6.68	1312	4626	8.68	2.66
7	2,157	948	4572	2.12	862	3364	1.56	-3.02
8	1,793	772	3706	2.07	775	2793	1.56	-2.79
9	2,771	830	4508	1.63	924	3713	1.34	-1.92
Total	13,250	7257	33677	2.54	8639	32480	2.81	-0.36

Source: CBS 2001 & 2011

189. The above given table shows that the total population of Bhimeshwor Municipality as per the census of 2011 is 32,480. The population of the municipality in 2001 was 33,677. The analysis of the census population shows that the overall annual growth rate of the municipality is declining by 0.36%. Most of the wards have had declining population growth rate in last decade. The declining population growth rate attributed to the Maoist insurgency during early 2000 AD.
190. However, Ward no 3, 4 and 6 of the municipality (former ward no 1, 5, 7 and 12 of Bhimeshwor Municipality or main Charikot area) have positive growth rate. The population densities of these wards are comparatively high.
191. As the social surveys have been carried out before the formation of present Bhimeshwor Municipality, all the social information has been collected and presented in terms of former wards. The service area of the proposed Charikot Water Supply and Sanitation Subproject comprises partial ward area of former ward nos. 2, 3, 4, 5, 6, 8, 9, 12 and 13 and complete area of former ward nos. 1, 7 and 10 of the former Bhimeshwor municipality. The project area has been delineated in consultation with WUSC and the local community. The consultants conducted a socio economic survey in 2016 of the proposed service area. The

survey shows that the total population of the service area is 21,909. The wardwise household number and population of the service area is given in the table given below:

Table 32: Households & Population of Beneficiaries

Former Ward	Present Ward Number of Bhimeshwar Municipality	HHS	Total Population
1	Complete Area of WN 3	937	6,214
2	Partial Area of WN 2	211	938
3		72	303
4		68	393
5	Partial Area of WN 4	220	1,056
6	Partial Area of WN 5	344	1,570
7	Partial Area of WN 4	305	1,408
8	Partial Area of WN 5	241	1,043
9		32	136
10	Complete Area of WN 3	843	5,984
12	Complete Area of WN 7	287	1,607
13		282	1,257
Total		3842	21,909

Source: Socio-economic Survey, 2015

5.3.2 Caste/Ethnic Groups

5.3.2.1 Ethnicity and caste

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

193. The survey revealed that Brahmin/Chhetri are the major caste group of the project area comprising about 48.59% (1867) of the total 3842 households whereas the Janajati comprises about 41.25% (1585). Similarly, the Dalits and other caste groups (Mushalman and Madheshi etc.) are 9.94% (382) and 0.21% (8) respectively.

5.3.3 Economic Features

5.3.3.1 Economic Activities

194. The economy of the municipality is extensively agrarian although most of the households in the project area depend on more than one occupation. During the household survey of the project area, the detailed data has been collected regarding the major occupation and economic activities of each household of the project town. The survey shows that out of 3842 households, the highest number

of population, i.e., 35.92% (1380) are engaged in Agriculture, 23.97% (921) population depend on the business, 26.68% (1025) are engaged in services, 6.98% (268) were abroad for foreign employment and 1.48 % (57) are engaged in running industries. Similarly, about 2.86% (110) and 2% (77) of household head are dependent upon labor and other miscellaneous works respectively. The survey also shows that the lowest (0.10%) of the households are dependent.

195. There are four public and private banks providing banking services to the people of the municipality. Similarly some cooperatives are also in operation in the service area.

5.3.3.2 Monthly Income Details

196. The survey revealed that main sources of household income of the service area are agriculture, service, remittance and wage labour, respectively. Among the total households 11.37 percent have monthly income less than Rs. 7500 which is considered as poor household. About 12.05% of households have monthly income ranges of Rs. 7501 to Rs. 10875. Similarly, 38.44% of households have income range of Rs. 10,875 to Rs. 20,000, 32.3% of household have income range of Rs. 20001 to Rs. 50,000 and about 5.83% of households have income ranges above than Rs. 50,000 in a month. Similarly, the survey shows that only 11.37% of total population fall under the poor category as per the implementation guidelines (Income less than Rs. 7500 per month).

197. Hence, the survey revealed that the main sources of household income of the service area are agriculture, service and business respectively. The table given below gives details on the distribution of mean monthly household income.

Table 33: Monthly Income Level of Households by Ward

Income Range	Ward												Grand Total	%
	1	2	3	4	5	6	7	8	9	10	12	13		
<Rs.7500	47	82	18	23	16	81	31	57	0	48	14	20	437	11.37
Rs.7501- Rs.10875	40	34	18	15	24	95	54	62	0	73	16	32	463	12.05
Rs. 10876- Rs.20000	319	50	18	24	73	103	123	83	11	342	164	167	1477	38.44
Rs.20001- Rs.50000	468	25	13	5	95	56	79	32	21	304	84	59	1241	32.30
>Rs.50000	63	20	5	1	12	9	18	7	0	76	9	4	224	5.83
Grand Total	937	211	72	68	220	344	305	241	32	843	287	282	3842	100

Source: Socio-economic survey 2015

5.3.3.3 Monthly Expenditure Details

198. The survey team has collected basic data information of expenditure level of household by monthly basis. The survey shows that among the total 3842 households, 21.50 % (826) have monthly income of more than Rs. 7,501- 10,875, about 33.10% (1271) of total households have monthly income in the range of Rs. 10,875-20,000 whereas 14.50% (556) households have monthly income with the range Rs. 20,001-50,000. Likewise, only 1.7% (65) households are earning more than Rs. 50,000 per month. About 29.30% (1124) households falls under poor category as they are only earning less than Rs 7,500 per month. The monthly expenditure level of HHs in the service area is given in the table below.

Table 34: Monthly Expenditure Level of Households by Ward

Expenditure Range	Ward												Grand Total	%
	1	2	3	4	5	6	7	8	9	10	12	13		
<Rs.7500	129	138	56	53	28	240	59	177	0	93	50	101	1124	29.3
Rs.7501-Rs.10875	194	37	7	8	25	36	61	41	3	217	93	104	826	21.5
Rs.10875-Rs.20000	430	15	3	4	75	30	106	15	27	361	132	73	1271	33.1
Rs.20001-Rs.50000	165	18	5	2	87	38	70	8	2	153	6	2	556	14.5
>Rs.50000	19	3	1	1	5	0	9	0	0	19	6	2	65	1.7
Grand Total	937	211	72	68	220	344	305	241	32	843	287	282	3842	100

Source: Socio-economic survey, 2015

5.3.3.4 Willingness to Pay

a) Monthly Water Tariff

199. The sampled survey during detailed socioeconomic survey was carried out to observe the response of the community revealed towards the willingness to pay for monthly water tariff. As per the findings, more than 41.67% (80) of total 192 sampled households prefer to pay monthly water tariff in the range from Rs. 151 to 200 whereas about 3.65% (7) of 192 households prefer to pay in the tariff range from Rs. 201-300. Similarly, 7.29% (14) of households are willing to pay between Rs. 301-350 per month and 10.94% (21) of households prefer to pay monthly water tariff in the range from Rs. 351 to 400. Likewise, about 18.75% (36) and 10.94% (21) of households are willing to pay in the range from Rs. (401 to 450) and from Rs. (451 to 500) respectively. Only 6.77% (13) of 192 sampled households prefer to pay for monthly water tariffs for more than Rs.500. This data

indicates that the positive response towards the willingness to pay for monthly water tariff.

b) Up-front Cash Contribution

200. As per the survey, 97.24% (3736) of total 3842 households have shown willingness to pay 5% up-front cash contribution for the proposed project whereas, only 2.76% (106) households were not ready for upfront cash contribution.

201. The above givent table 28 in the section 5.3.3.2 shows that the poverty household within the project area is about 11.37% (437) HHs and it is observed that almost all of the poor households has shown interest toward the program and willingness to pay for upfront cash contribution eventhough there is provision of free tap connection to poor households. This indicates enthusiasm of people residing within the project town for the proposed project.

5.3.3.5 Affordability

202. The study has also assessed affordability of community in terms of monthly income level for expense on water supply & sanitation service. Hence, assessing the income level of households, more than 89 % of households can afford monthly water tariff and contribute for up front cash. Hence, affordability of the community has been obseved as encouraging and positive towards the program.

5.3.4 Education & Skills

203. The institutional data shows that there are 12 educational institutions including including two Multiple Campus one Nursing campus, eight higher secondary level schools as well as one children home was recorded in service area with 5363 people including students, staffs and teachers. The study also shows that most of the educational institutions are depending on both tap and springs water source.

204. The survey also revealed that about 9.27% (356) of households head are illiterate. Whereas, just literate ratio is 33.78% (1298) and only 6.77% have graduated or reached above graduate level.

5.3.5 Health and sanitation

205. Medical facilities for diagnosis and treatments are available in the service area. There are seven medical institutions including three hospitals, four Health post and polyclinic with 49 bed capacities was recorded.. Similarly, there is also facility of some polyclinics, pharmaceutical stores and medical shops in the project town.

206. 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 related to water borne and communicable disease was crossed checked by visiting hospital and health posts within the service area. According to the survey, there is record of 4.87% (889) people that suffered from diarrhea and 4% (735) that suffered from dysentery. Similarly, about 2.58% (472) people were known to be 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

207. There are several piped water supply systems constructed under various programme by different agencies in different year. 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 has been shown in table below:

Table 35: Name list of WUSC and its Details

SN	Name of WUSC	Source	No. of Taps	No. x Cum of RVT
1	Charikot 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	Taknagi 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	Dolakha WUSC BNP 2 & 3	Gautam Tole,	500	1x20, 2x50, & 1x90
10	Hatti Chara Charighang Manedanda	Hattichara,		18
11	Jilu Bhatnase BNP 7	Jhulekhola	80	1x200
12	Upper Matti WUSC BNP 8	Thulo Dhoro, Sano & Thulo Pokhari	125	3x10
13	Middle Matti WUSC BNP 8	Banpale and Trishul Muhan	200	1x10, 3x20 & 1-25
14	Junge Chanse WUSC BNP6	Chanse Muhan	200	
15	Jilu WUSC BNP 5&7		200	
16	Khanepani WUSC(Dolakha)	Darfe Jungle	155 PVT. +35P	2x20, 1x50 & 1x90
17	Dolakha WUSC	Teekbatal & Chakthali	110 PVT & 3P	1x20 & 1x40

Source: DEDR, 2018

b) Coverage

208. Various WUSCs has been actively involved in supplying water to their concerned service areas. As the municipality does not have ground water potential, surface water have been tapped in different locations. A big area with large elevation difference in a scattered settlement is the main cause for large number of systems and WUSCs. Almost 90% of the total 3842 HHs in the municipality has access to the piped water. Majority 60.57% (2328) households have facility of private tap connection. Similarly, about 34% (1307) households are using water from public tap while 4.40% (170) households rely on Kuwa/spring sources for water consumption.

c) Service Level and Consumption

209. In all of the existing systems, the supply is intermittent. The supply is only few hours of a day. As described earlier, there are numbers of system operated by number of WUSCs. All of the systems are surface water system and all of the systems are independent and isolated. However, due to urbanization process in core area and the vicinity of the Charikot Bazaar, few systems are overlapping in same service area.

d) Water Quality

210. During the survey, the respondents were asked in term of existing water quality in the project area. The survey revealed that about 21%of respondent feel as good quality, 78% feel satisfactory or moderate and only 1% feel bad in terms of water quality. The existing system carry out occasional disinfection (use of 3-5 kg bleaching powder once in a month during the rainy season). Water samples collected from the sampled sources were tested for various physical, chemical and bacteriological parameters. The test reports are given in the **Annex 6** .

e) Operation Costs & Tariff

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

f) Problems of the existing system

212. The existing system does not cover the whole area, is not able to meet the water demand and the supply is intermittent. The major problems of the existing system are presented below:

- The various WUSC have been supplying water to limited area of ward 1-13 except 11 only. Urbanization has been taking place in /or main adjoining areas;
- The existing systems are old and the available water infrastructures are not sufficient to meet current water demand. The supply is intermittent with supply up to 3 hrs on average that is also in a good day and only in limited area;
- The supplied water is not sufficient to meet the water demand of the service area. The consumers are largely dependent on other sources;
- In most systems water is supplied as it comes from the sources without treatment. Only, few WUSC carries out occasional disinfection with bleaching powder during wet season.
- The newly formed integrated WUSC has not taken the rein of all different WUSCs. The former WUSCs assign technicians and other supporting office staff and office assistant, who operates the system, applies bleaching powder, runs different valves, carries out maintenance of system including pipelines, meter reading etc. The current operation and maintenance service is poor and involvement of human resources is not enough to operate the system;
- The WUSC does not maintain a separate account for operation of water supply system making it difficult to conduct financial analysis
- The WUSC does not have the inventory of existing assets. The existing facilities are in need of repair/rehabilitation but the operator is unable to do it due to limited financial resources.

5.3.6.2 Existing Sanitation Situation

a) Sanitation Facilities

213. The overall sanitary condition of the Municipality is found to be reasonably satisfactory. In the core area, almost all HHs have their private toilets whereas in isolated/semi-urban areas some people still practice open defecation. The socio-

economic survey (2016) reported that out of total 3842 households, 3.85% (148) HHs still practice open defecation in project area and majority of HHs i.e. 72.73 % have either pit latrines or ventilated pit latrines. Similarly, 23.19% (891) households have pour flush and minimal number of HHs i.e., 0.23% (9) HHs have cistern flush latrines. These details are given in the following table:

Table 36: Type of Toilets in use in Project Area

Type of toilet	Service Area (Former Ward of the Municipality)												Grand Total	%
	1	2	3	4	5	6	7	8	9	10	12	13		
No toilet	36	31	10	11	4	5	4	6	0	22	12	7	148	3.85
Pit Latrine	76	21	10	9	214	338	299	232	0	21	175	79	1474	38.37
V. Pit	462	156	50	48	2	1	2	1	32	270	100	196	1320	34.36
Pour flush	357	3	2	0	0	0	0	2	0	527	0	0	891	23.19
Cistern flush	6	0	0	0	0	0	0	0	0	3	0	0	9	0.23
Grand Total	937	211	72	68	220	344	305	241	32	843	287	282	3842	100

Source: Socio-economic Survey, 2015

214. The households as well as institutional latrines are not maintained properly and needs improvement.

b) Drainage Facilities

215. There is no proper drainage system for storm water as well as for the domestic sewage in Charikot 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 surface drain to avoid local poundage. As the terrain is mostly steep, there will be no issues of drainage and the study also shows that no drainage problems have been encountered till date and hence, people are less concerned about the storm water drainage facility. Detailed information regarding this issue were not collected as this does not fall under the scope of the project.

c) Wastewater Management Practices

216. There is no sewerage system in the project area. Wastewater from individuals HHs is managed inside the house. The socio economic survey conducted in 2016 shows that 96% HHs have their own toilet. Some of them have constructed septic shows that 96% HHs have their own toilet. Some of them have constructed septic tanks while some have directly connected the outlet of toilets to the surface drains. There is no wastewater treatment plant in the Municipality to treat domestic sewage/septage. The municipality is planning to organize separate

unit 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. However, this issue does not fall under the scope of the proposed project. Hence, this will not be considered in the design of the proposed project.

d) Solid Waste

217. The major sources of waste generation in the project town are households, hotels, hospital, market areas, meat stores, groceries, clothing/ fancy stores/tailors etc. During the socioeconomic survey, no study regarding types and volumes of solid wastes was carried out as the solid waste issue is not covered under the scope of the proposed project.

e) ODF Situation in Service Area

218. The study also shows that Bhimeshwore Municipality has not been declared as Open Defecation Free (ODF) area yet. This indicates that people of the project town still are not aware about safe sanitation activities.

5.3.6.3 Local Institutions

a) Existing Institutional Situation

219. The main institutions involved in water supply and sanitation sector in the project area are Bhimeshwor Municipality, Water Supply and Sanitation Division Office (WSSDO), Charikot Water Users and Sanitation Committee, other WUSC Committees and some NGOs. WSSDO, Dolakha 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. 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.

220. DWSSM through WSSDO constructed and then rehabilitated the water supply systems. The WUSCs have been managing the existing systems

b) Water Supply and Sanitation User's Association

221. The fifteen major existing WUSCs mentioned in the above section 5.3.6.4 has been integrated to form a single WUSC for the proposed project which is named as *Charikot Watersupply Users & Sanitation Committee*. This Integrated Charikot WUSC consists of eight members that represents the recently merged WUSCs

and clusters within the service area. The executive committee consists of six male and two female members and two male members are in key positions of chairperson, vice chairperson and secretary whereas one female member is appointed as treasurer. According to the caste/ethnicity status of WUSC body, six members are from Brahman/Chhetri and 2 female members are from Janajati(Newar Community) groups respectively.

222. The WUSC was registered in Water Resource Committee, Charikot in 2054 B.S. as per the Water Resource Act-2049 and Water Resource Rule 2050. The certificate of WUSC registration is given in **Annex 3**. This WUSC is now involved in management and improvement of the water supply system in Charikot Bazaar. Similarly, the renewal of WUSC and its annual general meeting is carried out regularly. The name list and position of the members of this integrated WUSC are given in table below:

Table 37: Members of Charikot Water Supply and Sanitation Users Committee

S.N.	Name	Position	Remarks
1	Mr. Ram Krishna K.C	Chairperson	
2	Mr. Krishna Bahadur Khadka	Vice Chairperson	
3	Mr. Dhurba Bashnet	Secretary	
4	Ms. Anita Shrestha	Treasurer	
5	Mr. Moti Prasad Chaulagai	Members	
6	Mr. Ram Saran Thapa	Members	
7	Ms. Kamala Maharjan	Members	
8	Mr. Ram Sharan Thapa	Members	

Source: Socio-economic survey, 2015

223. It is intended that the WUSC will assist the PMO to implement the proposed project and it will operate and maintain Charikot water supply system to provide regular and quality drinking water to the consumers.

c) Organization Structure of operators of Existing System

224. Charikot WUSC is the operator of the existing largest system. The WUSC has assigned three water supply technicians for managing water distribution, maintenance and meter reading of the whole system. Two staffs are also deployed.

6. ANALYSIS OF ALTERNATIVES

6.1 With- and Without-Project Alternatives

225. 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

226. "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.

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

228. The existing water supply system in the project area is intermittent and is not able to meet the increasing demands of the increasing population of the project area. Insufficient water supply will compel them to control the use of water for various purposes even for sanitation practices. Lack of water in the sanitation practices like flushing of water after use of latrine, bathing, washing clothes etc. will demote the domestic hygiene of the project area. This may pose outbreak of diseases like Typhoid, Cholera, Dysentery etc. This may in turn result in various environmental problems.

229. '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.
230. 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.
231. 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

232. 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 22,755 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. 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.
233. 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.

234. 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.

With No Forest Option

235. As it has already been mentioned in Table 29 that some of the project components need to be constructed within various community forest areas. During alternative analysis, 'With No Forest' option has also been considered so that occupying of forest area could be avoided for the construction of this proposed project. But, the technical study shows that there are no other possible options for the proposed project. This project is conceptualized as a unique system. Hence, this 'With No Forest' option seems inappropriate for the proposed project.

6.1.2.1 Alternatives Relative to Planning and Design

236. As per Feasibility Study Report, there are no such alternatives proposed for this project. The proposed project is a unique system and is the extension of mainly existing Charikot system.

237. Hence, 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.

7. ANTICIPATED ENVIRONMENTAL IMPACTS

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

7.1 Beneficial Impacts

239. 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

240. 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 2.86% of total households have to rely on labour/daily wages. Hence, this project will be beneficial to this 2.86% of total households. The amount of money earned by the local people will somehow increase the local economy thereby reducing the chances of seasonal migration of the local people depending upon daily wages works to survive.

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

b) Skill Enhancement

241. 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. Hence, this benefit is targetted to the local people relying on daily wages and those to be involved in labor works of this proposed project.

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

c) Local trade and business opportunity

242. 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 23.97% (921) and only 1.48% (57) of total 3842 households are involved in business & industry sector 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

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



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

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

b) Increased economic opportunity

244. After the completion of the project there is a possibility of migration of people from rural areas towards the town due to easy access 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

245. 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.

246. As per the sampled household survey carried out in 2016, 70% of female are observed to be involved in water fetching & storage while only 30% 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 through private

connection, 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 69% of female are involved in taking care of family members especially children and senior citizens.

247. 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 35* given above, two female members are appointed as members of Charikot Water Supply Users and Sanitation Committee among which one is appointed as Treasurer and one as a general member. Their involvement in WUSC will provide them the opportunity to actively participate in meetings, discussions and many other decision making level processes. The socioeconomic survey revealed that in comparison to men, women have much more work load regarding household activities though the gender inequality is gradually decreasing in urban areas like Bhimeshwore Municipality. Hence, women of the project area are mostly entangled within the household activities. The involvement of women members in WUSC will be the exemplary effort to encourage other women to come out of the cocoon within which they have been entwined by household activities for decades and isolated from the society. The proposed project will also give emphasis on various activities like stakeholder consultations, meetings etc. to persuade women to actively participate in project related activities.

248. 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 included 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, high in magnitude and long-term in duration.

249. To sustain the positive outcomes, effective operation & 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 38.

Table 38: 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	H (60)	L (20)	LT (20)	Very Significant (100)

Source: IEE Field Study, 2015

Note: Scoring is done based on following;

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

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

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

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

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

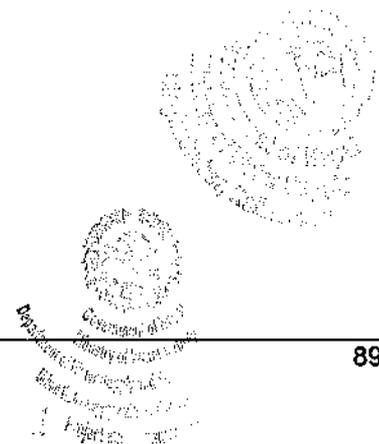
Significance of Impact

Total Score: More than 75 : Very Significant

50-75 : Significant

Less than 50 : Insignificant

Kanzya
Engineer



7.2 Adverse Impacts

7.2.1 Impact on Physical Environment

7.2.1.1 Design Phase

a) Soil Erosion & Slope Instability

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

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

7.2.1.2 Construction Phase

a) Erosion & land surface disturbance

251. 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 service area is hilly area. 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.

252. Similarly, the construction of Internal Access Roads will result in Slope Instability and Landslides due to site clearance and earthwork excavation works. However, its impact will not be significant as minimal length i.e., 200m length of this approach road has been proposed.

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

b) Spoil Disposal

253. 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 agricultural 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

254. 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.

255. 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.

d) Noise

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

257. During construction phase, generation of solid waste & waste water from the construction sites and workers camp are likely to create nuisance in the surroundings. Soil runoff from the construction site may lead to off-site contamination (particularly during rainy season). Similarly, Improper disposal of

construction debris may lead to off-site contamination of water resources. Unmanaged solid waste & effluent from workers camp may contaminate the surroundings. It is not possible to avoid this impact, however, it is not impossible too if provisions are envisioned with regular & proper monitoring activities. This will affect the construction workers, people residing in this predicted 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

258. 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

259. The construction of the proposed project components will occupy significant area of the land within the core area. This will affect the current land use pattern as the land to be used for the construction of these components could be used for other purposes like agricultural, residential etc. This effect will be direct in nature.

260. 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.

261. 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

262. 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

263. 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.

264. 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.

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

265. Some of the project components like RVTs, WTP and Guard House need to be constructed within the community forest areas that includes Barkhe Danda CF, Budhabhimsen CFs, Khorthali CFs and Shree Thangsa Deurali CFs. Similarly, some portions of Transmission Mains pass through the community forest areas. Hence, during construction works of these components, there is high chance of

flora & fauna being susceptible to risk. However, 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.

266. Similarly, the construction works within these community forests may induce noise that will create discomfort to the faunas existing in those areas. The construction of Internal Access Road will also have impact on flora through certain loss of vegetation due to clearing activities.

267. 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

268. During construction phase, nearby water bodies may be used by the workers for their daily activities like waste disposal, sanitation activities which may pollute the river quality which in turn lead the habitat of aquatic life towards risk.

269. Similarly, the construction works for the proposed Intakes and the rehabilitation works of the existing intakes may also contaminate the quality of existing & proposed sources affecting the aquatic habitat.

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

c) Forest Fire

270. It has already been mentioned that some of the project components have to be constructed within the community forest area. Due to this, during construction works within the community forest areas, there is greater possibility of accidental forest fire that may be due to carelessness of workers or sudden accidental causes. This forest fire in turn will result in various consequences that includes impact on flora & fauna, destroying of nutrients by the ashes, soil erosion etc.

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

d) Forest Encroachment

271. Due to construction activities, there will be regular inflow & outflow of the people to the forest area. This may result in possibility of encroachment of forest area. This will have direct impact on flora & fauna as their habitat will be disturbed by the forest encroachment. This will also discourage the ability of the forest vegetation to recover. Workers involved in the construction activities may use firewood of the forest areas which is illegal in actual.

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

7.2.2.2 Operation Phase

a) Impacts on Aquatic Life

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

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

7.2.3 Impact on Chemical Environment

7.2.3.1 Construction Phase

a) Impacts on Water Quality of the nearby rivers

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

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

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

7.2.3.2 Operation Phase

a) Impacts on Quality of Water Stored in Reservoir

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

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

b) Impacts on Water Bodies

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

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

7.2.4 Impact on Socio-economic Environment

7.2.4.1 Design Phase

a) Structural Instability

277. This Bhimeshwore municipality is also seismic prone zone area as it was also highly affected by the massive earthquake that shook various parts of Nepal in April 25, 2015. If certain seismic activity again occurs in the future, this may result in Cracking of structure that leads to facility failure and public discomfort. 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 through safe design of earthquake resistant structures.

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

b) Health & Safety of Community & Workers

278. 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 utilities

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

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

7.2.4.2 Construction Phase

a) Community health and safety hazards

280. 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

281. 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

282. The core Charikot bazaar area may be susceptible to traffic congestion during pipeline laying works as the road of this area is a bit narrower that may provide discomfort to the passer-by & shopkeepers and may obstruct the daily activities of the people living in that area .

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

d) Disruption to Local Vendor's Business

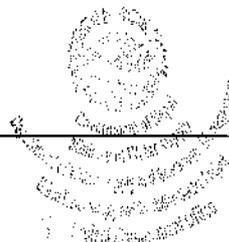
283. The construction works during pipe laying activities may disrupt local vendor's business as the construction activities may obstruct their customers to have easy & direct access to their shops. This may hamper their daily business activities.

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

e) Mobilization of Child Labor

284. 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

285. 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. Dolakha, 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 that will be experienced in the project town also. 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

286. 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. Similarly, the existing paved as well as unpaved road will also get damaged. This will obviously create discomfort to the people and people will be deprived of regular facilities they are getting from the existing utilities.

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

7.2.4.3 OperationPhase

a) Occupational Health and Safety Hazards

287. 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

288. 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

289. Irregularity in the supervision of the operation of distribution system may lead to excessive algae growth in service reservoir which may produce toxins causing serious illness in humans consuming water. The algal growth may also impart earthy taste & odor which may create dismay to the consumers and this may result in customer complaints 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

290. This issue will arise and result in disruption in smooth operation of water supply service with the Operator's disregard of the impacts of the following during operation: (i) climate change-induced drought; (ii) seismic events; (iii) Lack of Sense of ownership & affordability; (iv) Lack of institutional capacity & policy compliance and (v) Ineffectiveness in O & M.

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

291. The summary of impact matrix of adverse issues of the project is given in Table 39.

Table 39: 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)
Forest Fire	D	M (20)	L (20)	ST (5)	Insignificant (45)
Forest Encroachment	ID	M (20)	L (20)	LT (20)	Significant (60)
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)

Adverse Issues	Impact Rating				
	Nature	Magnitude	Extent	Duration	Rating
Health & Safety of Community & Workers	ID	M (20)	L (20)	LT (20)	Significant (60)
Damage to the existing facilities & False Claims by the people	D	M (20)	L (20)	ST (5)	Insignificant (45)
ii) Construction Phase					
Community Health and Safety Hazards	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Workers' Health and Safety Hazards	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Traffic Congestion	D	M (20)	L (20)	ST (5)	Insignificant (45)
Disruption to local vendor's business	D	M (20)	L (20)	ST (5)	Insignificant (45)
Mobilization of Child Labor	ID	M (20)	L (20)	LT (20)	Significant (60)
Impacts on the sustainability of works	D	H (60)	L (20)	ST (5)	Very significant (85)
Damage to the existing facilities	D	M (20)	L (20)	ST (5)	Insignificant (45)
iii) Operation Phase					
Occupation Health and Safety Hazards	ID	M (20)	L (20)	LT (20)	Significant (60)
Delivery of Unsafe Water	D	M (20)	L (20)	LT (20)	Significant (60)
Impacts on Consumer's Health	D	M (20)	L (20)	ST (5)	Insignificant (45)
Non Sustainability of Services or Completed Works	ID	M (20)	L (20)	LT (20)	Significant (60)

Source: IEE Field Study, 2016

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

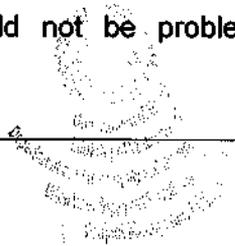
Total Score: More than 75 : Very Significant

50-75 : Significant

Less than 50: Insignificant

292. 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

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implementation. Apart of this, the Table 39 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.



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8. MITIGATION & AUGMENTATION MEASURES

293. The anticipated environmental impacts discussed in the earlier chapter are either adverse or beneficial. To sustain the project, it is necessary to deal with these impacts properly. Hence, the IEE study has proposed the effective measures to cope with these impacts. Here, the proposed measures include 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

294. 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

295. 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

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

b) Spoil Disposal

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

- Follow Spoil Management Plan as included in **Annex 2E**.
- Use of excess Spoil or Soil for filling depressed areas or borrow pits wherever possible.
- Appropriate disposal of Spoil at the designated places.
- Spoils should not be disposed on natural drainage paths, canals and other infrastructures.
- Provision of toe walls and retaining walls to protect the erosion of disposed spoils.
- Provision of proper drainage, vegetation and adequate protection against erosion at the Spoil Disposal Site.

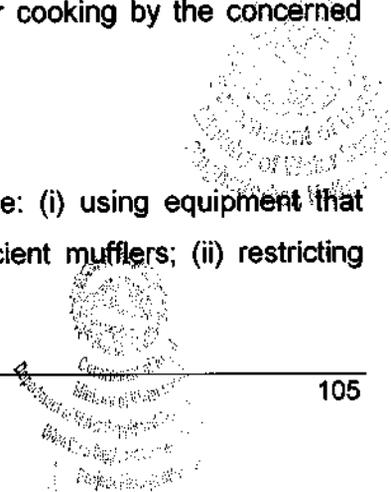
c) Air Pollution

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

d) Noise Pollution

299. The measures to mitigate the noise pollution include: (i) using equipment that emits the least noise, well-maintained and with efficient mufflers; (ii) restricting


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noisy activities to daytime and overtime work to avoid using noisy equipment; (iii) limit engine idling to a maximum of 5 minutes; (iv) spread out the schedule of material, spoil and waste transport; (v) minimizing drop heights when loading and unloading coarse aggregates; (vi) Use of Vehicles complying with NVMES,2069 B.S.; (vii) Use of equipments/machinery that comply with applicable emission standards of GoN i.e., National Noise Standard Guidelines, 2012; and (viii) Use of Diesel Generators complying with National Diesel Generator Emission Standard,2012

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

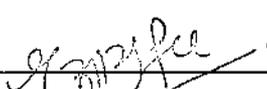
300. The mitigation measures for this impact is briefly described below:

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


May 2018



to the municipality waste collectors who will finally dispose those wastes to the landfill sites of the project town or by disposing those wastes to the burial pits at suitable place.

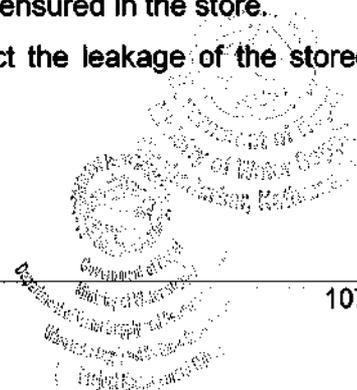
- Non biodegradable wastes like glass,plastics & metals shall be managed by reusing them for site use or selling them to scrap dealers instead of disposing them.
- Strict Prohibition on open incineration of solid wastes & Strict Prohibition on use of plastic materials to minimize the quantity of plastic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

f) Accidental Leakage or Spillage of Stored Fuel/Chemicals

301. 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.

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g) Impact on Land Use Pattern

302. 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

303. 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

304. 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

305. 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) Adopt the suitable mitigation measures proposed to minimize noise pollution as mentioned above in 8.1.1 d).

- (v) Regular Monitoring by DSMC & PMO
 - (vi) The forest area will be used as per Section 68 (1) of Forest Act 2049 (1993) which has also been mentioned in Section 2.4.14.
- b) Impacts on Aquatic Life**
306. 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
- c) Forest Fire**
307. The mitigation measures for this impact include: (i) Prohibition on burning dry grass or debris ; (ii) Prohibition on camp fires & smoking within the forest area to the workers;(iii) Keeping fire fighting equipment stand by within the construction sites; (iv) Provision of safety trainings regarding forest fire to the construction workers prior to construction
- d) Forest Encroachment**
308. The mitigation measures for this impact include: (i)Strict & Regular Monitoring during the entry of workers for the construction workers, (ii) Mobilization of the concerned community forest groups, (iii) Legal Provision along with imposing fines as punishment for those responsible for forest encroachment & (iv) Provision of trainings to the construction workers to provide support in controlling encroachment.

8.1.2.2 Operation Phase

a) Impacts on Aquatic Life

309. 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

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

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

311. 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.

312. 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

313. 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

314. 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

315. This impact can be mitigated through proper design of earthquake resistant structures as per standard and code of practice.

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

b) Health & Safety of Community & Workers

317. The mitigation measure for this impact involves;

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

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

c) Damage to the existing facilities

318. 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.
- Provision of Prompt Reinstatement of paved as well as unpaved roads after completion of excavation of pipeline works.

319. 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

320. 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

321. The mitigation measures for this impact include:

- (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

322. 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 followed by compaction right 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 especially at Charikot Bazaar Area and along Lamosanghu to Jiri Highway, the sample of which has been attached in **Annex 2D**.

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

d) Disruption to Local Vendor's Business

324. 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

325. The mitigation measures for this impact includes;

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

f) Impacts on Sustainability of Works

326. 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

327. If during construction phase, the problem regarding damage to the existing facilities 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.

328. 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

329. 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

330. 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

331. 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

332. The following mitigation measures to avoid non-sustainability of services or completed works are as follows:

- a) WUSC should monitor yield closely especially in the dry season and during a climate-change-induced drought.
- b) After every seismic event, WUSC should conduct engineering investigations of completed works and implement the necessary corrective actions without delay. This shall involve preparation of Emergency Preparedness & Response Plan and Immediate Implementation of this plan after any seismic event.
- c) Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs
- d) 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

333. 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

334. 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.

335. 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

336. 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

337. 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

338. 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



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9. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

9.1 Stakeholder Consultation & Participation

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

340. 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 40: Stakeholder Analysis & Mapping

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

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

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

S.N.	Stakeholders	Primary ²	Secondary ³	Stakeholders'Role or Interest	Level of Influence
5.	DWASH-CC		✓	It provides coordination in the preparation of local WASH plans with inputs from WASH sector actors and in the effective implementation of the local plans related to this project.	High
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 agency.Here, the municipality will be also responsible for policy compliance as well as for addressing public protests if any.	High
8.	Community Forest User's Group		✓	It is responsible for establishing coordination with the contractor during construction works within the community forest area.	High
9.	Forest Security Personnel		✓	It is responsible for establishing coordination with the contractor during construction works and for establishing harmony between locals and construction workers within the community forest area.	High
8.	DSMC		✓	It will assist PMO & RPMO in the overall planning, implementation and monitoring of the project activities regarding environmental & social safeguards requirements.	High
9.	WJSC		✓	It is responsible for O & M of the proposed water supply system. It will also facilitate the concerned authorities during planning as well as construction phase.	High
10.	Households (Families & Individuals)	✓		They are the main beneficiaries and are benefitted by the provision of enhanced & improved continuous water supply service.	Low

S.N.	Stakeholders	Primary ²	Secondary ³	Stakeholders' Role or Interest	Level of influence
11.	Contractors, Petty Contractors		✓	It is responsible for bidding for works and involved in the construction of the proposed project.	Low
12.	Local Technicians/Plumbers	✓		This group will be benefitted through the increased work opportunities related to construction works of the proposed project.	Low
13.	Unemployed Locals	✓		This group will be benefitted through the increased work opportunities related to construction works of the proposed project.	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 Charikot Bazaar area.	Low
15.	Schools & Hospitals	✓		This group will be benefitted by the provision of enhanced and improved continuous water supply service.	Low
16.	Commercial Establishments (Private Enterprises)	✓		This group is benefitted by enhancing their business by supplying items to the construction employees regarding their basic needs.	Low
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 2016 and DEDR & DDR, 2018

341. The consultations were carried out on various dates at various locations within the project town for the discussion of the anticipated environmental impacts that may result from the construction of the proposed Charikot Water Supply & Sanitation Project. The consultations were undertaken with key stakeholders that includes Local Bodies, Beneficiaries Households, CFUGs, 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

342. 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 the project town 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.
- v. The project should give priority to local people while hiring for the construction activities.
- 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 Charikot Bazaar area like Traffic Congestion, Disruption to Local Vendors, Discomfort to the passerby, Noise Pollution, Air Pollution, Damage to the existing facilities etc.
- viii. The construction works within the community forest areas should not involve cutting trees as well as destruction of any kind of forest resources.

343. All the stakeholders present during consultation programs expressed their sincere commitment towards the proposed project, committed to collect 5% upfront cash contribution from the beneficiaries and agreed to provide aid during project construction whenever required.

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

- i. The proposed project will address the water shortage problem faced by Bhimeshwore municipality.
- ii. The proposed project has provision of water treatment system. This will resolve the problems of consumption of either occasional treated or untreated water.
- iii. The proposed project has provision of continuous water supply system. This will end the irregular water supply service.

- iv. The proposed project with water treatment facility and continuous water supply provision if effectively implemented will address the needs of Bhimeshwore municipality 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 Bhimeshwore municipality will be given priority for employment to the extent possible however, it requires strong coordination with the concerned contractor.
345. 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.

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

Table 41: Summary of Major Public Consultations carried out by Study Team

S.N.	Meeting	Facilitator	Venue & Participation	Topic of Dissemination
1	June 21, 2015	Env. expert/ Social Safe Guard Specialist/Contract Management Expert and Social Mobilizer	WUSC office Charikot, WUSC executive body and advisor team	Information sharing about the Third Small Town Implementation, Role and responsibility of various stake holders, Working modality social & environment impacts and safe guard.
2.	August 21, 2015	Social Mobilizer	Municipality Office, Charikot - WUSC executive body and advisor team and Executive Chairman of Municipality	Dissemination of TSTWSSSP approach, modality, role & responsibility of various stakeholders. Preparation of social and technical survey works
3.	August 22, 2015	Safe Guard Specialist/WS and Sanitation Engineer/ C. Management Specialist and Social Mobilizer	WUSC Office, Charikot -WUSC executive body and advisor team Local leader, beneficiaries, WUSC representative etc.	Dissemination of TSTWSSSP approach, modality, role & responsibility of various stakeholders, delineation of service area
4.	November 30, 2015	Social Safe Guard Specialist/ Social Mobilizer	Different Tole of Municipality and WUSC office -Local leader, beneficiaries, WUSC representative etc.	Information Sharing and discussion of project / roles & responsibilities of various stakeholders and collection of Upfront 5% cash from User.
5	June 17, 2016	Consultant Team, DWSSDO, WUSC members, TDF, Local people of service area	Community Hall, Simpani, Charikot	Presented Feasibility report
6	September 1, 2017	Design Engineer /Env. Expert GESI Expert and Social Safe Guard Specialist	Meeting Hall of PMO – Mayor, MPs, WUSC Chairman and WUSC members, PMO/DRTEC Team and other stakeholders including TDF	Presented Final report and discussion

S.N.	Meeting	Facilitator	Venue & Participation	Topic of Dissemination
7	February 7, 2018	Design Engineer /Env. Expert GESI Expert and Social Safe Guard Specialist	Party Palace at Charighyang, Charikot – Mayor, MPs, WUSC members, Key informant, Consultant Team, DWSSDO, DRTAC, TDF, Consultant Team / Local people of service area	Presented Final Detailed Design report and discussion

Source: DEDR & DDR, 2018

347. 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.



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10. GRIEVANCE REDRESS MECHANISM

10.1 Purpose of the Grievance Redress Mechanism

348. 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.
349. 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.
350. A municipal-level public awareness campaign will be conducted on a regular basis as shown in the Communication & 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

351. A Grievance Redress Committee (GRC) will be formed at the Municipality level, comprising the Mayor as Chairperson of GRC, and Regional Project Manager RPMO as Secretary. The GRC members will comprise of (1) WUSC Secretary; (2)

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

352. 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.

353. The GRM procedure is depicted in Figure 5, and is outlined below in detail, with each step having time-bound schedules and responsible persons to address grievances and indicating appropriate persons whose advice is to be sought at each stage, as required:

- (i) **First Level of GRM (WUA level):** The first-level, which is also the most accessible and immediate venue for quick resolution of grievances will be the contractors, RDSMC field engineers and RPMO supervision personnel, who will immediately inform the WUA. Any person with a grievance related to the project works can contact UWSSP to file a complaint. The municipal-level field office of the RPMO, in WUA's building, will document the complaint within 24 hours of receipt of complaint in the field, and WUA or local bodies will immediately address and resolve the issue at field-level with the contractor, supervision personnel of RPMO and RDSMC field engineers within 5 days of receipt of a complaint/grievance. The assigned RDSMC's

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

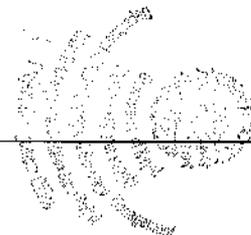
Social Mobilizer will be responsible to fully document: (i) name of the person, (ii) date of complaint received, (iii) nature of complaint, (iv) location and (v) how the complaint was resolved. If the complaint remains unresolved at the local level within 5 days, the WUA will forward the complaint to the municipality level GRM.

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

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



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355. 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.

356. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use ADB's Accountability Mechanism (AM) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Nepal Resident Mission. The complaint can be submitted in any of the official languages of ADB's developing member countries (DMCs). The ADB's AM information will be included in UWSSP Information Datasheet (PID), to be published in web and distributed to the affected communities, as part of the project GRM.

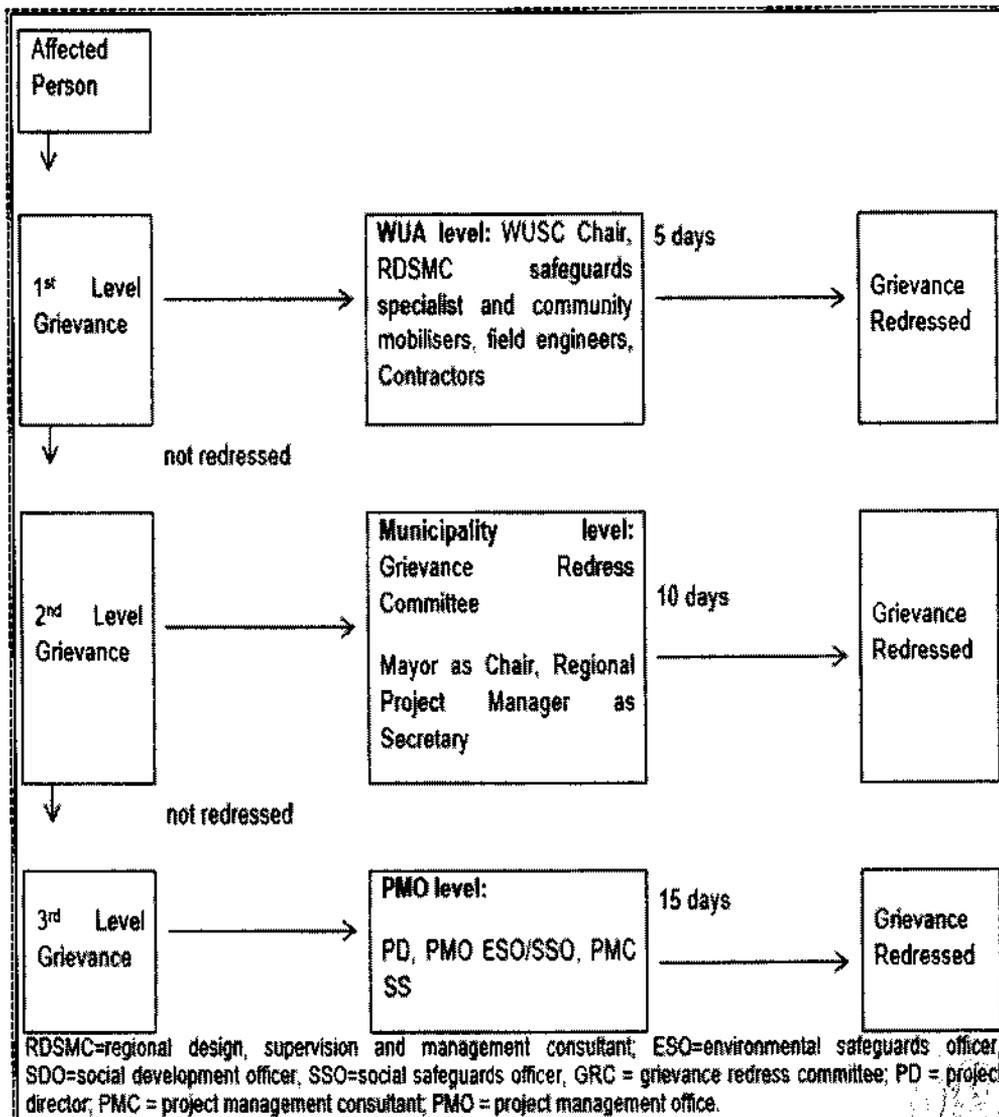


Figure 4: Grievance Redress Mechanism (Formal Approach)

11. ENVIRONMENTAL MANAGEMENT PLAN

11.1 Introduction

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

358. 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

359. The Ministry of Water Supply (MoWS) will be the executing agency with the responsibility of project execution with the responsibility of project execution delegated to the Department of Water Supply and Sewerage Management (DWSSM). The Water Supply and Sanitation Division/Sub-division Office (WSSDOs) are the project implementing agencies. Water User's and Sanitation Committees of the proposed towns are the implementing agencies.

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

a) **Prior to construction:**

- MoWS will deputize a qualified staff to act as the Environmental Safeguard Officer of the Project management office (PMO).

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

b) During construction and operation:

11.2.2 Safeguard Implementation Arrangement

361. 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.

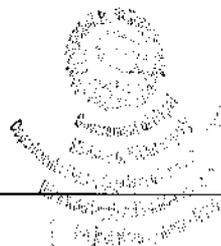
362. Regional Project Management Offices (Eastern and Western RPMOs):The environmental officer assigned by DWSSM to the RPMOs will receive support from (i) the PMO environmental officer, (ii) environmental specialist from PMQAC; and (iii) the environmental specialist and EMP monitors of the regional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

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



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- (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.

364. **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.

365. **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.

366. **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.

367. 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.

368. **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.



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11.3 Environmental Management Plan (EMP) Matrix

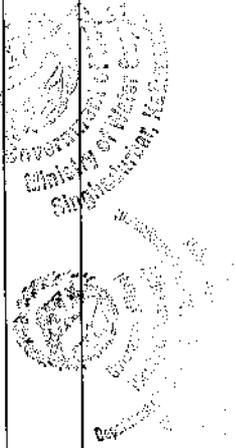
369. The table given below gives brief details on the Environmental Management plan (EMP) matrix that is to be implemented for the project implementation.

Table 42: 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	<ul style="list-style-type: none"> Incorporate measures and sites for handling excessive spoil materials Incorporate drainage plan in final design 	PMO, RPMO, & DSMC	<ul style="list-style-type: none"> Spoil Management Plan Final Design Documents 	Before award of contract, During Detailed Design Phase
b) Construction Phase Topography/Geology	Erosion & Land Surface Disturbance	<ul style="list-style-type: none"> Protecting the foundation from damage during backfilling Using the right backfill materials Compacting the backfill Final finishing the subgrade to ensure that water drains away from the foundation During construction of Internal Access Road, Soil Erosion & Land Surface Disturbances will be mitigated through appropriate slope protection measures like Gabion Wall Construction, Retaining Wall Construction and Construction of Drainage Structures 	Contractor	<ul style="list-style-type: none"> Contractor's Work Log Book 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.	<ul style="list-style-type: none"> 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. 	Contractor	<ul style="list-style-type: none"> Spoil Management Plan Photographs of Spoil Disposal Site 	During Construction Phase

IEE Report of Charikot WSSP

Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring			
Air Quality	Air Pollution	<ul style="list-style-type: none"> 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. 	Contractor	Written Notice/Code of Conduct Visible Emission Number of complaints from sensitive receptors Number of water Tank/s Capacity of Water Tank/s Daily/Weekly Frequency/Timing of water spraying Locations of water spraying	During award of contract Weekly Basis During Construction Weekly Basis During Construction			
		<ul style="list-style-type: none"> Strict Prohibition of open burning of solid waste 				Contractor	<ul style="list-style-type: none"> Contractors Log Book of Materials to ensure the use of crushed gravel Photographs 	Weekly Basis During Construction
		<ul style="list-style-type: none"> Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, as necessary; 						
Air Quality	Air Pollution	<ul style="list-style-type: none"> if re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces; 	Contractor	<ul style="list-style-type: none"> Contractors/Consultant's log book of vehicle inspection & maintenance 	Daily Basis/During Construction			
		<ul style="list-style-type: none"> Use of Construction/ Transportation Vehicles complying with NVMES,2069 				Contractor	<ul style="list-style-type: none"> Written Notice/Code of Conduct Type of fuel supplied to camps Quantity of fuel supplied to camps 	Prior to construction Weekly Basis during construction Weekly Basis during construction
		<ul style="list-style-type: none"> Regular inspection & maintenance of construction/transportation vehicles Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking. 						



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IEE Report of Charikot WSSP

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Acoustic Environment	Noise Pollution	<ul style="list-style-type: none"> Restricting noisy activities to daytime and overtime work to avoid using noisy equipment; 	Contractor	Written Notice	Prior to construction
		<ul style="list-style-type: none"> Prohibit the use of pressure horn by transportation vehicles 	Contractor	Written Notice/Code of Conduct Number of vehicles fitted with pressure horns Maximum Sound Level of Pressure Horn	Daily Basis
		<ul style="list-style-type: none"> Regular inspection & maintenance of construction/transportation vehicles to ensure the use of Vehicles complying with NVMES,2069 B.S. 	Contractor	Contractor's/Consultant's log book of vehicle inspection & maintenance	Daily Basis
		<ul style="list-style-type: none"> Regular inspection & maintenance to ensure the use of equipments/machinery that comply with applicable emission standards of GoN i.e., National Noise Standard Guidelines, 2012 	Contractor	Contractor's/Consultant's log book of equipment/machinery inspection & maintenance	Daily Basis
		<ul style="list-style-type: none"> Regular inspection & maintenance to ensure the use of Diesel Generators complying with National Diesel Generator Emission Standard,2012 	Contractor	Contractor's/Consultant's log book of equipment/machinery inspection & maintenance	Daily basis
		a) Construction Wastes	Contractor	<ul style="list-style-type: none"> Daily/Weekly quantity/volume of reusable/recyclable SW collected 	Daily basis
		<ul style="list-style-type: none"> Adopt 3R (Reduce, Reuse & Recycle) concept 	Contractor	<ul style="list-style-type: none"> Locations of stockpiling sites 	Daily basis
		<ul style="list-style-type: none"> Ensure storage areas are secure, safe & weatherproof. Management of reusable wastes 	Contractor	<ul style="list-style-type: none"> Number of cases of on site reuses 	Daily basis
		<ul style="list-style-type: none"> Sale of Recyclable wastes to scrap dealer 	Contractor	<ul style="list-style-type: none"> Daily/Weekly quantity/volume of such wastes sold to or given to scrap vendors Frequency of sale to scrap vendors 	Daily basis
		<ul style="list-style-type: none"> Final Disposal of Bio degradable solid wastes 	Contractor	<ul style="list-style-type: none"> Number/size of burial 	Daily basis

Haphazard Disposal of Wastes

Solid Waste

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IEE Report of Charikot WSSP

Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Solid Waste	Haphazard Disposal of Wastes	<ul style="list-style-type: none"> 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. 	Contractor	<ul style="list-style-type: none"> pits for final disposal of bio-degradable solid waste Location of burial sites Frequency of burials Contractor's log book of construction materials 	Daily basis
		<p>b) Solid Wastes, Wastewater and Sewage from labour camp</p> <ul style="list-style-type: none"> Adopt Segregation of Solid Waste (3R Concept) on the basis of being biodegradable or non-biodegradable. It is because non-biodegradable wastes cannot be broken down by decomposers and their disposal poses a big problem. Management of biodegradable wastes that includes food waste, paper waste, biodegradable plastic, etc. by any suitable processes that include Composting & incineration. If these two processes are not possible then, the wastes shall be either managed by handing over these wastes to the municipality waste collectors who will finally dispose those wastes to the landfill sites of the project town or by disposing those wastes to the burial pits at suitable place. Non biodegradable wastes like glass, plastics & metals shall be managed by reusing them for site use or selling them to scrap dealers instead of disposing them 	Contractor	<ul style="list-style-type: none"> Location of construction sites Number of Colored Bins to segregate wastes into biodegradable & non biodegradable wastes Daily/Weekly quantity/Volume of biodegradable solid waste collected Site Photographs Contractor Log Book 	Daily basis during construction Daily basis during construction

Government of Nepal
Ministry of Water Supply
Singdurbar, Kathmandu

TAEJICOR (JV) Pte
Engineer

IEE Report of Charikot WSSP

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		<ul style="list-style-type: none"> • Strict Prohibition on open incineration of solid wastes & use of plastic materials to minimize the quantity of plastic wastes. • Construction of the temporary latrines with temporary soak pits & septic tanks within the camp site for proper disposal of sewage. • Provide temporary but proper drainage system for proper outlet of waste water generated from cooking practices adopted by the workers • Employ local people from nearby villages to maximum extent possible. It will minimize the number of workers residing at worker's camp. Lesser the number of people, lesser will be the solid waste & effluent generated. However, it cannot be made mandatory because availability of local people with required skills will not be ensured at the time of construction. 	Contractor	<ul style="list-style-type: none"> • Written Notice 	Prior to Construction & During Construction
		<ul style="list-style-type: none"> • Provision of well managed storage site 	Contractor	<ul style="list-style-type: none"> • Location of storage site 	Weekly Basis during construction
		<ul style="list-style-type: none"> • Organize awareness programs for the workers responsible for handling fuel/chemicals 	DSMC & Contractor	<ul style="list-style-type: none"> • Records of awareness programs in the form of minutes, photographs 	Prior to the construction
		<ul style="list-style-type: none"> • Supervise workers to handle fuel/chemicals properly 	DSMC & Supervisor Contractor	<ul style="list-style-type: none"> • Records of any accidental spillage/leakage 	Daily Basis During Construction
		<ul style="list-style-type: none"> • Use of spill kit materials to block flow and prevent discharge to nearby water bodies 	Contractor	<ul style="list-style-type: none"> • Contractor's log book of materials procured for construction 	Weekly Basis During Construction
		<ul style="list-style-type: none"> • Scatter the Sawdust, sand or dry soil over the area of spill and leave for few minutes to soak up the fuel/chemical. So, availability of saw dust, sand or dry soil should be ensured in the store 	Contractor	<ul style="list-style-type: none"> • Frequency of use of saw dust, sand or dry soil 	Weekly Basis During Construction
Handling of Fuels/Chemicals	Accidental Leakage or Spillage of Stored Fuel/Chemicals				

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IEE Report of Charikot WSSP

Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation &	Monitoring Indicator	Frequency of Monitoring
		<ul style="list-style-type: none"> Regular Inspection Visit to the storage site to inspect the leakage of the stored container of fuel/chemical 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. 	DSMC Contractor	<ul style="list-style-type: none"> Number of Site Visits Complaints of Leakgae 	Weekly Basis During Construction
Land Use Pattern	Change in land use pattern in haphazard manner	<ul style="list-style-type: none"> 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. 	PMO & DSMC	<ul style="list-style-type: none"> Details of land ownership Monitoring Reports on Haphazard Land Use 	During Detailed Design Phase
Drainage	Disruption to Natural Drainage	<ul style="list-style-type: none"> Immediate Response on handling of dismantled debris Segregation of Dismantled Debris Adopt 3R (Reduce, Reuse & Recycle) concept 	DSMC Contractor	Pipe Layout plan	During Construction
Drainage	Disruption to Natural Drainage	<ul style="list-style-type: none"> Sale of Recyclable Wastes to Scrap Vendors/Dealers 	DSMC Contractor	<ul style="list-style-type: none"> Location of Spoil Disposal Photographs of before and after restoration 	Daily Basis During Construction
Dismantled Debris	Haphazard Disposal of Dismantled Debris		Contractor	<ul style="list-style-type: none"> Number of complaints from the sensitive receptors Number of Colored Bins Contractor's Work Log Book 	Daily Basis After Construction and Prior to Operation
2. Impacts on Biological Environment					
a) Construction Phase					



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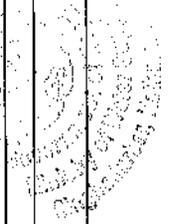
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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Flora & Fauna	Loss of vegetation, Loss of habitat of faunas	<ul style="list-style-type: none"> Replace the excavated top soil to its original position after the completion of pipe laying work Re-vegetating disturbed slopes and grounds, as applicable; 	Contractor	<ul style="list-style-type: none"> Photographs of before and after the replacement of top soil Contractor's Work Log Book 	Daily Basis During Construction
Flora & Fauna	Loss of vegetation, Loss of habitat of faunas	<ul style="list-style-type: none"> Awareness programs regarding conservation of existing flora & fauna, to the workers and the community Adopt the suitable mitigation measures proposed to minimize noise pollution as mentioned earlier Regular Monitoring 	PMO,DSMC & Contractor	<ul style="list-style-type: none"> Minutes & Photographs of Awareness Programs 	Prior to Construction
Flora & Fauna	Loss of vegetation, Loss of habitat of faunas		Contractor	<ul style="list-style-type: none"> Written Notice Contractor's Work Schedule 	As mentioned earlier
Aquatic Life	Loss of habitat of aquatic life	<ul style="list-style-type: none"> The forest area will be used as per Section 68 (1) of Forest Act 2049 (1993)which has also been mentioned in Section 2.4.14. Strict Monitoring on the daily activities of workers 	DSMC & RPMO	<ul style="list-style-type: none"> Contractor's Log Book Number of Monitoring Visits 	Daily Basis During Construction
			Contractor, & DSMC & RPMO	Forest Act,2049 (1993)	At the start of the construction
			Contractor & DSMC	<ul style="list-style-type: none"> Location of Labor Camp Site Photographs Number of Complaints from the sensitive receptors Number of Monitoring Visits Monitoring Reports 	Weekly Basis
		<ul style="list-style-type: none"> Provision of temporary but well equipped toilets 	Contractor & DSMC	<ul style="list-style-type: none"> Location of these temporary facilities Photographs of toilets constructed 	Weekly Basis

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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		<ul style="list-style-type: none"> Restriction to workers from fishing 	Contractor & DSMC	<ul style="list-style-type: none"> Written Notice Number of complaints from the sensitive receptor 	Daily Construction
		<ul style="list-style-type: none"> Adopt measures mentioned above for the solid waste management 	Contractor & DSMC	<ul style="list-style-type: none"> Number of Colored Bins to segregate wastes Daily/Weekly quantity/Volume of Biodegradable solid waste collected 	Daily Construction
Forest Fire	Impact on Flora & Fauna, Destruction of nutrients by the ashes, soil erosion	<ul style="list-style-type: none"> Prohibition on burning dry grass or debris Prohibition on camp fires & smoking within the forest area to the workers Keeping fire fighting equipment stand by within the construction sites; Provision of safety trainings regarding forest fire to the construction workers prior to construction 	Contractor & DSMC	<ul style="list-style-type: none"> Written Notice right before the construction Contractor's Log Book Photographs of Safety Trainings 	Daily Construction
Forest Encroachment	Impact on Flora & Fauna	<ul style="list-style-type: none"> Strict & Regular Monitoring during the entry of workers for the construction workers, Mobilization of the concerned community forest groups, Legal Provision along with imposing fines as punishment for those responsible for forest encroachment & Provision of trainings to the construction workers to provide support in controlling encroachment. 	Contractor & DSMC	<ul style="list-style-type: none"> Written Notice right before the construction List of Records of ingoing & outgoing people from the community forest Training Photographs 	Daily Construction
b) Operation Phase					
Aquatic Life	Pollution of water bodies endangering aquatic lives	<ul style="list-style-type: none"> Strict monitoring to the operators involved to discourage Direct discharge of the effluent to the water bodies Proper Implementation of Water Safety Plan (WSP) 	WUSC	<ul style="list-style-type: none"> Number of complaints from the sensitive receptors WUSC Reports Water Safety Plan 	Weekly Basis
3. Impacts on Chemical Environment					
a)Construction Stage					



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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Water Quality	Pollution on surface water pipelines over water bodies, poorly managed construction sediments and other wastes, poor sanitation practices by workers	<ul style="list-style-type: none"> Appropriate Design of Septage Disposal through design of toilets with septic tanks 	Contractor, DSMC	<ul style="list-style-type: none"> Semi Annual Environmental Monitoring Report Photographs of toilets constructed 	Prior to Construction as well as During Construction
		<ul style="list-style-type: none"> Disposing of spoils or excess soils as free filling materials as soon as possible 	Contractor	<ul style="list-style-type: none"> Spoil Management Plan Location of Spoil Disposal Site 	During Construction
		<ul style="list-style-type: none"> Locating temporary storage areas on flat grounds and away from main surface drainage routes; Shielding temporary storage areas with sandbags 	Contractor	Photographs of temporary storage areas	Monthly Basis
		<ul style="list-style-type: none"> Adopt measures mentioned above for the solid waste management 	Contractor	<ul style="list-style-type: none"> Number of Colored Bins to segregate wastes Daily/Weekly quantity/Volume of Biodegradable solid waste collected 	Daily Basis
		<ul style="list-style-type: none"> providing adequate water supply and sanitation facilities at work sites. 	Contractor	<ul style="list-style-type: none"> Number of Complaints received from the workers Number of Water Supplies to the workers 	Weekly Basis
		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Number of supervisions Reports on Supervision 	Weekly Basis
b) Operation Stage					
Water Quality	Degradation of Quality of water stored within the reservoir	<ul style="list-style-type: none"> Proper Implementation of Water Safety Plan (WSP). 	WUSC O & M Team	Water Safety Plan of WUSC	Monthly Basis

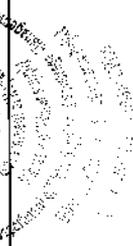
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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Water Quality	Impact on Water Bodies	<ul style="list-style-type: none"> Removing of Algae grown within the reservoir at regular intervals by the O & M team deployed by the WUSC. 	WUSC O & M Team	<ul style="list-style-type: none"> Photographs WUSC Monthly Reports 	Monthly Basis
		<ul style="list-style-type: none"> Disposal of raw sludge to the appropriate landfill or burial sites of the proposed project town 	WUSC O & M Team	<ul style="list-style-type: none"> Frequency of Burials Location of Burial Sites 	During Cleaning of sedimentation tank
		<ul style="list-style-type: none"> Use of raw sludge for agricultural land 	WUSC O & M Team	<ul style="list-style-type: none"> Quantity/Volume of Raw Sludge Scraped from sedimentation tank 	During Cleaning of sedimentation tank
		<ul style="list-style-type: none"> Avoid direct discharge of the raw sludge to the water bodies through strict monitoring to the operators involved 	WUSC O & M Team	<ul style="list-style-type: none"> Written Notice 	During Cleaning of sedimentation tank
		<ul style="list-style-type: none"> Proper Implementation of Water Safety Plan (WSP) 	WUSC O & M Team	WUSC Reports	During entire operation phase, Monthly Basis
4. Impact on Socio-economic Environment					
a) Design Phase					
Structural Instability	Cracking of structure leads to facility failure and public discomfort due to construction of water supply components in high earthquake zones	<ul style="list-style-type: none"> Proper Design of each & every component as per standard and code of practice. 	PMO, RPMO & DSMC	Detailed Design Documents	During detailed design phase
Health & Safety of Community & Workers	Lack of provision will have impact during construction	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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					

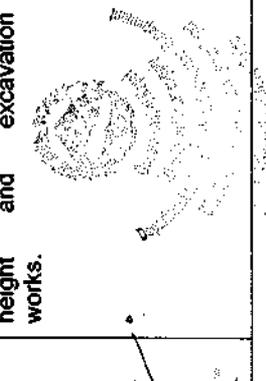
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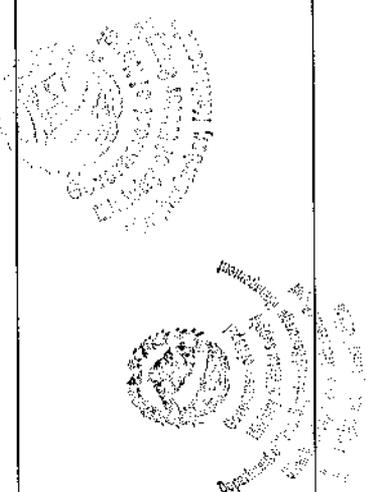


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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Community Health & Safety	<ul style="list-style-type: none"> Cross-cutting threats from construction's impacts on air and water 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. 	<ul style="list-style-type: none"> Contractor's implementation of EMP Adequate lighting, temporary fence, reflecting barriers and signage at active work sites; Contractor's preparedness in emergency response; Adequate dissemination of GRM and Contractor's observance/implementation of GRM. 	<ul style="list-style-type: none"> Contractor, RPMO, DSMC Contractor Contractor Contractor 	<ul style="list-style-type: none"> EMP Photographs depicting lighting, temporary fencing, barriers and signage facilities. Quantity of lighting, fence, reflecting barriers and signage Emergency Response Plan Monthly Reports of GRC Number of Grievance Redress Form received Site -Specific H&S plan Record of H&S orientation training Availability of personal protective equipment at construction site Environmental Site Inspection Report 	<ul style="list-style-type: none"> During Phase, Weekly Basis During Construction Phase, Monthly Basis During Construction, Weekly Basis During Construction, Monthly Basis 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 Weekly Basis during construction Weekly Basis during construction Weekly Basis during construction
Workers Health & Safety	<p>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.</p> 	<ul style="list-style-type: none"> Comply Labor Act (1992) of GoN Train all site personnel on environmental health and safety Provide Personal Protective Equipment (PPEs) to workers that includes protective clothing, helmets, goggles and other equipments designed to protect the wearer's body from injury or infection and ensure their effective usage Require workers to wear high visibility clothes Exclude public from worksites Maintain accident reports and records. Make first aid kits readily available 	<ul style="list-style-type: none"> Contractor Contractor Contractor Contractor 	<ul style="list-style-type: none"> Contractor's Visitors' Log Book Number of accidents as per site records Contractor's Health & Safety Log Book 	<ul style="list-style-type: none"> Weekly Basis during construction Weekly Basis during construction Weekly Basis during construction

IEE Report of Charikot WSSP

Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
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.	<ul style="list-style-type: none"> Maintain hygienic accommodation in work camps Ensure uncontaminated water for drinking, cooking, and washing. Assure clean eating areas Make sure sanitation facilities are readily available Provide adequate space and light to the camp site Adequate supply of potable water to the camps and good sanitation within camps Provide medical insurance coverage for workers Provide orientation for guest visitors Ensure that visitors do not enter hazard areas unescorted; Ensure moving equipment is outfitted with audible backup alarms; Hearing protection equipment enforced in noisy environment Chemical and Material storage areas need to be marked clearly 	Contractor	<ul style="list-style-type: none"> Location of Worker's Camp Site Number of Monitoring Visits Number of Complaints from the workers Number of water supplies Number of complaints from the workers Medical Insurance Documents Record of Orientation training (Photographs & Minutes) Contractor's Visitor's Log Book Contractor's Log Book of Machinery & Equipment Signage Board to make aware regarding Chemical Storage and Material Storage Area 	<ul style="list-style-type: none"> Monthly Basis during construction Weekly Basis during construction Prior to the construction Monthly Basis during construction Weekly Basis during construction Monthly Basis during construction



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Field	Impacts	Mitigations / Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Traffic Congestion	Interference in the daily activities of people	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Number of Site Visits and Photographs of Sites Traffic Management Plan 	Daily Basis
Local Vendor's Business	Discomfort to the customers to get access to the shops	<ul style="list-style-type: none"> Avoid delay in construction works and Prompt Backfilling right after completion of pipe laying works. Provision of temporary access to the shops through provision of planks 	Contractor	<ul style="list-style-type: none"> Field Visits Contractor's Work Schedule Photographs 	Weekly Basis
Deployment of Child Labor	Deprivation of Children's right to education, health, safety and moral development is deprived	<ul style="list-style-type: none"> 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
		<ul style="list-style-type: none"> 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. 	Contractor & PMO	Citizenship Certificate of the workers	Prior to Construction
			Contractor & PMO	Contract Document	During award of contract

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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Sustainability of Works	Damage to unsettled/unfinished/uncompleted structures and affecting their structural integrity by seismic event if any.	<ul style="list-style-type: none"> After every seismic event, the contractor must conduct engineering investigation of built structures and implement the necessary corrective actions immediately 	Contractor	<ul style="list-style-type: none"> Monthly Report Progress Contractor's Log Book 	Construction Phase
Existing Facilities	Damage to the existing utilities creating discomfort to the people	<ul style="list-style-type: none"> Monitor construction workers to adopt carefuleness and to strictly follow the layout drawings. 	Contractor, RPMO,DSMC	<ul style="list-style-type: none"> Number of Complaints received at GRC Pipeline Layout Plan Contractor's Bill of Quantities Photographs 	During Construction Phase on Daily Basis
c) Operation Phase					
Occupational Health & Safety	Worker's exposure to, and/or mishandling of chemicals and other hazardous substances pose health and safety hazards.	<ul style="list-style-type: none"> Installation of clear, visible signage in premises on safety measures Setting up a mechanism for the quick response to spills of chemical and hazardous substances. 	WUSC	<ul style="list-style-type: none"> Number of Site Visits Site Visit Reports Photographs of location where signage are installed Frequency of use of chemical & hazardous substances Quantity of chemical/hazardous substances used for the proposed project 	Weekly Basis
Drinking water supply	<ul style="list-style-type: none"> Extraction of unsatisfactory raw water quality Delivery of unsafe water to the distribution system Inadequate protection of intake Health Hazards arising 	<ul style="list-style-type: none"> Ensure the correct operation of water treatment plant to meet satisfactory water quality Provide Safe Storage for chemicals Ventilation of "Housed" dosing unit for chlorine 	PMO, RPMO & DSMC	<ul style="list-style-type: none"> WUSC Monitoring Reports Location of Chemical Storage Photographs Detailed Drawings Contractor Working drawings 	Monthly Basis during operation Monthly Basis during operation During Construction



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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	from inadequate design of facilities for receiving, storing and handling of Cl & other chemicals	<ul style="list-style-type: none"> Train operators for handling chlorine 	RPMO, PMO & WUSC	<ul style="list-style-type: none"> Photographs of Dosing Unit Constructed 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.	<ul style="list-style-type: none"> Regular Monitoring by the WUSC Removing of Algae grown within the reservoir at regular intervals by the operating team deployed by the WUSC. Monitoring & Proper Implementation of WSP. 	WUSC	<ul style="list-style-type: none"> WUSC Reports Frequency of Algae Removal 	Monthly Basis
Non Sustainability of Services or Completed Works	Disruption in water supply service by sudden seismic events or climate change droughts	<ul style="list-style-type: none"> WUSC should monitor yield closely especially in the dry season and during a climate-change-induced drought. After every seismic event, WUSC should conduct engineering investigations of completed works and implement the necessary corrective actions without delay. This shall involve preparation of Emergency Preparedness & Response Plan and Immediate Implementation of this plan after any seismic event. 	<ul style="list-style-type: none"> WUSC WUSC & the local body 	<ul style="list-style-type: none"> WUSC Monitoring Reports WUSC Reports Number of Human Resources Mobilized for monitoring Yield Monitoring Reports 	<ul style="list-style-type: none"> Monthly Basis During Dry Season and Immediate action during climate-change-induced drought. Immediate after any seismic event
		<ul style="list-style-type: none"> Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs 	WUSC	<ul style="list-style-type: none"> Photographs of capacity building programs Minutes of such programs WUSC Monitoring Report 	During project construction and During initial stage of operation phase
		<ul style="list-style-type: none"> Carrying out regular O & M with effectiveness 	WUSC	WUSC Monitoring Report	Right after the completion of project construction



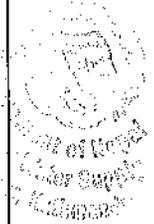
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Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		through proper management of WUSC.			period
B. Beneficial Impacts					
1. Impact on Socioeconomic Environment					
a) Construction Phase					
Income	Employment Generation	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Contractors Log Book Number of local labours employed in project Consultant Monitoring Report 	During Project Construction
Personal Skills	Skill Enhancement	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Contractors Log Book Hands on training Photographs WUSC monitoring report 	During Project Construction
Local trade & business opportunity	Enhanced Local trade & business opportunity	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Contractors Materials Log Book WUSC monitoring report 	During Project Construction
b) Operation Phase					
Health & Hygiene	Improved health & hygiene	<ul style="list-style-type: none"> Regular maintenance of the water supply components should be done so that the project operates smoothly and the benefits are intact 	WUSC	<ul style="list-style-type: none"> Number of Site Inspection Visits Photographs of Inspection Visits WUSC monitoring report 	During O & M
Economy	Increase Economic Opportunity	<ul style="list-style-type: none"> Ensuring regular maintenance of the water supply components 	<ul style="list-style-type: none"> WUSC 	<ul style="list-style-type: none"> Number of Site Inspection Visits Photographs 	During O & M

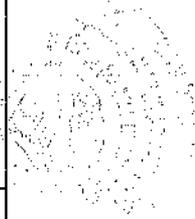
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Field	Impacts	Mitigations / Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Social Status	Social Empowerment	<ul style="list-style-type: none"> Promoting urbanization through proper land development activities in the area. 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 	<ul style="list-style-type: none"> Local Authority WUSC 	<ul style="list-style-type: none"> Number of members of WUSC Photographs of capacity building programs Minutes of meetings 	O & M phase



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11.4 Environmental Monitoring Program

370. 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.

371. 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 43 presents the indicative environmental monitoring plan for the project which includes relevant environmental parameters, with a description of the sampling stations, the frequency of monitoring, applicable standards, and responsible agencies.

Table 43: Environmental Monitoring Program

S. No.	Field	Stage	Parameters	Location	Frequency	Standards	Responsibility
1.	Air quality	<ul style="list-style-type: none"> • Before construction to establish baseline • Construction phase 	PM10 SO2 NOx	<ul style="list-style-type: none"> • Worksite locations • Along water transmission main 1-km interval from PTWs • Construction campsite locations 	<ul style="list-style-type: none"> • 24-hour monitoring once in a season (except monsoons) for the construction period 	<ul style="list-style-type: none"> • National Ambient Air Quality Standards, 2003 	Contractor
2.	Noise and vibration levels	<ul style="list-style-type: none"> • Prior to construction to establish baseline • Construction phase 	Equivalent day and night time noise levels	<ul style="list-style-type: none"> • PTWs location • Along water transmission main 1-km interval from PTWs • Construction campsite locations 	<ul style="list-style-type: none"> • Once in a season (except monsoons) for the construction period 	<ul style="list-style-type: none"> • National Noise Standard Guidelines, 2012 	Contractor
3.	Water quality	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Adjacent to construction sites (to be identified by the (DRTAC or DSMC)) 	<ul style="list-style-type: none"> • Twice a year (pre-monsoon and post-monsoon) for the entire period of construction 	<ul style="list-style-type: none"> • National Drinking Water Quality Standards, 2006 	Contractor
4.	Survival rate of landscaping, tree plantation	<ul style="list-style-type: none"> • O&M phase 	Survival rate	<ul style="list-style-type: none"> • In the areas where re-plantation/ landscaping proposed 	<ul style="list-style-type: none"> • Twice a year for 2 years 	<ul style="list-style-type: none"> • None 	WUSC

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11.5 Institutional Capacity Development Program

372. 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.

373. WUSC cannot monitor the quality of supplied water as prescribed in NDWQS and its Directives. Although monitoring kits and laboratory rooms will be provided, this would not guarantee WUSC can handle monitoring appropriately. DWSSM has five regional laboratories; however, some are not functioning fully due to lack of human resources. Considering that public health is a critical concern associated with water supply, it is recommended that a licensed and accredited laboratory be engaged to conduct water quality monitoring for at least the first 2-3 years of operation with WUSC actively participating in developing its capacity. Water quality monitoring should be carried out in such a way that WUSC will be "learning by doing." After the engagement period, there should be continuing periodic training of new persons to ensure that the capacity of WUSC is sustained. The cost for monitoring during operation is based on the assumption that a licensed laboratory will be engaged in both the monitoring requirements and to train WUSCs. A Water Safety Plan is included in the project design and will oblige the operator to carry out water quality monitoring accordingly. The amount of NRs. 500,000 will be provided annually to implement the Plan. There will be sufficient fund to include training by the licensed and accredited laboratory while monitoring water quality.

374. 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 44*. The Environmental Safeguard specialist & EMP Field Monitoring Staff are responsible for organizing different training programs for Environmental Management.

Table 44: Training Program for Environmental Management

Items	Pre-construction/prior to construction	Construction	
Training Title	Orientation workshop <i>[Signature]</i>	Orientation program/ workshop for contractors and supervisory staff	Experiences and best practices sharing

Items	Pre-construction/prior to construction	Construction	
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	<p>Module 1: Orientation</p> <ul style="list-style-type: none"> • ADB Safeguards Policy Statement • Government of Nepal Environmental Laws and Regulations <p>Module 2: Environmental Assessment Process</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Roles and responsibilities of officials/contractors/consultants towards protection of the environment • Environmental issues during construction • Implementation of EMP • Monitoring of EMP implementation • Reporting requirements 	Experiences on EMP implementation – issues and challenges Best practices followed
Duration	1 day	1 day	1 day on a regular period to be determined by PMO, ICGs, and (provide if DRTAC or DSMC)
Participants	Executing and implementing agencies, PMO, and PMO staff (technical and environmental) involved in the project implementation	PMO ICGs Contractors	PMO ICGs Contractors

11.6 Staffing Requirement and Budget

375. Staffing requirement will include the: (i) deputizing a DWSSM or PMO staff as the PMO environmental safeguards officer; (ii) deputizing WSSDO staff as RPMOS environmental engineers in each subproject town; (iii) engagement of a PMO-environmental safeguards specialist to provide technical assistance and guidance to the PMO and partly to the RPMOS and capacity development/training; and (iv)

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a DSC environmental safeguards specialist to conduct the IEEs and prepare the IEE reports according to the provisions of this EARF.

376. The cost required for implementing the EMP will cover the following activities:

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

377. 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.

378. 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.

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

380. The indicative costs of EMP implementation are shown in *Table 45*.



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Table 45: 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	75,000.00
c)	Water Quality Monitoring	75,000.00
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	30,000.00
iii.	Air Pollution	
	Excavation Segmentation Plan	No additional cost required
	Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily	120,000.00
	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	225,000.00
vi.	Accidental Leakage or Spillage of Stored Fuel/Chemicals	70,000.00
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	70,000.00
	Others as mentioned in Sub Section 8.1.2.1 a)	No additional cost required
ii.	Impacts on Aquatic Life	
	Provision of temporary but well equipped toilets at worker's camp	210,000.00
	Solid Waste Management	No additional cost required as it has already been mentioned above in v.
iii.	Forest Fire	
	Prohibition on burning dry grass or debris	No Additional Cost Required
	Keeping firefighting equipment stand by within the construction sites	No Additional Cost Required
	Provision of safety trainings regarding forest fire to the construction workers prior to construction	No Additional Cost Required
iv.	Forest Encroachment	
	Strict & Regular Monitoring during the entry of workers for the construction workers	No Additional Cost Required
	Mobilization of the concerned community forest groups.	No Additional Cost Required

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
	Legal Provision along with imposing fines as punishment for those responsible for forest encroachment	No Additional Cost Required
	Provision of trainings to the construction workers to provide support in controlling encroachment.	No Additional Cost Required
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	
	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	75,000.00
	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	250,000.00
	Adequate dissemination of GRM and Contractor's	No additional cost required

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
	observance/implementation of GRM	
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	50,000
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 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		1,800,000.00

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.

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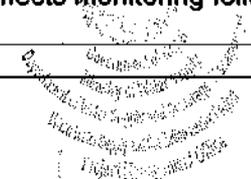


381. The above given table shows that the total indicative cost for EMP implementation in NRs. 1,800,000.00. This has been included under provisional sum in BoQ and this total cost includes local level monitoring cost and mitigation costs that also includes necessary environmental mitigation measures for the anticipated impacts during the entire construction period.

382. The environmental management will be implemented during the detailed design phase that will continue through the procurement, construction, and operation phases. Table 46 & 47 presents the indicative timeframe of key EMP activities about the project implementation schedule & the proposed topics for Capacity Building/Training respectively.

Table 46: Environmental Management Implementation Schedule

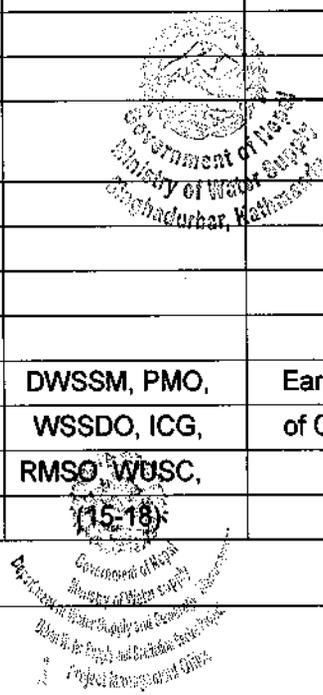
Activity		Indicative Time Frame
PROJECT IMPLEMENTATION		
	Detailed Design & Bidding Documents	Q2 Y0
	Procurement	Q3 Y0
	Construction	Q4 Y0 – Q4 Y2
	Contractor Operating Period	Q3 Y2 – Q4 Y3
	Handover to WUSC for Operation	Q3 Y3 – Q1 Y4
	Defects Liability Period	Q3 Y2 – Q4 Y4
ENVIRONMENTAL MANAGEMENT		
Overall		
1.	Design Review and Technical Audit Consultant (DRTAC)-Engagement of Environmental Specialist	Starting Q4 Y0 (5 yrs of intermittent inputs)
2.	PMO's submission of Environmental Monitoring Report (EMR)	
	- Monthly EMR for project's Monthly Progress Report	- 8 th day after effective month
	- Semi-Annual EMR during construction for submission to ADB	- 8 th day after effective 6-mo. period
	- Annual EMR for submission to ADB	- 8 th day after aneffective 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



Activity		Indicative Time Frame
2.	Submission of Environmental Monitoring Report (EMR)	Q4 Y0 – Q4 Y2
	- Monthly, by Contractor	5 th day of the month following the effective month
	- Quarterly, by Contractor or by Licensed Laboratory	3 rd day of the month following the effective quarter
Operation Period (potentially could start even before DLP is over)		
1.	Implementation of mitigation measures & monitoring activities as specified in the EMP	Starting anytime between Q3 Y3 & Q1 Y4
2.	Submission of EMR	anytime between Q3 Y3 & Q1 Y4
	- Monthly, by Operator	5 th day of the month following the effective month
	- Quarterly, by Operator or (if applicable) by Licensed Laboratory	3 rd day of the month following the effective quarter

Table 47: Proposed Topics for Capacity Building/Training

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



Topic		Target Participants	Timing
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)	WSSDO, 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 & WSSDO		



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12. MONITORING AND REPORTING

383. 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 & DMSC 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) and Ministry of Forests & Environment (MoFE) under Government of Nepal will also undertake monitoring process through random field visits to review the project performance.
384. RPMOs will submit monthly monitoring and implementation reports to PMO, who will take follow-up actions, if necessary. PMO will submit semi-annual monitoring reports to ADB. This report will be based on the Sample Semi-Annual Monitoring Report Template given in **Annex 2F** and Sample Environmental Site Inspection Report given in **Annex 2G**. The subproject budgets will reflect the costs of monitoring and reporting requirements.
385. 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.
386. 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:

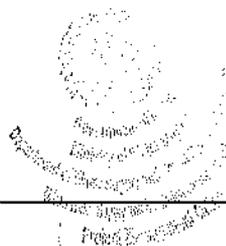
- (i) conduct periodic site visits for projects with adverse environmental or social impacts;

- (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.



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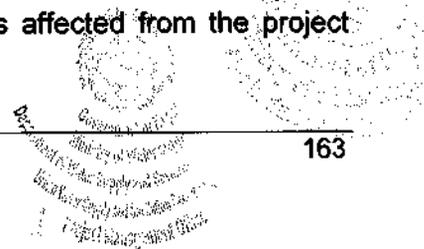


13. CONCLUSION

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


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

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



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Chairman



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ANNEXES



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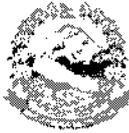


**ANNEX 1
APPROVED TERMS OF REFERENCE (ToR)**



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

Panipokhari, Kathmandu
Sindhu

Ref No **98/074-75**

21 August, 2017

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

Sub : Approval of ToR Of Charikot (Dolakha) Water Supply and Sanitation Project

The TOR of IEE is approved by Ministry of Water Supply and Sanitation on 2074/04/16. Now we are request you to prepare IEE reports, as per the approved ToR of Charikot (Dolakha) Water Supply and Sanitation Project. The copy of approved ToR is attached herewith.

Thank you

Divakar Prasad Dhakal
(Deputy Project Director)

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

TERMS OF REFERENCE (ToR)

for

INITIAL ENVIRONMENTAL EXAMINATION

of

CHARIKOT TOWN WATER SUPPLY AND SANITATION PROJECT

CHARIKOT, DOLAKHA 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

May, 2017

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

List of Abbreviations

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

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

Table of Contents

1.	NAME AND ADDRESS OF THE PROPONENT.....	1
2.	BACKGROUND AND DESCRIPTION OF THE PROJECT.....	2
2.1	Project Background.....	2
2.2	Objective of TOR and IEE study.....	2
2.3	Description of the Project.....	2
2.3.1	Location and Accessibility of the Project Area.....	2
2.4	Sub-project Components.....	5
2.4.1	Intake.....	5
2.4.2	Transmission Main.....	6
2.4.3	Thrust Blocks, Saddle Blocks and Thrust Beam.....	7
2.4.4	River and Stream Crossing.....	7
2.4.5	Water Treatment Plant.....	7
2.4.6	Service Reservoir.....	8
2.4.7	Bulk Distribution Mains.....	8
2.4.8	Distribution Main.....	9
2.4.9	House Connection.....	9
2.4.10	Appurtenances.....	10
2.4.11	DMA Establishment.....	11
2.4.12	Proposed Service Area.....	12
2.5	Population and Demographic Characteristics.....	13
2.6	Existing Water Supply.....	14
2.7	Coverage.....	18
2.8	Service Level and Consumption.....	18
2.9	Water Quality.....	18
2.10	Problems of Existing System.....	19
2.11	Ethnicity and Caste.....	19
2.12	Land Use Pattern.....	19
2.13	Settlement Pattern.....	20
2.14	Education and Health.....	20
2.15	Water-borne and Communicable Diseases.....	20
2.16	Economic Activities.....	21
2.17	Poverty Conditions.....	21
2.18	Existing Sanitation Facilities.....	21

Rich's

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

2.19	Project Rationale.....	22
2.20	Need of the Sanitation Component.....	24
2.21	Hydrology and Climate.....	24
2.22	Flora and Fauna.....	24
2.23	Protected Areas.....	27
2.24	Community Forest.....	27
2.25	Infrastructure Facilities.....	27
2.25.1	Transportation, Electricity and Communication.....	27
2.25.2	Educational Institutions.....	28
2.25.3	Other institutions.....	28
2.26	Quality of Life Values.....	28
2.27	Cultural and religious sites.....	28
2.28	Resettlement, Relocation and Compensation Issues.....	28
2.29	Salient Features.....	28
2.30	Proposed water supply system.....	29
2.31	Relevancy of the Project.....	32
4.	POLICIES, LAWS, RULES, DIRECTIVES AND GUIDELINES.....	37
5.	REQUIRED TIME, ESTIMATED BUDGET AND SPECIALISTS REQUIRED FOR PREPARING THE REPORT.....	38
6.	ANTICIPATED IMPACTS OF THE PROPOSED PROJECT ON ENVIRONMENT.....	39
7.	ALTERNATIVE ANALYSIS.....	41
7.1	Alternative System Analysis.....	41
7.1.1	System Alternative I.....	41
7.1.2	System Alternative II.....	41
8.	MATTERS TO BE IMPLEMENTED WHILE IMPLEMENTING THE PROJECT.....	42
8.1	Environmental Management Plan.....	42
8.2	Environmental Monitoring Plan.....	42
8.3	Information Disclosure, Public Consultation and Participation.....	42
8.4	Grievance Redress Mechanism.....	43
9.	REPORT.....	44
10.	OTHER NECESSARY MATTERS.....	45
11.	LITERATURE REVIEWED.....	46

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

List of Tables

Table 1 : Salient Features of the Project.....	3
Table 2 : Details of Transmission Pipes Sub-system wise.....	7
Table 3 : Water Treatment Plant in Various Sub-systems.....	8
Table 4 : Details of Pipe used in BDS Sub-system wise.....	9
Table 5 : The total design length of pipes used in Distribution.....	9
Table 6 : Proposed Buildings and Boundary Type.....	11
Table 7 : Population of the Concerned Wards of the Project Town.....	13
Table 8 : Beneficiaries households.....	14
Table 9 : Comparative details of the existing and the proposed system.....	15
Table 10 : Comparative details of the existing and the proposed system.....	16
Table 11 : New addition to the existing system.....	18
Table 12 : Result of water quality tests.....	18
Table 13 : Land-use pattern.....	20
Table 14 : Reported Water Borne and Communicable Diseases in 2015.....	20
Table 15 : Distribution of mean monthly household income.....	21
Table 16 : Toilet coverage (HHs).....	22
Table 17 : Willingness to pay connection charge (in NPR).....	23
Table 18 : Willingness to pay monthly water charges (NPR).....	23
Table 19 : List of Plants in the Project Area.....	24
Table 20 : Mammals in the Project Area.....	26
Table 21 : List of Birds in the Project Area.....	26
Table 22 : List of Reptiles and Amphibians Found in the Project Area.....	27
Table 23 : List of Fishes Found in the Project Area.....	27
Table 24 : Salient features of the project.....	28
Table 25 : Criteria for requirement of IEE and/or EIA for Drinking water supply Projects.....	32
Table 26 : Proposed Work Schedule.....	38

List of Figures

Figure 1 : Schematic Diagram of Sub-System-1.....	5
Figure 2 : Schematic Diagram of Sub-System-2 and 3.....	6
Figure 3 : Proposed service area.....	12
Figure 4 : Existing and Proposed service area coverage.....	13

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

v 

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

1. NAME AND ADDRESS OF THE PROPONENT

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

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E-mail: info@stwssp.gov.np

Website: www.stwssp.gov.np

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

2. BACKGROUND AND DESCRIPTION OF THE PROJECT

2.1 Project Background

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

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

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

Both the Nepal 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 are 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 biophysical, socio-economic and cultural environment of the project area,
- Recommend practical and site specific environmental mitigation and enhancement measures prepare and implement environmental monitoring plan for the project,
- Provide information on the general environmental setting of the Charikot Town area as baseline data. Make sure that IEE is sufficient for the proposed water supply project.

2.3 Description of the Project

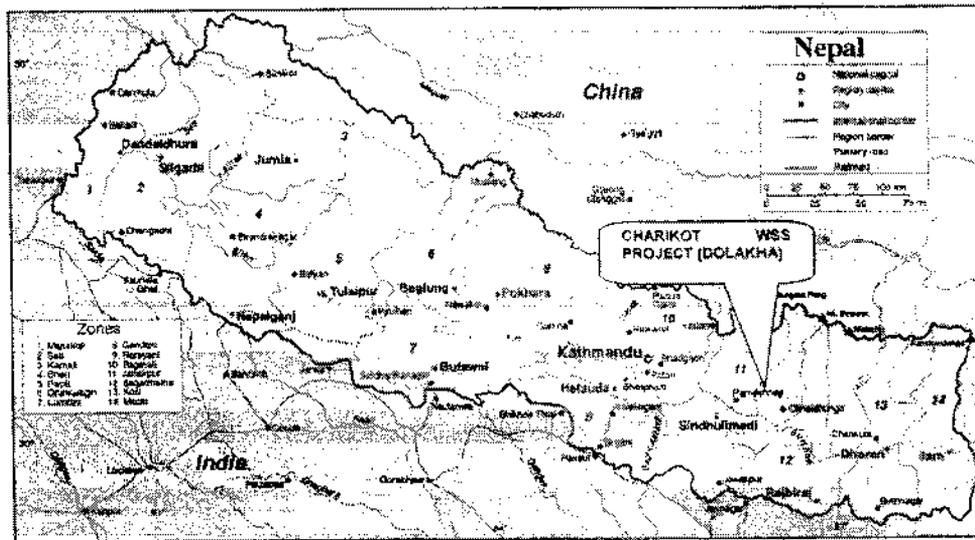
2.3.1 Location and Accessibility of the Project Area

The Project is located in Bhimeshwor Municipality, which is situated in Dolakha district in Janakpur Zone of the Eastern Development Region of Nepal. It lies between 270 37' 58" N to 270 44' 42" N latitude to 850 05' 12" E to 850 59' 31" E longitude. The municipality is in a hilly region with an altitude ranging between 950 to 2550 m above mean sea level with an average altitude of 1554 meters.

The Charikot VDC is bounded by Nandu VDC in the east, Borich VDC in the west, Suspa Kashemawoti VDC in the north and Phasku VDC in the south.

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

The Lamosanghu-Jiri road passes through the Bhimeshwor Municipality. Lamosanghu is located on the Arniko Highway (also referred as Kodari Rajmarga). The project area is approximately 139 km from Kathmandu. Regular local and express bus services are available from Kathmandu.



The project area is in a hilly region. The Municipality has a subtropical to a temperate climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of about 1710 mm.

Table 1 : Salient Features of the Project

SN.	Items	Description
1	Name of Project	Charikot Town Water Supply and Sanitation Project
2	Type	Gravity
3	Study Level	Detailed Engineering Design
4	Location Area	
	Region	Central Development Region
	Zone	Janakpur
	District	Dokha
	VDC/Municipality	Bhimeshwor Municipality
	Ward	Complete area of Ward No. 1 to 10 and partial area of ward No. 12 and 13
5	Available Facilities	
	Road	On the Lamosanghu- Jiri Highway
	Supply Water System	WUSCs
	Electricity	Available
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
6	Social Status	
	Present HHs Numbers (2016)	3842

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

SN.	Items	Description
	Present Population (2016)	21,909
	Base Year Population (2018)	22,756
	Design Year Population (2035)	34,610
	Average HHS size	5.7
	Weighted Growth Rate % (WGR)	2.1
	Projected HHs in Design Year (based on WGR)	- 6070
7	Water Demand (MLD)	
	Base Year (2018)	2.878
	Design Year (2032)	4.378
8	Source Characteristics	
	Source Name	Apart of Existing small source, Charawati River and its tributaries are main sources
	Source Type	Perennial River
	Source Location	Within the Municipality
8	Type of Structures	
	Proposed Intakes	10 Nos with rehabilitation of 5 Nos intake
	Water treatment plant	Total Capacity for 51.3 lps, in 5 location including one set with 6.6 lps capacity
	Ground Reservoir (No and Capacity in CUM)	2N-40 cum + 1E-250 cum + 3N-250 cum + 3N-150 cum
	Valve Chamber (Bricks/PCC)	70/25
	Office Cum GH (O1)/Guard House (G1) / Small Guard House (G2) /Dosing House (DS)	1-O1 / 3-G1 / 3-G2 / 9- DPH
	Household Connection	3,842
	Fire Hydrant	14
	Total Length of pipe in transmission and Bulk	44,674 m (with 1351 m of BDS)
	Items	Description
	Distribution	
	Total Length of pipe in Distribution	143,321 m
	Total Cost of WS Component (Inclusive of all) NRs	893,892,356.20
	Cost Sharing Arrangement	
	GON Component (75 %)	670,419,257.15
	TDF Loan (25 %)	223,473,089.05
	WUSC's Commitment for O&M as upfront (Cash)	17,877,847.12
	Tariff	
	Up to 6 cum/monthly (NRs)	210
	7 to 10 cum/monthly (NRs)	53
	11 to 20 cum/monthly (NRs)	79
	EIRR (Base case) %	31.05
	Environment	
	ADB Category	B, Only IEE necessary
	IEE finding	No significant adverse impact.
	Per Capita Cost for WS component	
	Per Capita Cost (for base year pop.)	39,283
	Per Capita Cost (for design year pop.)	25,828

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

2.4 Sub-project Components

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

2.4.1 Intake

Altogether there are ten intakes. The first sub-system, SS-1 or OLD system comprise six numbers of intake and other two sub-systems, SS-2 and SS-3, each comprises of two stream intake.

Out of these six intakes in the old system, two are spring intake, and four are stream intakes. As they are drawing water from these sources in the past with a cumulative safe yield of 11 lps, the safe yield of the transmission system of this sub- system has been adopted as 10.6 lps. Collected water from two streams will be collected at collection chamber. This are with a cluster of intakes are in the range of 2669 m to 2964 m.

Two stream intake (TYP-4) have been proposed at Hattichahara for Sub-system 2 (SS-2). One intake is at the main Charnawati river, and another one is from its tributaries which is about 300m from the Charnawati off- take. Each branch of rivers has safe yield of more than 20 lps. As the bed is of hard rock like as stilling basin in this waterfall area, Bottom Rack intake have been proposed in both of these rivers. A gravel trap at the end the bottom rack has been provided to trap the heavy sediment which enters from the bottom rack and rolled gallery. The gravel trap shall occasionally be cleaned by manual means. A filter box (intake) with perforated pipes covered by filter material is proposed after the gravel trap. Collected water from two streams will be collected at collection chamber. In totality cumulative discharge of about 31 lps have been proposed. Relative Level (RL) of these intakes are around 2318 m msl.

As the main course of Charnawati river flows in very steep gradient at intake area of SS-3 Sub-system, temporary type of weir by Rip-Rap has been recommended. A single orifice type intake with minimal sill height has been provided to divert river water to intake filter chamber in the main river. As rigid structure like concrete or masonry weir is not found suitable for the river of mid hill with wider river width. A temporary weir formed by heaping of Rip-Rap for 0.5 to 1 m high across 20m wide river has been provided for the diversion structure of this system. Moreover, such flexible structure is easy for operation and maintenance. A single orifice type of intake has been provided to capture the design flow even during the lean season. To make simple design and simple operation, no gates and scour sluice at intake are provided. To control heavy discharge in the canal during flood time in the river, a control orifice is provided immediately after the gravel trap.

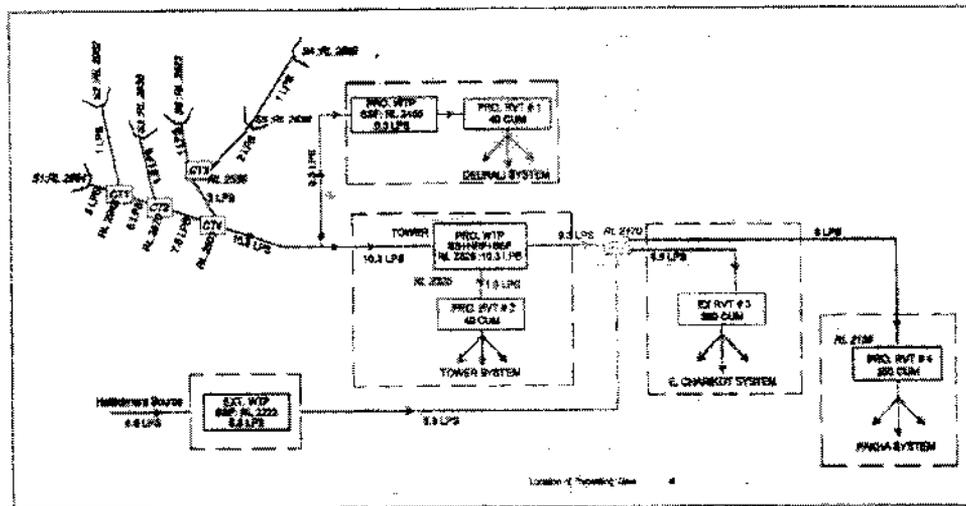


Figure 1 : Schematic Diagram of Sub-System-1

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Similarly, another simple stream intake (TYP 2) has been proposed at the tail water stream of the Ghatta in Sub-system (SS-3). This place is close to existing Ghatta and very close to Lamosangu - Jiri Road. Both of these intakes are on the tributaries of Charnawati. This tributary have safe yield of 10 lps. Simple off-take type of intakes have been proposed. In totality cumulative discharge of 11 lps have been proposed from this two branch. Relative Level (RL) of these intakes are around 1910 m msl.

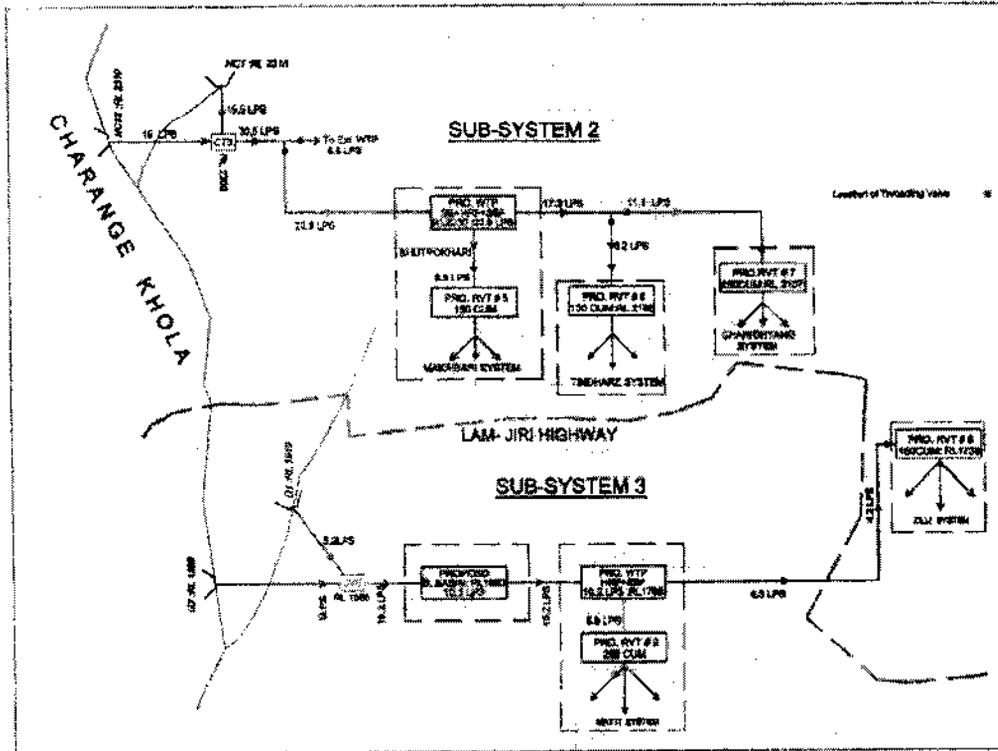


Figure 2 : Schematic Diagram of Sub-System-2 and 3

2.4.2 Transmission Main

There are three different transmissions for different sub-system. The total length of transmission main of Old System (SS-1) is about 12.665 km. This Transmission System transfer water to WTP-2 of SS-2 at Tower area. As the pipe used in existing transmission line is of sub-standard regarding pressure rating, it is not recommended to incorporate in the proposed transmission system.

The transmission length of the Hattichahara Transmission system (SS-2) is about 9.468 km. The valley crossing and pipeline along river gorge in steep terrain are the main reason to provide Di pipe. In one stretch (about a 1500m wide) of transmission line at Valley the pressure on this transmission line exceed

160 m and below 250m. Therefore, a higher PN rating fittings including flanged pipe has been recommended.

Similarly, a transmission line of Ghatta Transmission system (SS-3) is about 13.305 Km.

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

Table 2 : Details of Transmission Pipes Sub-system wise

Sub-System	Length (m)	Pipes Details
Existing System	12685	PE (50-140mm)
Hattichahara System	9468	DI(150-200mm)-PE(125-200mm)
Ghatta System	13305	PE(110-180mm)

2.4.3 Thrust Blocks, Saddle Blocks and Thrust Beam

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 30 kg/sq cm and 20 kg/sq cm for transmission and distribution line, respectively.

Similarly, Thrust Beam and Saddle Blocks are proposed for DI Pipes laid up in the sloppy area and unburied portion. All saddle block are proposed to be anchored with concrete at the center of each pipe to prevent movement. This type of support in the initial stretches of Hattichahara Transmission system. 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.

A special thrust block and beams for 25 PN rating has been designed and recommended in 1500 m long stretches of the valley crossing in Hattichahara Transmission system (SS-2).

2.4.4 River and Stream Crossing

There is a number of a river crossing in all three transmission system. There are two major crossing, one is in SS-1, and another is in SS-2. MS truss Pipe Crossing for a span of 25 m and span of 20 m have been proposed in the Transmission line of SS-2 and SS-3, respectively. These truss crossings are triangular in shape comprising of tuber Mild Steel sections and braced by welded tubular sections to form composite light section which is economical than the traditional angle and channel sections.

A simple crossing by providing SP-4 type concrete Saddle Blocks are recommended for the small crossing for DI pipes. These type of crossing are used only when the span of crossing is less than 6 m. There are about five numbers of this type of crossings in the all three transmission system. In the case of crossing near existing bridge and culvert, provision has been made for pipe clamps.

2.4.5 Water Treatment Plant

The Charikot water supply system will have five water treatment plants (WTPs). As the DMA-1 (Deurali System) is drawing water from the existing sources, a small WTP-1 comprises of the only slow sand filter (SSF) with a filtration rate of 0.25 m/hour has been proposed. This service area is at a higher elevation than the proposed big water treatment plant WTP-2 at Tower. This Deurali area is introduced during detail engineering design, and this area is presently served directly by the existing Charikot transmission system. Therefore separate WTP has been proposed for this SS-1. The capacity of the SSF is 0.3 lps. Two circular RCC unit of 1.8 m diameter and height of 3.4 m of SSF has been proposed.

Excluding one separate slow sand filter in WTP-1 for DMA-1, the Charikot water supply system will have major 4 number of water treatment plants.

Out of 4 major water treatment plants, one water treatment plants is existing treatment plant referred as WTP-E, which will be rehabilitated to improve its performance. The design capacity of existing WTP worked out to be 6.6 lps. As the elevation allows for the Hattichahara Transmission System (SS-2), discharge of 6.6 lps has been diverted from this Transmission System. This WTP will be referred as WTP-E from now on. The elevation of this area is about 2222 m.

Proposed Water treatment plant near tower referred as WTP-2 for Old transmission system (SS-1) has been proposed at elevated area to treat 10.3 lps water. This location has been identified as a command location for the reservoir to serve elevated settlement along old transmission line which are presently getting water from the transmission mains. Elevation of this WTP area is at about 2325 m.

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

Similarly, third water treatment plant has been proposed for the partly treatment of (23.9 lps) discharge from Hattichahara Transmission system ((SS-2). It is situated at 2220 m and referred as WTP-3.

The fourth water treatment plant (WTP-4) has been proposed for Ghatta Transmission system to treat 10.2 lps water. The settling basin has been proposed near the intake and Horizontal Roughing filters and Slow sand filter in a different area.

Plain sedimentation has been provided as a pre-treatment unit in all main proposed WTP. Where settling process of coarse and heavy suspended particles such as sand, silt, etc. will settle through the force of gravity. In every setting tank retention period is more than 4 hours.

All setting basin are rectangular settling basin with a longitudinal flow. A Setting basin with two identical chambers of the size of 2.6 m x 9 m has been adopted for 10.3 lps with a design load of 0.8 cum/sq. m /hour. In case of 23.9 lps design discharge, the two identical chamber of tentative size 4 m x 14 m has been adopted with same design load.

Horizontal roughing filters have been proposed in every treatment plant. The filtration rate of 1.8 cum/sq.m/hr has been adopted for design. Inlet and outlet chambers each of 90 cm wide has been provided in the unit. Each unit comprises of three chambers for fill filter material in graduation fashion (coarse to fine).

The roughing filter has been designed for a discharge capacity of 10.3 lps and 23.9 lps. For 10.3 lps capacity, the number of units proposed is 4. The size of each unit is 5m x 7m (3m+2m+2m). Similarly, eight unit each of 5m x 7m (3m+2m+2m) has been provided for design discharge of 23.9 lps.

Slow Sand Filter as main filtration unit has been proposed in every major treatment plant. The filtration rate of 0.2 cum/sq.m/hr has been adopted for design. All SSF will have a depth of 2.8 m including free board of 50 cm. Three chambers each 6 m x 12 m has been proposed to filter design discharge of 10.2 to 11 lps capacity as a unit. Similarly, the same size of two units has been proposed to filter design discharge of 23.9 lps.

Table 3 : Water Treatment Plant in Various Sub-systems

Description	WTP-1(P)	WTP-E (Existing)	WTP-2 (Proposed)	WTP-3 (Proposed)	WTP-4 (Proposed)
T. Sub-system	SS-1 (Old)	SS-2 (Hattichahara)	SS-1 (Old)	SS-2 (Hattichahara)	SS-3 (Ghatta)
Design Discharge	0.3 lps	6.6 lps	10.3 lps	23.9 lps	10.2 lps
Units	SSF	SB+HRF+SSF	SB+HRF+SSF	SB+HRF+SSF	SB+HRF+SSF

Detailed calculations about the numbers, size, and shapes of various units have been annexed in Appendices Volume.

The bleaching powder has been proposed as disinfection agent for disinfection of water. The chlorinators of appropriate capacity have been proposed for chlorination of filtered water.

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

2.4.6 Service Reservoir

The cumulative capacity of nine service reservoir provided in the Charikot water supply subproject is about 1,530. The reservoir sizing for all sub-component has been carried out and shown calculation in Appendix. A minimum of 40 cum capacity has been provided for all reservoir. A existing tank of 250 cum capacity has been incorporated from the existing system.

2.4.7 Bulk Distribution Mains

As the service area is very scattered and stretched in 15 to 20 km with high elevation difference within the service area (in the range of 1000 m), the proposed concept of Bulk Distribution has been proposed. This has been done to reduce inequality of pressure in HHs connection within the service area so that the household at high elevation and tail end of the service area will get equal service level.

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

All of the storage reservoirs of the Sub-system will get required water from corresponding water treatment plants. The total cumulative length of BDS is about 8.382 km. The details of pipe used in BDS of different Subsystem has been presented below.

Table 4 : Details of Pipe used in BDS Sub-system wise

Sub-System	Length (m)	Pipes Details
Existing System	1287	PE (75-110mm)
Hattichahara System	5555	PE (125-140mm) GI(100mm)
Ghatta System	1540	PE (90mm)

2.4.8 Distribution Main

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 200 mm and 150 mm. To proper saddle arrangement at the household connection in distribution pipe, the minimum diameter of distribution pipe has been adopted as 50mm.

Table 5 : The total design length of pipes used in Distribution

A	PE PIPES of 10 Kg/Sq cm	Length (m)	B	PE PIPES of 6 Kg/Sq cm	Length (m)
	50 mm OD	81,956		75 mm OD	2,381
	63 mm OD	20,755		90 mm OD	6,677
	75 mm OD	3,303		110 mm OD	6,552
	90 mm OD	3,708		125 mm OD	996
	110 mm OD	3,382		140 mm OD	5,142
	125 mm OD	0		160 mm OD	870
	140 mm OD	2,500		Sub Total	22,618
	160 mm OD	111	C	GI Pipes	
	Sub Total	115,715		50 ND	4,160
D	DI Spigot-Socket Pipe			65 ND	72
	DI 150 ND	112		80 ND	0
	DI 200 ND	647		100 ND	37
	Sub Total	759		Sub Total	4,269
				Total	143,361

Three types of pipes have been used in the distribution network; Ductile Iron (DI), Galvanized Iron Pipe and PE pipes. However, the uses of GI pipes has been limited. The total pipe length of various diameter are given in the table above. The total pipe length of the proposed distribution system works out to 143.36 km.

2.4.9 House Connection

Three type of house connection has been envisaged in the project. There are about 192 number of house connection from DI pipes, about 2882 number of house connection from PE pipes and about 768 number of house connection from GI pipes. This will make the total household connection of 3,842 in the project area. Most of the connection will be private.

The house connection shall comprise of about 12 m pipe PE or GI Pipe (as per requirement) and 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 the case of tapping from GI pipes, the house connection pipe shall be medium class GI of 15 ND.

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

Tapping of household connection in PE pipe has been proposed from PE saddle with ferrule and in the case of DI pipe, DI saddle shall be used with ferrule without touching DI pipe by the ferrule. Tapping from GI pipes has been proposed from PE saddle with ferrule

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

2.4.10 Appurtenances

Line or Sectional Valves

Line or Sectional valves are gate valves used to isolate sections of a pipeline in an emergency or for maintenance and repair. It should be noted that gate valves are suitable for isolation of a pipeline in either "fully open" or "fully close" positions, but not for frequent open/close operation and flow regulation. All valves shall be with nominal pressure rating PN15 unless in special circumstances where higher pressure rating is required.

Pressure reducing valves

Pressure reducing valves (PRVs) are recommended to maintain a preset, reduced, generally constant outlet (downstream) pressure for a range of flow rates and inlet (upstream) pressure in the distribution system. The by-pass arrangement has been provided in PRV arrangements to maintain system during breakdown PRV and Maintenance of the valves. All PRV valves shall be with nominal pressure rating PN 15 unless in special circumstances where higher pressure rating is required.

Air (Release) Valves

Air valves will be installed at all high points of the pipeline, in sections which form a peak on the hydraulic gradient and on the downhill side of line valves.

Air valves shall be of combined type with a larger and smaller venting orifice which permits passage of large volumes of air for vacuum breaking and venting on starting up and closing down operation and a small venting cross section for the release of small volumes of air under full internal operation pressure. All air valves shall be Double Orifice Air Valves and shall be with nominal pressure rating PN 15 unless in special circumstances where higher pressure rating is required.

Washout valves

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

Flow meters

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

Fire Hydrant

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

Chambers

Two type of Chambers has been proposed in the project. A Chamber constructed by brick masonry wall has been provided in non-vehicular areas and rural area. In other vehicular carriageway and city area chambers constructed with RCC has been provided.

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The concrete chambers shall serve as housing, protection and convenient access to these pipe appurtenances. Inside the concrete chambers necessary concrete supports shall be provided for pipes and valves at appropriate locations.

Access to the concrete chamber will be given via lockable cast iron covers with frames. Manhole covers of heavy duty type have been recommended in these RCC chambers. Covers for manholes in paths may be proposed of medium duty type.

Office, Guard Quarter, Guard Room, Dosing House and Boundary Wall

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 a fringe area of town and rural area of the municipality.

A two bay two story building for office (OFF-1) is proposed at Charighyang Area. The building comprises of big meeting hall, water quality laboratory, administrative rooms, store for household meter and other small gadgets in addition to the guard room, kitchen and bathroom for a guard.

Three numbers of single story Guard House (GH-1) are proposed at three WTP locations (WTP-2, WTP-3, and WTP-4). The Guard House building comprises of residence facilities for a guard in addition to room for tools for repair and maintenance.

Similarly, four numbers of small Guard House (GH-3) are proposed at three reservoir locations. The Guard House comprises of two rooms. As the location are very nearby village, only guard room is proposed. Another room has been proposed as a tool room.

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 nine numbers of Dosing Pump House have been proposed.

As the system comprises of many RVTs and other structures to be protected and operated, different size of building structures and different type of boundary has been discussed with the WUSC and proposed in the project. The table below summarizes these in details.

Table 6 : Proposed Buildings and Boundary Type

Location	Component	Building	Boundary Type
Charighyang	Main Office	OFF-1	GI Chain link with BAW
Deurali	WTP-1+ RVT #1	DPH	Fencing by Barbed Wire
Tower	WTP-2+ RVT #2	GH-1 + DPH	GI Chain link with BAW
Bisuna	RVT-3 + RVT- #4+ Existing Office	2 nos of DPH	Exist
Bhutpokhari	WTP-3 + RVT- #5	GH-1 + DPH	GI Chain link with BAW
Tindhare	RVT # 6	GH-3 + DPH	GI Chain link with BAW
Simpani	RVT # 7	GH-3 + DPH	GI Chain link with BAW
Ghatta	SB of WTP-4		Fencing by Barbed Wire
Matti	WTP-2 (HRF+SSF) + RVT # 6	GH-1 + DPH	GI Chain link with BAW
Jilu	RVT # 7	GH-3 + DPH	GI Chain link with BAW
Various Locations	Intakes, IC, CC and BFTs		Fencing by Barbed Wire

2.4.11 DMA Establishment

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

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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 on 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.

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. To manage NRW in the proposed system, total system divided into 6 DMA according to the serving reservoir.

2.4.12 Proposed Service Area

The service area of the proposed project covers entire wards 1 to 10 & partial area of ward no. 12 & 13 of the Municipality except for ward no. 11.



Figure 3 - Proposed service area

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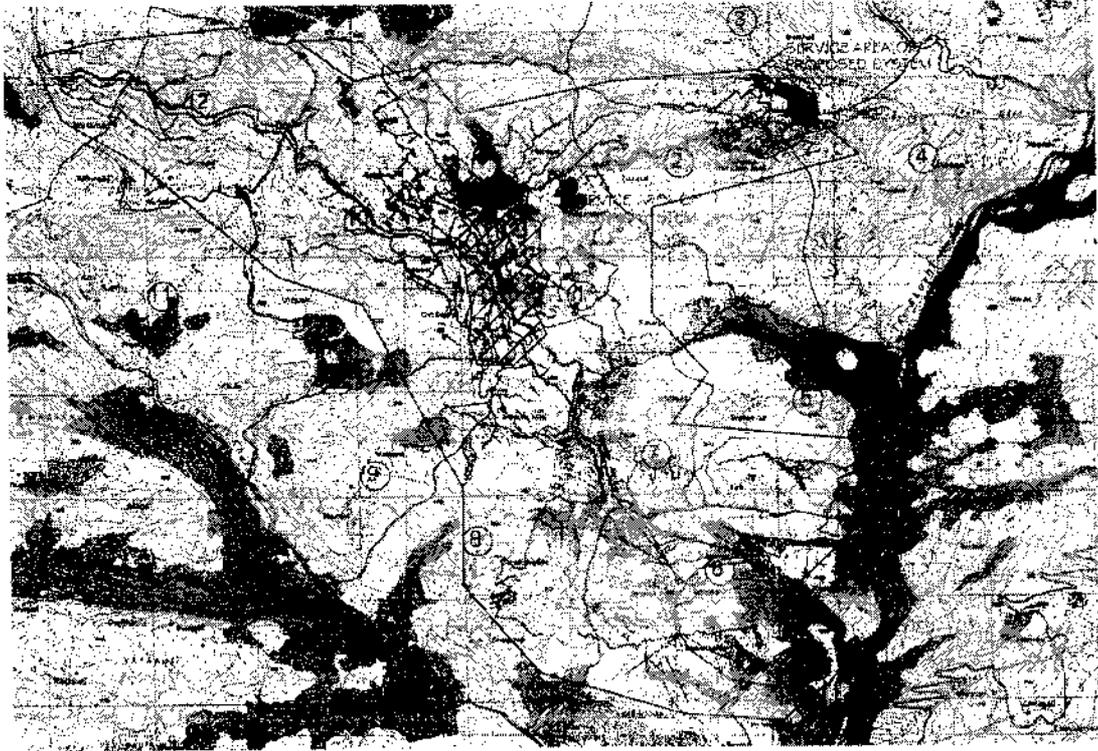


Figure 4 - Existing and Proposed service area coverage

2.5 Population and Demographic Characteristics

The total population of the Bhimeshwar Municipality as per the 2011 census was about 22,537 living in 6078 households. The average HHs size of the area has decreased from 4.46 in 2001 to 3.71 in 2011. The ward-wise population of the project area of the town according to the census, 2001 and 2011 has been presented below:

Table 7 : Population of the Concerned Wards of the Project Town

Ward	W. Area (Ha)	Census 2001			Census 2011			Growth Rate
		HHs	Pop	Densities (PPHA)	HHs	Pop	Densities (PPHA)	
1	395.12	662	3,036	7.68	1134	4,330	10.96	3.61
2	263.23	501	2,018	7.67	476	1,615	6.14	-2.20
3	474.22	238	947	2.00	242	978	2.06	0.32
4	494.10	384	1,707	3.45	266	978	1.98	-5.42
5	461.23	250	1,190	2.58	371	1,437	3.12	1.90
6	658.00	471	2,011	3.06	510	1,866	2.84	-0.75
7	132.00	147	671	5.08	273	1,011	7.66	4.18
8	592.00	140	721	1.22	355	1,276	2.16	5.87

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9	197.00	314	1,484	7.53	275	1,056	5.36	-3.35
10	527.00	854	3,559	6.75	1,312	4,626	8.78	2.66
11	500.00	382	1,927	3.85	338	1,212	2.42	-4.53
12	204.00	259	1,209	5.93	256	1,043	5.11	-1.47
13	921.00	307	1,436	1.56	268	1,109	1.20	-2.55
Total	5,818.90	4909	21,916	3.77	6,076	22,537	3.87	0.28

Source: CBS 2001 and 2011

Table 2-1 shows that the average HHs size of the area has decreased from 4.46 in 2001 to 3.71 in 2011. Ward 1 of the Municipality, old Charikot 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 21,909. Table 8 shows the coverage of population including beneficiaries' households in the project area.

Table 8 : Beneficiaries households

Ward	HHs	Population
1	937	6,214
2	211	938
3	72	303
4	68	393
5	220	1,056
6	344	1,570
7	305	1,408
8	241	1,043
9	32	136
10	843	5,984
12	287	1,607
13	282	1,257
Total	3842	21,909

Source: Socio-economic survey 2016

2.6 Existing Water Supply

There are several piped water supply systems within the project area. There are about 17 major systems operated by 17 different WUSCs. The details of each system with are shown in Table 2-3. And the comparative details of the existing and the proposed system are presented in Table 9, Table 10, and Table 11.

Table 9: Comparative details of the existing and the proposed system

Charikot WUSC BNP	Chothing WUSC BNP -10	Maidane WUSC BNP-10	Khole WUSC BNP-12	Taknagi WUSC BNP-10	Ramkot WUSC BNP-10	Gauri Swora Thapa Group BNP-10
Existing Systems						
Source (location)	Jhule Khola	Beesauna	Local spring	Tagnagi	Ramkot spring	Mulkharka
No. of Taps	60-65	40-50	20	60	75	95
No. x Cum of RVT	1	NA		No	No	3x10
Water Treatment Plant						
Yield						
Type	Surface	Surface	Surface	Surface	Surface	Surface
Proposed Systems						
Source (location)						
1. 4 Nos. Stream Intake						
2. 2 Nos. Spring Intake						
No. of						
	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP

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Taps													
No. x Cum of RVT	RVT 1-40 RVT2-40 RVT3-250 RVT4-250												
Water Treatm ent Plant	2 Nos. 1)Sedimentation Basin+ Horizontal Roughening Filter+ Slow Sand Filter, Reduced Level-2326m with 10.3 lps intake 2) Slow Sand Filter at Reduced Level of 2455m with 0.3 lps intake.												
Yield	10.6 lps												
Type	Surface												

Table 10 : Comparative details of the existing and the proposed system

	Purano Bazar WUSC BNP-1	Dolakha WUSC BNP 2 & 3	Hatti Chara Charighang Manedanda BNP	Jilu Bhatmase BNP 7	Upper Marti WUSC BNP 8	Middle Marti WUSC BNP 8	Junge Chanse WUSC BNP6	Jilu WUSC BNP 5&7	Khanepani WUSC(Dolakha)	Dolakha WUSC
Source (location)	Darfe ko Jungle Tundikhel	Gautam Tole,	Hattichara, Jhulekholo		Thulo Dharo, Sano& Thulo Pokhari	Banpale and Trishul Muhani	Chanse Muhani		Darfe Jungle	Teekhatat & Chakthali
No. of Taps	125	500	80	125	200	200	200	200	155 PVT. +35 P	110 PVT & 3 P
No. x Cum of	1x100	1x20, 2x50, & 1x90	1x200	3x10	1x10, 3x20 & 1-25				2x20, 1x50 & 1x90	1x20 & 1x40

Existing Systems

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RVT															
Yield															
Type	Surface														
Proposed Systems															
Source (location)	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP	The source is not used because it does not meet the quality standards envisioned by TSTWSSSP

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

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Table 11: New addition to the existing system

New addition to the existing system		
Source (location)	Subsystem 2 Two intakes i) Main Charnawati River (ii) One tributary of Charnawati River 300m from off-take	Subsystem 3 Two intakes i) Main Charnawati River downstream of subsystem 2 ii) One tributary of Charnawati
No. x Cum of RVT	1x150 1x150 1x250	1x250 1x250
Yield	15 lps 15.5 lps	5 lps 5.2 lps
Type	Surface	Surface

2.7 Coverage

The various WUSCs have been supplying water to concern service areas. As the Municipality does not have ground water potential, surface water has been tapped from different locations. Almost all 90% of the HHs in the Municipality has access to piped water. Majority (60.57%) households have private tap connections. Similarly, about 34% households are using water from public taps, and 4.40% households depend on Kuwas/springs for water supply.

2.8 Service Level and Consumption

All systems are intermittent for only a few hours of the day. All of the systems are surface water systems, and all of the systems are independent and isolated. However, due to the urbanization process in the core area and the vicinity of the Charikot Bazaar, a few systems overlap in some service areas.

2.9 Water Quality

The consumer or users get water virtually without any treatment in many systems. The socio-economic survey 2015 shows that the perception of water users about water quality is divided into good (21%), moderate (76 %) and bad (1 %) respectively.

Some of the major systems carry 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 parameters. The results of the tests are shown in Table 12. All parameters of water quality of sampled wells are within the permitted value of NDWQS.

Table 12: Result of water quality tests

S. N.	Parameters	Unit	Observed Value of Sample			NDWQS, Nepal
			Jhapre	Hattichahara	Odare	
1	pH at 26°C	-	7.0	7.4	7.7	6.5-8.5
2	Electrical Conductivity	µmhos/cm	31	162	272	1500
3	Turbidity	NTU	2.0	2.1	2.1	5(10)
4	Taste and Odor		N.O.	N.O.	N.O.	N.O.
5	Color	TCU	0.09	0.15	0.14	500
6	Total hardness as CaCO ₃	mg/l	20	80	124	5(15)
7	Total Dissolved Solid	mg/l	19	98	165	1000
8	Total Residual Chlorine	mg/l	<0.10	<0.10	<0.10	0.1-0.2
9	Chloride	mg/l	<0.50	<0.50	<0.50	250

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10	Ammonia	mg/l	0.45	0.46	0.47	1.5
11	Nitrate	mg/l	0.80	0.89	0.84	50
12	Aluminum	mg/l	<0.01	<0.01	0.02	0.2
13	Fluoride	mg/l	0.15	0.51	0.13	0.5-1.5
14	Sulfate	mg/l	4.2	9.7	12.4	250
15	Mercury	mg/l	<0.001	<0.001	<0.001	0.001
16	Calcium	mg/l	4.8	12.8	24	200
17	Iron	mg/l	0.21	<0.05	<0.05	0.30(3)
18	Manganese	mg/l	<0.05	<0.01	<0.01	0.2
19	Lead	mg/l	<0.01	<0.003	<0.003	0.01
20	Cadmium	mg/l	<0.003	<0.05	<0.05	0.003
21	Chromium	mg/l	<0.05	<0.05	<0.05	0.05
22	Copper	mg/l	<0.05	<0.02	<0.02	1
23	Zinc	mg/l	<0.02	<0.01	<0.01	3
24	Arsenic	mg/l	<0.01	<0.01	<0.01	0.05

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

2.10 Problems of Existing System

The existing system does not cover the whole area, is not able to meet the water demand and the supply is intermittent. The major problems of the existing system are presented below:

- The various WUSC have been supplying water to limited areas of Ward 1-13 except 11 only. Urbanization has been taking place in /or main adjoining areas;
- The existing systems are old, and the available water infrastructures are not sufficient to meet the current water demand. The supply is intermittent with supply up to 3 hrs on average in limited areas;
- The supplied water is not sufficient to meet the water demand of the service area. The consumers are largely dependent on other sources;
- In most systems water is supplied as it comes from the sources without treatment. Only, a few WUSCs carry out occasional disinfection with bleaching powder during the wet season.
- The newly formed integrated WUSC has not taken the rein of all different WUSCs. The former WUSCs assign technicians and other supporting office staff and office assistants, who operate the systems, apply bleaching powder, operate different valves, carry out maintenance of the systems including pipelines, road meters, etc. The current operation and maintenance service is poor, and involvement of human resources is not enough to operate the systems;
- The WUSC does not maintain a separate account in the operation of the water supply system making it difficult to conduct financial analyses;
- The WUSC does not have an inventory of the existing assets. The existing facilities are in need of repair/rehabilitation, but the operators are unable to carry them out due to limited financial resources.

2.11 Ethnicity and Caste

The survey revealed that Brahmins/Chhetris are the major caste groups of the project area comprising about 49% of the total households where the Janajatis comprise about 41%. Similarly, the Dalits and other caste groups (Mushalmans and Madheshis, etc.) are 10% and 1% respectively.

2.12 Land Use Pattern

The Municipality covers 58.89 Sq. Km of land. Out of that, most of the land (53%) is covered by forest and agriculture (40%). More than 50% of the land in the municipality is steeper than 30°. The detailed land use pattern of Charikot Municipality is shown in Table 13.

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Table 13 : Land-use pattern

S. N.	Land use	Area (km ²)	Area (%)
1	Agriculture	23.06	39.63
2	Forest	30.56	52.52
3	Residential area	2.75	4.72
4	Others	1.82	3.13
Total		58.19	100

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

2.13 Settlement Pattern

The town is located in a hilly area with heterogeneous ethnic composition. The Sat Dobato is the heart of the Municipality which is the entry point to the main market. Most of the government and non-governmental offices are located in ward no 9 and 10 which is the most densely populated of the service area. The settlement pattern in the other wards is scattered.

2.14 Education and Health

Education

The institutional data shows that twelve educational institutions including two Multiple Campuses one Nursing campus, eight higher secondary level schools as well as one child home were recorded in the service area with 5363 people including students, staff, and teachers. Likewise, about 14 governmental, non- governmental and financial institutions exist in the area and provide service to the community.

The socio-economic survey of 2016 AD shows that the overall literacy rate is 90.73 %. About 9.27 % are still illiterate, and only 6.77 % have graduated.

Health

Medical facilities for diagnosis and treatments are available in the service area. There are 7 medical institutions including 3 hospitals, 4 health posts and polyclinics with 49 beds.

2.15 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 4.87% (889) suffered diseases from diarrhea whereas 4% (735) suffered from dysentery. Similarly, about 2.58% (472) were suffered from other water- borne diseases (such as skin, stomach pain, fever), etc. (Table 14)

Table 14 : Reported Water Borne and Communicable Diseases in 2015

Disease	Children	Female	Male	Total	%
Diarrhea	367	223	299	889	4.87
Dysentery	290	234	211	735	4.02
Other Water Bourne disease	213	124	135	472	2.58
Total	870	581	645	2096	11.47

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

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2.16 Economic Activities

The economy of the Municipality is extensively agrarian although most of the households in the project area depend on more than one occupation. During the household surveys of the 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 36% are engaged in agriculture, 26.68% are service holders, about 24% depend on the business, about 7% are engaged in foreign employment, 3% are labor, and 0.10 % are dependents.

There are more than 10 hotels/lodges with 104 beds and are managed by 14 staff in the project area. At the moment, there are 4 industries and businesses in Charikot. The type of industries operating in the Municipality is rice mills, cotton, grill, and carpet, etc.

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

There are 12 educational institutions and 18 government/NGO offices. The major government offices are district based offices and the Municipality office.

2.17 Poverty Conditions

The survey revealed that the main sources of household income of the service area are agriculture, service, remittance and wage labor, respectively. Among the total households, 11.37% have a monthly income of less than Rs. 7500 which is considered as a poor household. About 12.05% of the households have a monthly income ranging from Rs. 7501 to Rs. 10875. Similarly, 38.44% of the households have an income ranging from Rs. 10,875 to Rs. 20,000, 32.3% of households have an income ranging from Rs. 20001 to Rs. 50,000 and about 5.83% of the households have income ranging is above than Rs. 50,000 a month. Similarly, the survey shows that about 24.7% of the total populations live below the poverty level (Table 15).

Table 15 : Distribution of mean monthly household income

Income Range	Ward												Grand Total	%
	1	2	3	4	5	6	7	8	9	10	12	13		
<Rs.7500	47	82	18	23	16	81	31	57	0	48	14	20	437	11.37
Rs.7501-Rs.10875	40	34	18	15	24	95	54	62	0	73	16	32	463	12.05
Rs. 10876-Rs.20000	319	50	18	24	73	103	123	83	11	342	164	167	1477	38.44
Rs.20001-Rs.50000	468	25	13	5	95	56	79	32	21	304	84	59	1241	32.30
>Rs.50000	63	20	5	1	12	9	18	7	0	76	9	4	224	5.83
Grand Total	937	211	72	68	220	344	305	241	32	843	287	282	3842	100

Source: Socio-economic survey 2016

2.18 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 4% HHs still practice open defecation in the project area and the majority of HHs i.e. 58 % have either water-sealed private toilets or improved pit latrines. 38% existing pit latrines have to be improved or modified (Table 16).

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

201-300	4	0	0	0	0	0	0	3	0	0	7	3.65
151-200	17	9	8	4	0	0	0	13	26	3	80	41.67
Total	30	9	15	16	17	10	1	57	28	9	192	100.00

Source: Socio-economic survey, 2015

Poverty Alleviation Aspects

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

2.20 Need for the Sanitation Component

Charikot Municipality has not been declared as Open Defecation Free (ODF) area. About 4% of the HHs does not have toilets and the percentage of a pit latrine is 38.37 which need to be upgraded or renovated. Institutional toilets & public toilets will be dealt within the sanitation components. These facilities will also inculcate the habit of toilet use among students and the general public.

Proper and effective management of storm water drainage has become the most important problem of the Charikot Town. As urbanization increases, the frequency of localizing pondage 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 a Master Plan for the Municipality area in close consultation and collaboration with the newly formed Municipal Office.

Since significant work and procedures are necessary for the development of septage treatment, it will be dealt separately, and an additional separate contract package would be developed for implementation. Extensive work is required in managing septage collection, conveyance, treatment, and disposal. Similarly, a solid waste management Master Plan will be prepared and submitted in the waste management master plan in totality. All sanitation activities could be implemented in the second phase.

2.21 Hydrology and Climate

The district has a subtropical to a temperate climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of 1710 mm. The average maximum & minimum temperature of the district is 19° and 8° Celsius respectively.

2.22 Flora and Fauna

The common species of plants within and around the proposed project area are shown in Table 19.

Table 19 : List of Plants in the Project Area

S.No.	Scientific Name	Local Name	Family
1	<i>Vepris bilocularis</i>	Ainseu	Rosaceae
2	<i>Emblica officinalis</i>	Amala	Euphorbiaceae
3	<i>Pteris ovalifolia</i>	Angeri	Ericaceae
4	<i>Cedrealla toona</i>	Tuni	Meliaceae
5	<i>Lagerstroemia indica</i>	Ashare phul	Lythraceae
6	<i>Adhatoda vasica</i>	Asuro	Acanthaceae
7	<i>Melia azedarach</i>	Bakaino	Meliaceae
8	<i>Ficus bengalensis</i>	Bar	Moraceae
9	<i>Terminalia bellirica</i>	Barro	Combretaceae
10	<i>Aegle marmelos</i>	Bel	Rutaceae
11	<i>Rhus wallichii</i>	Bhalayo	Anacardiaceae
12	<i>Populus ciliate</i>	Bhote Pipal	Salicaceae
13	<i>Lagerstroemia Parviflora</i>	Bot Dhayaro	Lythraceae
14	<i>Schima wallichii</i>	Chilaune	Theaceae

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

15	<i>Bassia butyracea</i>	Chyari	Sapotaceae
16	<i>Berberis aristata</i>	Chutro	Berberidaceae
17	<i>Debregeasia salicifolia</i>	Daar	Urticaceae
18	<i>Garruga pinnata</i>	Dabdabe	Burseraceae
19	<i>Mussaenda macrophylla</i>	Dhobeni	Rubiaceae
20	<i>Colebrookea oppositifolia</i>	Dhursul	Labiatae
21	<i>Dioscorea bulbifera</i> L.	Githa	Dioscoreaceae
22	<i>Callicarpa macrophylla</i>	Guyanfo	Verbenaceae
23	<i>Lannea coromandelica</i>	Halluade	Anacardiaceae
24	<i>Terminalia chebula</i>	Harro	Combretaceae
25	<i>Syzygium cumini</i>	Jamun	Myrtaceae
26	<i>Phoebe lanceolata</i>	Jhankri syaula	Lauraceae
27	<i>Ficus lacor</i>	Kabro	Moraceae
28	<i>Anthocephalus chinensis</i>	Kadam	Rubiaceae
29	<i>Myrica esculenta</i>	Kafal	
30	<i>Adina cordifolia</i>	Karam	Rubiaceae
31	<i>Acacia catechu</i> *	Khayar	
32	<i>Ficus semicordata</i>	Khanayo	Moraceae
33	<i>Sapium insigne</i>	Khirro	Euphorbiaceae
34	<i>Morus alba</i>	Kimbu	Moraceae
35	<i>Litsea monopelata</i>	Kutmiro	Lauraceae
36	<i>Duabanga grandiflora</i>	Lampate	Lythraceae
37	<i>Engelhardtia spicata</i>	Mauwa	Juglandaceae
38	<i>Erythrina stricta</i>	Phaledo	Leguminosae
39	<i>Ficus religiosa</i>	Pipal	Moraceae
40	<i>Pinus roxburghii</i>	Sallo	Coniferae
41	<i>Terminalia tomentosa</i>	Saj	
42	<i>Bombax ceiba</i>	Simal	Bombacaceae
43	<i>Vitex negundo</i>	Simali	Verbenaceae
44	<i>Mallotus philippensis</i>	Siudure	Euphorbiaceae
45	<i>Albizia chinensis</i>	Siris	Leguminosae
46	<i>Dalbergia sisoo</i>	Sisoo	
47	<i>Bauhinia variegata</i>	Tanki	Leguminosae
48	<i>Alnus nepalensis</i>	Urtis	Betulaceae

Source: IEE Field VisiSource: 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 20.

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

Table 20 : Mammals in the Project Area

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

Source: IEE Field Visit Survey, 2016

Some of the birds reported in the forest areas are listed in Table: 21.

Table 21 : List of Birds in the Project Area

S.No.	Common Names	Scientific Names	Status of occurrence		
			Common	Sparse	Rare
1	Asain Koel	<i>Eudynamis scolopacea</i>		√	
2	Barn owl	<i>Tyto alba</i>		√	
3	Battai			√	
4	Bhangera	<i>Passer domesticus</i>	√		
5	Bhudi Phor	<i>Ciconia espiscopopus</i>		√	
6	Bhyakur	<i>Pellorneum ruticepa</i>			
7	Blue-throated Barbet	<i>Megalaima australis</i>	√		
8	Chil	<i>Actinactes malayensis</i>		√	
9	Chyakhura	<i>Arborophila torqueola</i>		√	
10	Common Myna	<i>Acridotheres tristis</i>	√		
11	Dangre		√		
12	Dhukur	<i>Streptopelia sp</i>	√		
13	Huchil	<i>Bubo bubo</i>		√	
14	Indian Cuckoo	<i>Cuculus micropterus</i>	√		
15	Jureli	<i>Pycnonotus cafer</i>		√	
16	Kag	<i>Crocyus macrorhynchos</i>	√		
17	Kalij	<i>Lophura teucomelano</i>	√		
18	Koili	<i>Cuculus micropterus</i>	√		
19	Lampuchure	<i>Caprimulgus macrurus</i>		√	
20	Lato Koshero	<i>Bubo nepalensis</i>			√
21	Nyauli	<i>Megalaima spexies</i>		√	
22	Suga	<i>Psittacula cyanocephala</i>	√		

Source: IEE Field Visit Survey, 2016

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

The commonly found reptiles and amphibians observed in the project area are presented in Table 22.

Table 22 : List of Reptiles and Amphibians Found in the Project Area

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

Source: IEE Field Visit Survey, 2016

Similarly, common fishes found in the project area are given in Table 23.

Table 23 : List of Fishes Found in the Project Area

SN	Scientific Name	Local Name	Migratory species	Economic Importance
1	<i>Basilus Vagra</i>	Faketa	R	Food
2	<i>Garra sp</i>	Buduna	R	Food
3	<i>Glyptothorax sp</i>	Kabra	R	Food
4	<i>Heteropneustes fossilis</i>	Singhi	R	Food
5	<i>Neotissococheilus hexagonolepis</i>	Katle	MM	Food
6	<i>Noemacheilus sp</i>	Gadela	R	Food
7	<i>Psilorhynchoides pseudocheneis</i>	Tite (Endemic)	R	Medicinal
8	<i>Schizothoracichthys sp</i>	Asala	R to MM	Food
9	<i>Channa gachua</i>	Hile	R	Food
10	<i>Tor tor</i>	Sabar	R to MM	Food

Source: IEE Field Visit Survey, 2016

2.23 Protected Areas

No national parks and protected areas exist in the project area. No forest will get affected by the proposed project intervention.

2.24 Community Forest

The community forests within and nearby of the proposed project are Chandrawati Community Forest, Suppa Community Forest, Gaurasoara Community Forest and Kharthali Community Forest.

2.25 Infrastructure Facilities

2.25.1 Transportation, Electricity, and Communication

Charikot is approximately 139 km from the Capital of Nepal, Kathmandu. Charikot, the project town is linked by the Lambsanghu - Jiri road of Arniko Highway also referred as Kodari Rajmarg. Regular local and express bus services are available from the Kathmandu.

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

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.

2.25.2 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.

2.25.3 Other institutions

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

2.26 Quality of Life Values

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

2.27 Cultural and religious sites

Dolakha Bhimeshwor Temple and Kalinchowk Bhagwati Temple are two famous cultural and religious sites of the project area.

2.28 Resettlement, Relocation and Compensation Issues

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

2.29 Salient Features

Table 24 : Salient features of the project

SN.	Items	Description
1	Name of Project	Charikot Town Water Supply and Sanitation Project
2	Type	Gravity
3	Study Level	Feasibility
4	Location Area	
	Region	Central Development Region
	Zone	Janakpur
	District	Dolakha
	VDC/Municipality	Bhimeshwor Municipality
	Ward	Complete area of Ward No. 1 to 10 and partial area of ward No. 12 and 13
5	Available Facilities	
	Road	On the Lamoshanghu- Jiri Highway
	Supply Water System	WUSCs
	Electricity	Available
	Communication	Available
	Health Services	Available
	Banking Facilities	Available
6	Source Characteristics	
	Source Name	Apart Existing small source, Charnawati River and its tributaries are main sources
	Source Type	Perennial River
	Source Location	Within Service Area

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ToR for initial Environmental Examination of Charikot Water Supply and Sanitation Project

SN.	Items	Description
7	Type of Structures	
	Proposed intakes	10 Nos with rehabilitation of 5 Nos spring intake
	Water treatment plant	Total Capacity for 53 lps, 4-set (1 set comprises of Setting Basin + Horizontal Roughing Filter + Slow Sand Filter), including one set with 7.5 lps capacity
	Ground Reservoir (No and Capacity in CUM)	1N-40 cum + 1E-200 cum + 1N-400 cum + 3N-250 cum
	Valve Chamber (Bricks/RCC)	70/25
	Office Cum GH (O1) /Guard House (G1) / Small Guard House (G2) /Dosing House (DS)	1-O1 / 2-G1 / 1-G2 / 6- DS
	Household Connection	3,842
	Fire Hydrant	12
	Total Length of pipe in transmission and Bulk Distribution	45,071 m (with 6895 m of BDS)
	Total Length of pipe in Distribution	109,055 m
8	Social Status	
	Present Population (2016)	21,909
	Base Year Population (2018)	22,755
	Design Year Population (2038)	34,610
	Average HHS size	5.7
	Weighted Growth Rate %	2.1
9	Total Cost of WS Component (Inclusive of all) NRs.	870,354,459.26
10	Cost Sharing Arrangement	
	GON Component (75 %)	652,765,844.45
	TDF Loan (25 %)	217,588,614.82
11	WUSC's Commitment for O&M as upfront (Cash)	17,407,089.19
12	Tariff	
	Up to 6 cum/monthly (NRs)	210
	7 to 10 cum/monthly (NRs)	53
	11 to 20 cum/monthly (NRs)	79
13	Economic Analysis	
	EIRR (Base case) %	31.05
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.)	38,249
	Per Capita Cost (for design year pop.)	25,147

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

2.30 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

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

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 1 to 9 and partial areas of wards 10 and 11 of Charikot 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 socioeconomic impacts will be less.

Conceptual Design of the Sub-project

The Charikot sub-project has been conceptualized as a gravity surface water system. The overall concept has been developed with a distribution system comprising a bulk water system (BDS) and household distribution system (DS). The service area will be divided by difference in elevation and proximity. The service area is very scattered and stretches 15 to 20 km with very high elevation differences within the service area (in the range of 1000 m). The concept of BDS has been conceptualized to reduce inequality of pressure in HH 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 ten intakes. The first sub-system, SS-1 or OLD system comprises of six intakes and the other two sub-systems SS-2 and SS-3 comprises of two stream intakes each.

The old sub-system comprises of six intakes. Out of these six intakes, two are spring intakes and four are stream intakes.

Two stream intakes have been proposed at Hattichahara for Sub-system 2 (SS-2). One intake is from the main Charnawati river, and the other one is from its tributary which is about 300m from the Charnawati intake. This tributary has a safe yield of more than 20 lps. A trench with perforated pipes covered by filter material is proposed. Collected water from the two streams will be collected in a collection chamber. A total cumulative discharge of 31 lps has been proposed. The Relative Level (RL) of these intakes is about 2318 m masl.

Similarly, two stream intakes have been proposed for Ghatta Sub-system (SS-3) near the Ghatta area. This is close to the existing Ghatta and very close to Lamosangu - Jiri Road. Both of these intakes are on the tributaries of Charnawati. Each of these tributaries has a safe yield of 11 lps. A simple off-take type of intake has been proposed. A cumulative discharge of 11 lps has been proposed. The Relative Level (RL) of these intakes are about 1910 m masl.

Transmission Main

There are three different transmission system. The total length of the transmission main of the Old System (SS-1) is about 12.272 km. This transfers water to WTP of SS-2 at the tower area. As the pipe used in the existing transmission line is substandard regarding pressure rating, it is not recommended to incorporate it in the proposed transmission system.

The transmission length of the Hattichahara Transmission system (SS-2) is about 9.278 km. The transmission comprises a combination of 150 and 200 ND.DI pipe and 200 OD PE pipes. The valley crossing and pipeline along the river gorge in steep terrain are the main reason to provide DI pipes. As the pipe used in the existing transmission line to the existing WTP is of substandard regarding pressure rating, it is not recommended to incorporate it in the proposed transmission system.

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

Similarly, the transmission line of Ghatta Transmission system (SS-3) is about 13.44 Km. The major part of the transmission line comprises of 160 mm OD PE pipes in addition to a few hundred meters of 125 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, tees 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 sloping areas and un-buried portions. All saddle block are proposed to be anchored with concrete at the center of each pipe. Provision of RCC support for the stretches of buried and unburied DI pipelines which are laid in sloping areas has been made to prevent pipe movement.

River and Stream Crossing

There are some river crossings in all three transmission systems. The major one is at SS-2 near the intake. An MS truss Pipe Crossing for a span of 30 m has been proposed.

A simple crossing by providing SP4 type concrete saddle blocks is recommended for the small type of crossings for DI pipes. These types of crossings are used only when the span of crossing is less than 6 m. There are about five numbers of this type of crossings in all. In the case of crossing near the existing bridges and culverts, provision has been made for pipe clamps.

Water Treatment Plant

The Charikot water supply system will have 4 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 six service reservoirs provided is about 1275 cum which is about 31.74% of the total daily demand in the design year.

Bulk Distribution Mains

As the service area is very scattered and stretches 15 to 20 km with high elevation differences within the service area (in the range of 1000 m), the concept of Bulk Distribution has been proposed. This has been done 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 100 ND to 140 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 109.055 km.

House Connection

Three types of house connections have been envisaged in the project. There are about 192 number of house connections from DI pipes, about 2882 number of house connection from PE pipes and about 788 number of house connections from GI pipes. Most of the connections will be private.



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

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 the 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 the 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 95 valve chambers are expected in the system. An RCC valve chamber has been proposed on the carriageway 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 some 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 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.

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. To manage NRW in the proposed system, the total system is divided into 6 DMAs.

2.31 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 are intended to serve the water demand of the entire area of Charikot Municipality, Dolakha District. It is expected that on the implementation of the project the users of the area will be able to avail adequate amount of safe drinking water.

The project needs to go through the IEE process as stipulated in EPR 1997 (Amendments 1999 and 2007). The proposed project shall be using surface water sources. The Project does not involve the construction of any tunnels; relocation of people or households & there is no need to settle any households. The project is expected to benefit a design population of about 34,610 (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 25 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 25: 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

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

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
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 aquifer	NA
Water Treatment	Up to 25 liters per sec		Within 25 liters per sec
Construction of Tunnel for Channeling Drinking Water	Tunnel constructed		Not constructed
Water Resource Development which Displaces People Permanent Residents)	25 to 100 people	Over 100 people	Not done
Settlement of People Upstream of Water Source	Settlement of up to 500 people	Settlement of above 500 people	Not done
Supply of water to a population of	5, 000 to 50, 000	Over 50, 000	This is an extension of the existing system. Newer service areas have been added, and new sources are to be tapped.
Connection of New Source to Supply Water to existing water supply system for a population of	10, 000 - 100, 000	More than 100, 000	The current population is 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 groundwater from sources which are located at point and non-point sources of biological and chemical pollution and/or their influenced areas.	Not done	Applicable	No non-point and point sources of pollution in the vicinity of the water source

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

Condition described in the Act and Regulations	IEE Required as per the Regulation Annex 1g	EIA Required as per the Regulation Annex 3h	Conditions in the project
The operation of water supply project included in a multipurpose project utilizing a source of 25 liters per sec water. (Construction of Multiple Purpose Reservoir Required)	Not operated	Operated	This is not a multipurpose project and is solely for water supply

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

3. PROCEDURES TO BE ADOPTED FOR THE STUDY

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

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

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

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

Prepare questionnaires/checklists/matrices for the collection of primary data for both the 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 some government officials, representatives of NGOs and international organizations (IOs) supported projects and researchers.

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

Physical Environment: topography, soils, climate, and meteorology, geology, surface and 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) regarding assumed positive and negative impacts related to location, design, construction, and operation. Preparation and actual implementation of the construction activities will create some nuisance and inconvenience for the communities in the area.

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

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



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

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

3.3 Report Preparation

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

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

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)" 2068 B.S. (2009 A.D.)

Standards, Manuals, Strategies & Guidelines

- National IEE Guideline 2049 B.S. (1993 A.D.)
- National Drinking Water Quality Standards 2062 B.S. (2006 A.D.)
- Water Resources Strategy, 2059 (2002)

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

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

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

5.1 Time Schedule

Considering the time limitations, the study has to be completed within about 9 weeks. The work schedule is presented in the Table 26.

Table 26 : 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 Charikot Small Town Water Supply and Sanitation sub-project is approximately NRs. 500,000.00.

5.3 Human Resources Required

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

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

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

6. ANTICIPATED IMPACTS OF THE PROPOSED PROJECT ON ENVIRONMENT

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

6.1 Physical Impacts

Design Stage

- i. Soil erosion and slope stability due to incorporation of sloped areas in project design
- ii. Cracking of structure (leading to facility failure & hazard to public) due to construction of reservoirs in high earthquake zone
- iii. Inadequate disposal of sludge from reservoirs and treatment plant
- iv. Construction of intake in high earthquake zones
- v. Location of pipes and existing utilities particularly in heritage areas

Pre-Construction Stage

- i) Inadequate protection of reservoir area/source
- ii) Deterioration in the water quality in the storage reservoirs
- iii) Delivery of unsafe/ raw water to distribution system

Construction Stage

- i) Changes in land use pattern along the alignment due to the construction of different component structures.
- ii) Land instabilities, soil erosion, silt runoff, landslides and setting off street surfaces due to excavation works, and other construction-related activities during the construction phase of the project.
- iii) Changes in land form and drainage pattern due to spoil dumping, excavating and aggregate mining, etc.
- iv) Possible loss of agriculture land, cereal crops and settlements due to laying of pipes, reservoirs and construction activities and thus need of compensation at market price.
- v) Disposal of solid waste, waste materials, and construction spoils in the productive land.
- vi) Issue related to the groundwater extraction and associated offshore erosion, silt runoff and sedimentation.

Post Construction and Operation Stage

- i) Changes in land use patterns and the economic impacts on the affected people
- ii) Natural hazards associated with the reservoir due to reservoir induced seismic effects.

6.2 Biological Issues

Design Stage

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

Pre-Construction Stage

- i) Forest clearance

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

- ii) Tree cutting and forest clearance process/permits

Construction Stage

- i) Encroachment of vegetation as well as wildlife habitats and biodiversity of the protected species.
- ii) Loss of vegetation and terrestrial habitat due to project component and facility placements.
- iii) Loss of local vegetation and wildlife habitats due to illegal exploitation of the resources like felling, hunting and poaching activities by the construction workforce.
- iv) Impacts on groundwater resource/water resources
- v) Extinction/impacts of rare and endangered species of 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 groundwater resources

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 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, the 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 the withdrawal of economic activities after the completion of construction.
- ii) Changes in aesthetic values of landscape due to project structures and facilities associated.
- iii) Impacts of permanent loss of production from the project occupied areas.
- iv) Changes in Religious values of area due to project

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

7. ALTERNATIVE ANALYSIS

An alternative analysis of the project shall be considered as an integral part of the IEE study, which involves alternative ways of achieving the objectives of a proposed project. 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 regarding potential environmental impacts, capital and operating costs and institutional training and monitoring requirements should be described. Costs and benefits of each alternative should be quantified (wherever possible), and incorporating the estimated costs of any associated mitigation measures. The no-project option is always open.

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

- a. **Project design/pre-construction phase**
- b. **Project construction phase**
- c. **Project operation and maintenance phase**

Concerned agencies like STWSSSP, DWSS, WUSC and local agencies, local administration, police 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 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 has been done under two different scenarios. Optimization of a proposed water supply system can be done regarding system layout, alternative technology, alternative materials or even alternative design parameters. However, in the case of Charikot water supply system alternatives have been analyzed using alternate energy sources keeping other parameters constant.

As 225 cum capacity storage tank has been constructed in the project, consultants do not have any choice of system optimization by location and size of the storage tank. The following subsections briefly describe the features of the two alternatives opted for the project.

7.1.1 System Alternative I

In this system alternative, two types of pumps have been proposed. A dedicated direct current (DC) pump operated by solar energy has been proposed to be installed in one well, and the traditional electrically operated pump will be installed in the other well. A Combination of these pumps has been in operation in nearby town Garuda.

The OHT will be filled using a solar pump during daylight and used for distribution. To supplement water during the peak hour demand and non-operating hours of the solar pump, an electrical pump has been proposed.

7.1.2 System Alternative II

In this system alternative, all pumps are operated by electrical power keeping other parameters the same.



8. MATTERS TO BE IMPLEMENTED WHILE IMPLEMENTING THE PROJECT

8.1 Environmental Management Plan

The project proponent has to develop an Environmental Management Plan (EMP) to manage all the perceived environmental impacts of the project systematically. It shall be therefore based on the mitigation measures for the project induced impacts. An Environmental Management Plan (EMP) has a dual purpose. It is designed to monitor the contractor's work during project implementation. It helps to check contractual compliance with specified mitigation measures. It also helps in making periodic checks on the actual environmental impacts of the Project over the years following completion of the works and compares these with those impacts anticipated at the time of Project appraisal. The EMP, therefore, provides the necessary feedback required for correcting potentially serious Project deficiencies, and for the 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 before and during the project construction and operation to ensure that the works are being carried out by the approved design and that the environmental mitigation measures are fully implemented by 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 organizations with a legitimate interest in a project and/or who are likely to be affected by the project (stakeholders). It is a two-way process that informs and involves the community in developing a project and informs the proponent about issues and concerns, which can then be addressed in project design. Information disclosure involves stakeholders in monitoring the development and implementation of a project and fosters openness in decision-making by presenting documents and other project materials for public scrutiny. The consultation and disclosure involve consultation with stakeholders at an early stage of project preparation, and throughout project implementation. As a minimum, stakeholders will be consulted regarding the scope of the environmental study before work has commenced in earnest, and should then be informed about the likely impacts of the project and proposed mitigation once the draft IEE report is under preparation. The report should record the views of stakeholders and indicate how these have been taken into account in project development. Information is disclosed through public consultation and more formally by making documents and other materials available and at a location in which stakeholders can easily access them. This normally involves making draft reports available (in the local language) at public locations in the community and providing a mechanism for the receipt of comments and making documents available more widely.

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

Monitoring is one of the components of EMP. The results of monitoring should also be disclosed in the form of demonstration, charts, figures, graphs, and samples, etc., to the local people, school students, and other interested

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

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, Dolakha, 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 Charikot 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 Charikot 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*



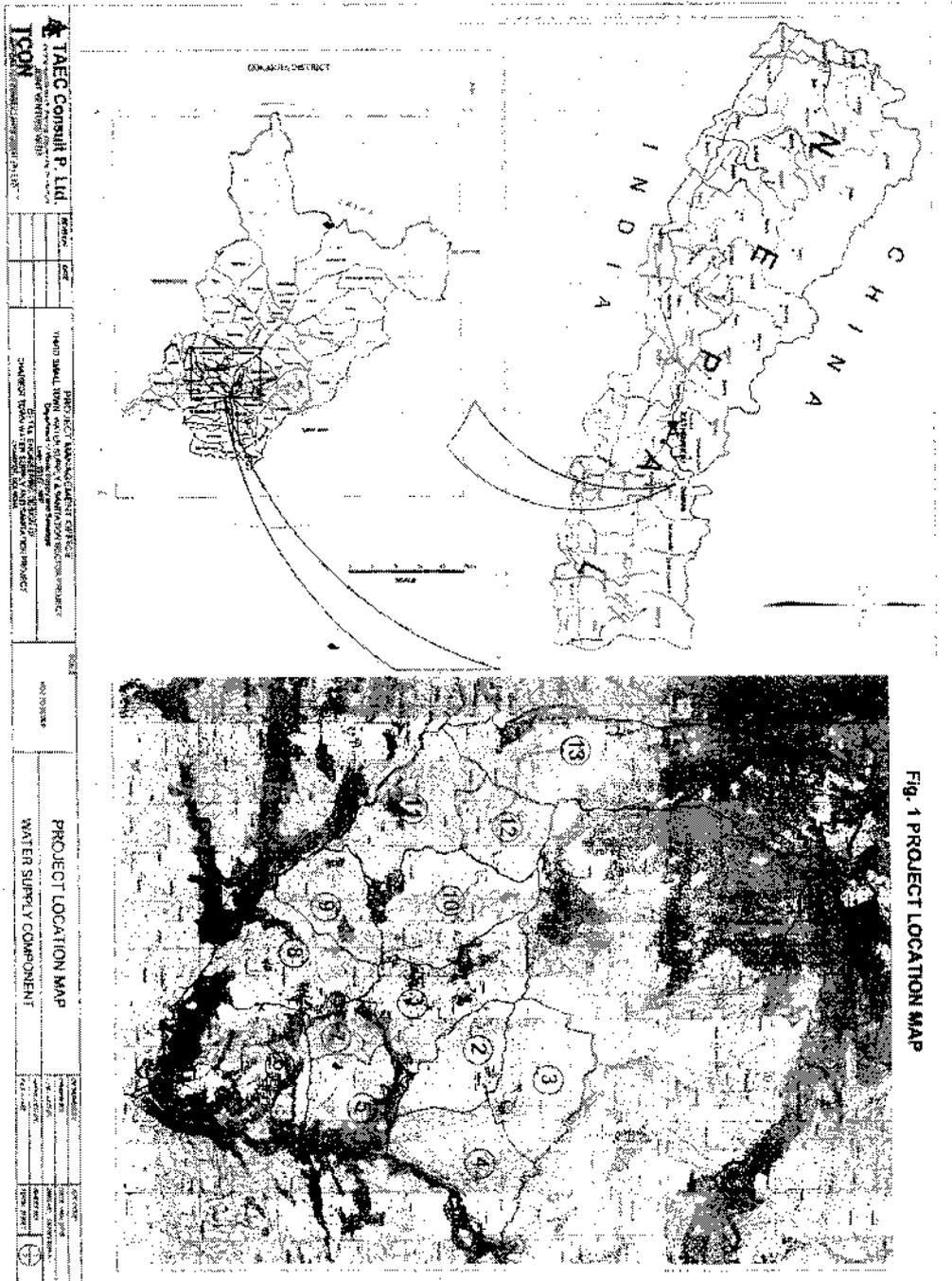
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ANNEXES

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ANNEX I
Project Location Map

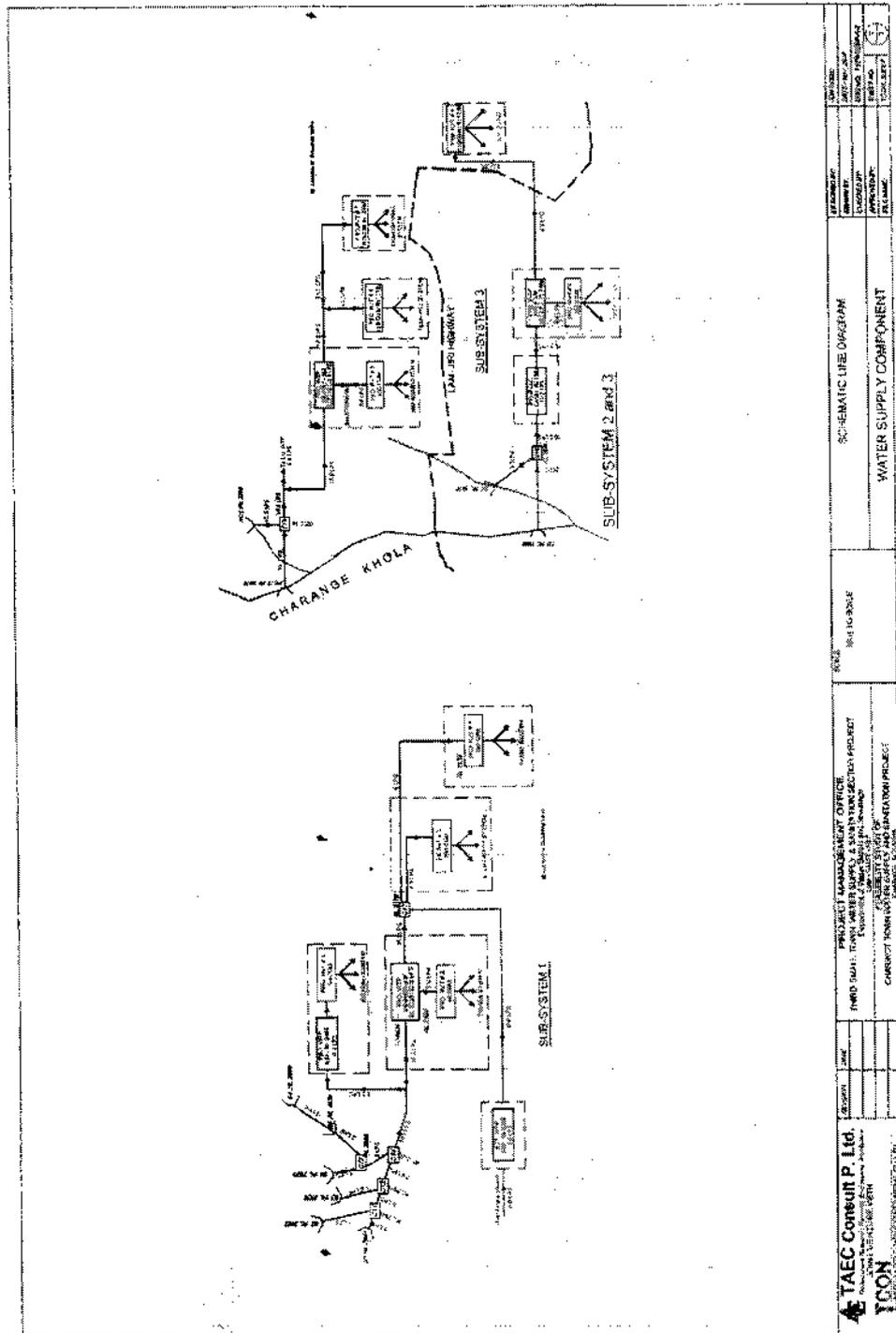
ToR for Initial Environmental Examination of Chankot Water Supply and Sanitation Project



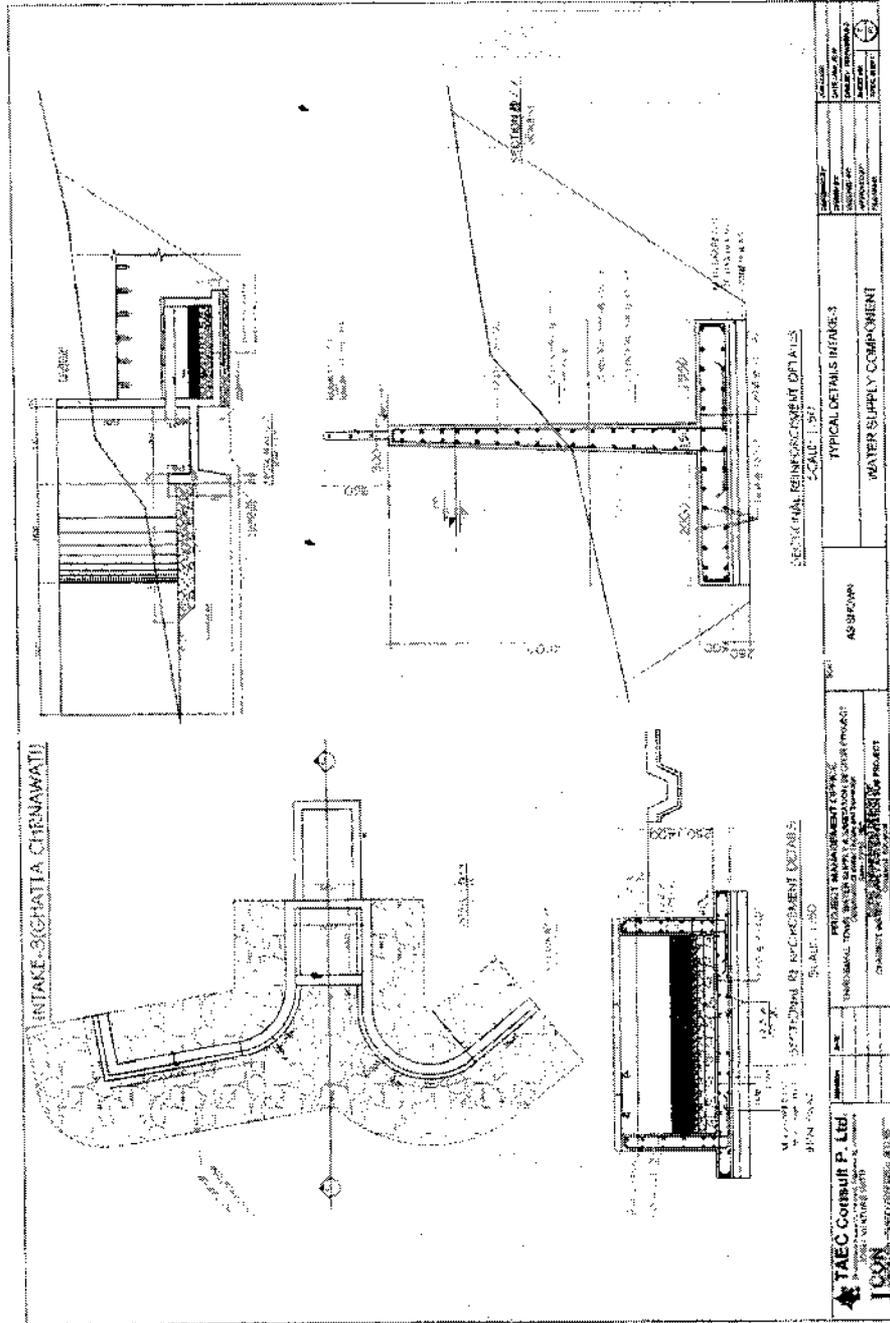
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ANNEX II
Schematic & Layout Plan for the Proposed Project

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ANNEX III

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

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

ADB's Rapid Environmental Assessment (REA) Checklist for Charikot 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: **Charikot 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			

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

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> • BUFFER ZONE OF PROTECTED AREA 			
<ul style="list-style-type: none"> • SPECIAL AREA FOR PROTECTING BIODIVERSITY 			
<ul style="list-style-type: none"> • BAY 			
<p>B. POTENTIAL ENVIRONMENTAL IMPACTS Will the Project cause...</p>			
<ul style="list-style-type: none"> ▪ pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff? 			
<ul style="list-style-type: none"> ▪ impairment of historical/cultural monuments/areas and loss/damage to these sites? 			
<ul style="list-style-type: none"> ▪ hazard of land subsidence caused by excessive ground water pumping? 			
<ul style="list-style-type: none"> ▪ social conflicts arising from displacement of communities? 			
<ul style="list-style-type: none"> ▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters? 			
<ul style="list-style-type: none"> ▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)? 			
<ul style="list-style-type: none"> ▪ delivery of unsafe water to distribution system? 			
<ul style="list-style-type: none"> ▪ inadequate protection of intake works or wells, leading to pollution of water supply? 			
<ul style="list-style-type: none"> ▪ over pumping of ground water, leading to salinization and ground subsidence? 			
<ul style="list-style-type: none"> ▪ excessive algal growth in storage reservoir? 			
<ul style="list-style-type: none"> ▪ increase in production of sewage beyond capabilities of community facilities? 			
<ul style="list-style-type: none"> ▪ inadequate disposal of sludge from water treatment plants? 			
<ul style="list-style-type: none"> ▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? 			
<ul style="list-style-type: none"> ▪ Impairments associated with transmission lines and access roads? 			
<ul style="list-style-type: none"> ▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals. 			
<ul style="list-style-type: none"> ▪ health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation? 			

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

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

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

	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

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

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

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

Household Survey

१. परिचय

१.१ अन्तर्घाता दिने व्यक्तिको नाम लेगाना:

(क) जिल्ला: (ख) गा.वि.स:

(ग) टोल रस्थान: (घ) वार्ड नं.:

१.२ पारिवारिक विवरण

(क) घरमुलिको नाम: श्रीमान् र श्रीमती

(ख) जाती: (ग) उमेर: (घ) लिंग: पुरुष महिला

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

(ज) बसेको वर्ष: (झ) शिक्षा:

(ञ) कुल परिवार संख्या

उमेर समूह	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 : (तपाईंको परिवारमा)

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

३. कृषि (मु-उपयोग)

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

छ छैन

३.२ यदि छ भने कति छ ? रोपनीमा भन्नुहोस :

क्र.स.	सामिति	बेत	बारी	खरबारी	वन	कैफियत
१	आफने					
२	संगालको					

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

क्र.स.	स्वामित्व	खेत	बारी	खरबारी	बन	कैफियत
३	कमाई आएको					
४	कमाउन दिएको					
५	जम्मा					

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

क्र.स.	ठाउँको नाम	जग्गा				कैफियत
		खेत	बारी	खरबारी	बन	

३.४ तपाईंको जग्गा आयोजना भित्र पर्छ र १ एभिकम नभलनग्यल तजभ अकउयलभतत या उचयवभअत धजभअधभ जज िवाकि०

- | | |
|---|--|
| घर | खेत |
| <input type="checkbox"/> लम्बाई (फिटमा) | <input type="checkbox"/> पाखो बारी |
| <input type="checkbox"/> चौडाई (फिटमा) | <input type="checkbox"/> जंगल |
| <input type="checkbox"/> छान्ना | <input type="checkbox"/> अन्य |
| <input type="checkbox"/> तल्ला | |
| <input type="checkbox"/> कोष | <input type="checkbox"/> जग्गाजी मूल्य (बलनचल्लीमा) नेरु |

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

घर गोठ

क्र.स.	किसिम	क्षेत्रफल
घर १		
घर २		
घर ३		

(१) कच्ची-खरले छाएको (२) पक्की (दुहा, ईटाको पखाल र ढलान फिगटी वा टिनको छानो)

	संख्या	क्षेत्रफल
गोठ		
अन्य (खुलाउने)		

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

क्र.स.	खाद्यान्न बाली	बाली लगाएको क्षेत्रफल	उत्पादन परिणाम
१.	खाद्यान्न बाली		
	धान		
	गहु		
	मकै		
	कोदो		

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

	दाल गेडागुडी		
	अन्य		
२.	नगदे वाली		
	आलु		
	तोरी		
	तरकारी		
	अन्य		

(ख) उक्त जग्गामा लगाएको फलफूल र अन्य बोट विरुवाको विवरण दिनुहोस्

क्र.सं.	बोटविरुवा	विरुवा सख्या		जग्गा
		फल लागेको	फल नलागेको	
१	फलफूल			
२	कागती			
३	सुन्तला			
४	आप			
५	मेवा			
७	अम्वा			
८	लिच्ची			
९	कटहर			
१०	करा			
११	आरु			
१२	नासपाती			
१३	आरुखड्डा			
१४	अन्य			
१५	झाले घांस			
१६	पाखुरी			
१७	काभो			
१८	बडहर			
१९	खनायो			
२०	राकी			
२१	गिदरी			
२२	अन्य			
२३	इन्धनको लागि प्रयोग गर्ने बोट विरुवा			
२४	काठमा प्रयोग हुने बोटविरुवा			
२५	बाँस तिगालो			

३.६ कं तपाईंको जग्गामा भएको गत वर्षको उत्पादनले तपाईंको परिवारलाई खान पर्याप्त भयो र

भयो

भएन

३.७ यदि अपर्याप्त भयो भने कति महिनाको लागि पुगेन र महिना

(क) तीन महिना

(ख) छ महिना

(ग) नौ महिना

(घ) बाह्र महिना

३.८ आफ्नो उत्पादन खाद्यान्न अपर्याप्त भएको बेला आफ्नो परिवारलाई कसरी खुवाउनु हुन्छ ?

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

- | | |
|--------------------------|-------------------------------|
| क. ऋण गरेर | ख. चाकरीबाट भएको आम्दानीबाट |
| ग. व्यापारीको आम्दानीबाट | घ. भारी बोकेर भएको आम्दानीबाट |
| ड. दैनिक मजदुरबाट भएको | च. अन्य |

३.९ पशुपालन सम्बन्धी :

तपाईंको घरमा कति / कस्ता पशु पाल्नेहरू पाल्नु भएको छ / न

क्र.सं.	पशुपक्षी	संख्या
१	गाई	
२	गोरु	
३	भैसी	
४	बाछ्रा	
५	वाछि	
६	पाडा	
७	पाडि	
८	राँगो	
९	घोडा	
१०	वाखा	
११	बोक्या	
१२	खसी	
१३	पाठा/पाठी	
१४	संगर/बंगुर	
१५	हाँस	
१६	कखुरा	
१८	अन्य (खुलाउने)	

४. घर परिवारको वार्षिक औषत आम्दानी :

श्रोत	वार्षिक आम्दानी (रु.)	श्रोत	वार्षिक आम्दानी (रु.)
कृषिबाट		अन्य श्रमहरू	
खाद्यान्न		नोकरी, सेवा	
नगदेवाली		ज्याला मजदुरी र भरीया	
फलफूल		निवृत्तिभरण	
जम्मा (१)		व्यापार	
पशुपालनबाट		घरनु उद्योग	
दुग्ध उत्पादन		पेशागत सेवा	
अण्डा कखुरा हाँस बिक्री		माछा बिक्री	
बाछ्रा/वाछि/गोरु/बिक्रि		अन्य	
भैसि/राँगो बिक्रि		जम्मा (३)	
बोक्या/खसी/भेडा/वाखा बिक्रि			
संगर/बंगुर बिक्रि			
कखुरा/हाँस बिक्रि			
जम्मा (२)			
	जम्मा आय (१+३)		

५. घर परिवारको वार्षिक औषत खर्च :

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

विवरण	जम्मा रकम (रु.)	विवरण	जम्मा रकम (रु.)
चामल		चिया	
वाल		दाउरा	
मकै		घिजूली	
तरकारी		मट्टिनेल	
दध / दही		ओपधि	
माछा / मास		शिस्ता	
तेल / धु		कपडा	
भर-मसला		चाडपर्व	
नून		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
 सिंचाई मुहाउने, कपडा धुने
 पिउने अन्य

७. स्वास्थ्य सम्बन्धि:

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

(ख) यदि थिए भने निम्न विवरण दिनुहोस् रु

क्र.सं.	माता	पुरुष	महिला	उमेर	रोग
१					
२					
३					
४					

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

(ग) बिरामी पर्दा सर्वप्रथम कहाँ जानुहुन्छ रु

(घ) त्यहाँ निकास कहाँ जानुहुन्छ रु कम्मा उल्लेख गर्नुहोस ।

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

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

३	हेल्थ सेन्टर		
४	आयुर्वेदिक औषधालय		
५	निजि क्लिनिकर औषधी पसल		
६	धामी भाकी		
७	अन्य		

८. महिलाको अवस्था:

(क) श्रमको वर्गीकरण

क्र.सं	कामको विवरण	हिस्सा प्रतिशतमा	
		पुरुष	महिला
१	खनजोत		
२	मल राख्ने		
३	जमिन तयारी		
४	रोज्ने		
५	गोडभेल		
६	सिचाई		
७	काट्ने		
८	बोक्ने र धन्काउने		
९	अन्न प्रसोधन (कुटाई गियाई)		
१०	घाँस दाउरा		
११	गोठालो		
१२	मेलपात		
१३	खाना पकाउने		
१४	पानी पधरो		
१५	बच्चाबच्ची र बुढाबुढी हेरविचार		

(ख) सम्पत्तिमा अधिकार

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

(ग) निर्णय प्रक्रियामा अधिकार

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

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

क्र.सं.	कार्यको विवरण	हिससा प्रतिशतमा	
		रूप	सहिता
२	पशु खरीदविक्री		
३	गरगहना खरीदविक्री		
५	अन्न खरीदविक्री		
६	फलफूल खरीदविक्री		
७	पशुजन्य पदार्थ खरीदविक्री		
८	काठ बाउग खरीदविक्री		
९	विहावारी		
१०	परिवार नियोजन		
११	छोराछोरी पढाई लेखाई		
१२	अन्य		

९. मुआब्जा सम्बन्धी:

(क) तपाईंको घर र जग्गाको मुआब्जा के मा चाहनु हुन्छ र

नगद जग्गाको सहा जग्गा अन्य

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

जग्गा किन्ने घर बनाउने ऋण तिर्ने
 व्यापार गर्ने अन्य

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

ANNEX 2: SAMPLE FORMS, FORMATS AND REPORT TEMPLATE

ANNEX 2A:RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST FOR CHARIKOT 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: **Charikot Water Supply and Sanitation project**

Screening Questions	Yes	No	Remarks
A. Project Siting : Is the project area			
Densely populated?		√	Charikot town has a moderate population density.
Heavy with development activities?		√	
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		√	
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?		√	

Screening Questions	Yes	No	Remarks
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	
Hazard of land subsidence caused by excessive ground water pumping?		√	It is a gravity system; hence, there is no requirement of 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)?	√		Water Treatment proposed in detailed design and water quality monitoring in EMP will ensure the water supply as prescribed in the NDWQS & its Directives.
Delivery of unsafe water to distribution system?	√		Water Treatment proposed in detailed design, water quality monitoring and continuous trainings to WUSC as stated in EMP will ensure the water supply as prescribed in the NDWQS & its Directives.
Inadequate protection of intake works or wells, leading to pollution of water supply?	√		Design proposes housing for intake wells, and perimeter fencing of the intake wells
Over pumping of ground water, leading to salinization and ground subsidence?		√	
Excessive algal growth in storage reservoir?	√		EMP provides mitigation measures.
Increase in production of sewage beyond the capabilities of community facilities?		√	
Inadequate disposal of sludge from water treatment plants?	√		EMP provides mitigation measures.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	
Impairments associated with transmission lines and access roads?		√	Transmission lines and access roads will not be affected. As stated in EMP, Impaired access roads will be repaired, as appropriate.

Screening Questions	Yes	No	Remarks
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	√		EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents or human error in dosing.
Health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?	√		EMP provides measures to mitigate health and safety impacts from improper handling, potential accidents or human error in dosing.
Dislocation or involuntary resettlement of people?		√	
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
Noise and dust from construction activities?	√		EMP provides mitigation measures.
Increased road traffic due to interference of construction activities?	√		EMP provides mitigation measures.
Continuing soil erosion/silt runoff from construction operations?		√	
Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√		EMP incorporates monitoring of distributed water according to the Directives for the NDWQS.
Delivery of water to distribution system, which is corrosive due to inadequate attention to the feeding of corrective chemicals?	√		EMP provides mitigation measures.
Accidental leakage of chlorine gas?		√	Regular & Effective Monitoring during operation phase should be strictly carried out
Excessive abstraction of water affecting downstream water users?		√	
Competing uses of water?		√	
Increased sewage flow due to increased water supply	√		EMP provides mitigation measures.
Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant		√	This is not applicable for this project as this covers only water supply components.

Screening Questions	Yes	No	Remarks
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)?		√	

Preliminary Climate Risk Screening Checklist for the Project Town

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

Options for answers and corresponding scores are given below.

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

Result of Initial Screening (Low, Medium, High): Low

Other comments: None

ANNEX 2B:RELEVANT ENVIRONMENTAL QUALITY STANDARDS

B.1 Ambient Air Quality Standards

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

* 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 _{eq} 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	µ/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

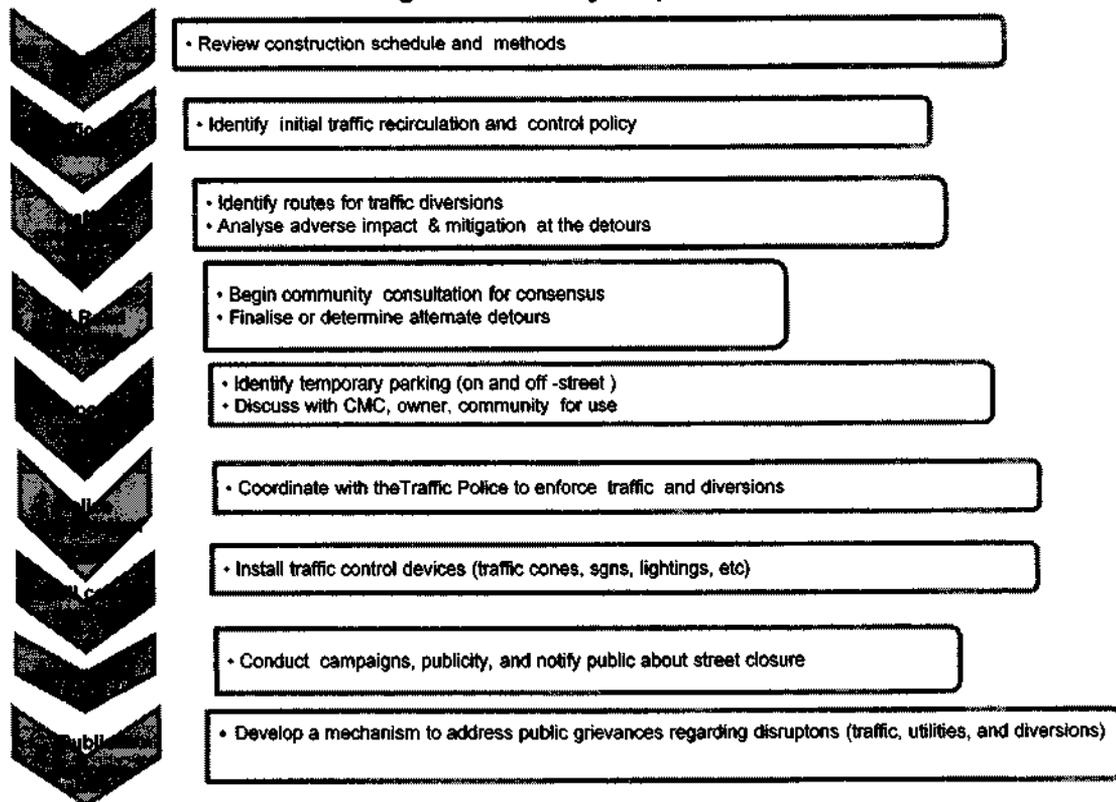
Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

- (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
- Manage onsite spoil handling to minimize environmental impacts on resident and other receivers
- Minimize any further site contamination of land, water, soil
- Manage the transportation of spoil with consideration of traffic impacts and transport related emissions

Structure of SMP:

Section 1: Introduction of SMP

Section 2: Legal and other requirements

Section 3: Roles and responsibilities

Section 4: Identification and assessment of spoil aspects and impacts

Section 5: Spoil volumes, characteristics and minimization

Section 6: Spoil reuses opportunities, identification and assessment

Section 7: On site spoil management approach

Section 8: Spoil transportation methodology

Section 9: Monitoring, Reporting, Review, and Improvements

Aspects and Potential Impacts

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

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

Spoil volumes, Characteristics and Minimization

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

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

Adopt Spoil Reduce, Reuse Opportunities

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

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

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

Storage and stock piling

Transportation and haulage route

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

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

Appendixes

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

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

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

INTRODUCTION

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

No.	Project Name	Status of Project				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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 ₉₀ (dBA) (Government Standard)	
			Day Time	Night Time

IEE for Charikot WSSP

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 _____ Unresolved _____
 Unsatisfactory _____ Incident _____ Resolved _____

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 <input type="checkbox"/> No <input type="checkbox"/>

Signature _____

Sign off

Position

_____ **Name**

Name
Position

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



जिल्ला प्रशासन कार्यालय

चौम जिल्ला

विषय: चौम जिल्ला प्रशासन कार्यालय

श्री श्रीमान् ...को सम्बन्धमा ...

सम्बन्धित विषयमा ...को मिति २०७२/०८/१२ ...

जो ...को ...
...को ...

अभिप्रेत
अध्यक्ष



MINUTES OF MEETING

आइतमिति २०७३ माघ ४ गते मिकेठ बजारपालिका मिय रकोमपानी तथा टोलको व्यवस्थापन समितिले गराउने कामको लागि मिकेठ बजार रकोमपानी उपमेस्ता समितिहरू गरी, मिकेठ बजारपालिकाको तथो सानाहाही रकोमपानी आयेडागा सज्यालको काम यस नगरपालिकाका कार्यकारी अधिकृत श्री संजय बहादुर शाजालको तथो मध्यमका - वही तपसिल अनुसाका उपस्थितितातपसिल मगसाका प्रस्ताव तथी कुलपण तपसिल मगसाका निर्णय गरियो।

उपस्थिति

- १ संजय बहादुर शाजालको मध्यमका
- २ रामकुमारी ड. स. - य. रको. पा.
- ३ कुमारी बहादुर मिकेठ हासिदहरा रको. पा.
- ४ कुमारी बहादुर रको. पा. - य. रको. पा.
- ५ सुमारा हाथको हासिदहरा रको. पा.
- ६ धुव बजेल
- ७ कानिल हाथको दोलावा रको. पा.
- ८ रामप्रसाद हाथको टोल रको. पा.
- ९ दाका शोपा - य. रको. पा.
- १० रोमा कार्की S. T.
- ११ कुमारी सुमारी थापा
- १२ मया मजेल (शाही)
- १३ मेल केसी मिन. पा १० रागनागी
- १४ रामकुमारी हाथको मध्यमका केसावरी
- १५ रामकुमारी हाथको मिन. पा - १
- १६ माल पशुडा रको. पा. कनगाथुधुधु
- १७ कुमारी हाथको मिन. पा - ६ तेल
- १८ मिकेठ हाथको
- १९ मिकेठ हाथको
- २० न्याय प्र. दहाल मी. न. पा. १०
- २१ धन बहादुर चोलागाड हाथको

- २१ श्रीकृष्ण शौपाने रामकोट रानेपानी *[Signature]*
- २२ गोकुल शर्मा श्रीकृष्ण रामकोट रानेपानी *[Signature]*
- २४ गोकुल शर्मा श्रीकृष्ण रामकोट रानेपानी *[Signature]*
- २२ नारायण चौलागाई " १ *[Signature]*
- २६ काल क. डावठ जिम्मा *[Signature]*
- २७ उपेन्द्र क. खडका *[Signature]*
- २८ गोकुल क. डावठ *[Signature]*
- २९ कुमार चौलागाई *[Signature]*
- ३० राम खडका के.के. *[Signature]*
- ३१ गंगाधर क. ड. श्री जिम्मा *[Signature]*
- ३२ विष्णु क. बुढाथोडी *[Signature]*
- ३३ प्रमोद खजु लामा *[Signature]*
- ३४ राज क. डावठ *[Signature]*
- ३५ श्री कुमार शर्मा *[Signature]*
- ३६ रामन पात्री *[Signature]*
- ३७ राम क. काँडा *[Signature]*
- ३८ रामकाँडा डावठ श्रीकृष्ण-१ *[Signature]*
- ३९ कमल बहादुर थापा *[Signature]*
- ४० लालिन्द्र शर्मा श्रीकृष्ण-३ *[Signature]*
- ४१ साइबहादुर लालिन्द्र श्रीकृष्ण-१ *[Signature]*
- ४२ हरिहर प्र. शौपाने रामकोट *[Signature]*
- ४३ पुर्ण प्र. काँडा श्रीकृष्ण-१ *[Signature]*
- ४४ राजबहादुर बुढाथोडी श्रीकृष्ण-३ *[Signature]*
- ४५ गंगाधर क. डावठ बुढाथोडी " *[Signature]*
- ४६ रामशर्मा थापा य. (का. पा) रामकोट *[Signature]*
- ४७ कपी कुमार डावठ हात्तिदहरा *[Signature]*

निर्णय

१ निर्णय नं. १ हात्तिदहरा-पारिधवाङ्ग-मानडाडा रानेपानी तथा सरसवाङ्ग उपमास्ता सल्लि

२. चारिकोट श्वाकपाकी तथा सरसफाई उपकरण
 समिति एकीकरण गर्ने सम्बन्ध समितिबाट
 निरुद्धार नगरपालिकाबाट सरसफाई कार्यमा
 ० तः ५०० रुपैयाँ आसरी श्वाकपाकी कार्यका लागि
 लागू गर्ने निर्णय गरियो । साथै सम्पु
 र्ण समिति २०७३ आर्थिक वर्षको लागि
 समेत समेत निर्णय गरियो ।

[Handwritten signatures and stamps]

मातृ मिति २०६२ मापु २ जते किरिहवा नगर-
पालिका मिय कियारिहवा खानेपानी तथा हर-
सफाउ उपकारना समितिहके ३ साला बाहरी खाने-
पानी मायातनाक परामर्श हाल किय निम
अनुसारका उपस्थितिका निम्न अनुसाका इला-
फल गरियो ?

उपस्थित	
१	सुब्रम अयोन Design Engineer TAE ZION
२	शिव शं. काल Contract expert specialist
३	अनिल यादव Contract input specialist
४	विद्यु राजभट्ट Field Facilitator
५	गोपाल मल्ल (आपत) वामकोट खाने उपकरण
६	बि. न. पा. ६
७	दिपा विमिरे (आपत) वामकोट खाने उपकरण
८	सुकुन घामी पानी ट्याङ्की उपकरण
९	लाल लुठ बल्लेतर
१०	कमल लडापुर
११	बारापाना भाजा गौरादेवरा खा. पा. अध्यक्ष
१२	राम के. काकी मि. न. पा. ९
१३	मोड लडापुर बल्लेतर मि. न. पा. ५ (माल्य के. के. पा. ५६)
१४	कृष्ण ठाकी श्री प्रो. हरमण (उपस्थित न. क. स.)
१५	बाबुराम शर्मा चिडिटे (श. हा. क. म. (न. क.))
१६	बस्ती थापा मि. न. पा. १० (खा. पा. ६)
१७	यादव प्र. ६६/११
१८	हरिहर प्र. १५/११
१९	राम शरण थापा
२०	शंकराज के. सी.
२१	कमल लडापुर (सफा)
२२	शंका काकी
२३	सुब्रम बल्लेतर हातिहवा ट्याङ्की
२४	सुब्रम बल्लेतर वामकोट खाने उपकरण

निर्णय

निर्णय नं. १ चिडिटे खानेपानी तथा हरसफाउ
उपकारना समितिहके परामर्श नैका खा. पा. बाहरी

खानपानी कार्योन्मुखी हस्तिकृत संयोजक आव (आम)।
 पाला शहरी खानपानी कार्योन्मुखी सेवा प्रदान
 गर्ने क्षेत्र सिङ्खार एकिकृत उपमहानगर समिति ३१६७ गरी
 १५१ नाम हस्तिकृत-कारिधारा, मनेडास ख. फ. उ. स.
 कारिधारा खानपानी तथा सरसफाई उ. स. कार. बाका-
 ण पहिचान गरी उक्त नाम नामाकरण गर्नेको लागि
 सम्बन्धीत निकायका अनुमोदित गर्ने निर्णय गर्दिए।
 तसर्थ उ. स. तथा पाला शहरी खानपानी कार्योन्मुखी
 सेवा क्षेत्रमा कारिधारी एकिकृतको कार्य २०६२ माप
 अनुसार सञ्चालन गर्ने निर्णय गर्दियो।

[Signature]
 २१/१२/१७



आडा मिति २०७२ पाष १५ गते मितिमा
 नगरपालिका क्षेत्र मध्य तेशी सागाशहर
 स्वामिनी तथा सरसफाई आयोगका सदस्य-
 लम गन इन्डस्ट्रियलका नामांकित उपको-
 न्तपुष्पको नया मकडको नगरपालिकाको
 काया हाथको गोमते न्यायलय प्रमुख श्री-
 शर्मिष्ठी थापाको सहितको केशी तथा फल
 अगुशाला प्रस्ताव माथी इलाफला सारिलको
 ल अगुशाला उपस्थितमा पत्रपत्र गरेका

- उपस्थित
- १ शर्मिष्ठी थापा नि.अ. प्र. (मि.क.पडा)
 - २ निश्कन्ती वि. प्रकाशमान सिंह पाक्रीन हरि
 - ३ हरि-पारिधाय. गनडाडा नि.पा. ड.सु.
 - ४ रामकृष्ण केशी नि.पा.
 - ५ कृष्ण क. खड्का
 - ६ कृष्ण क. काडी हरिहर
 - ७ नया सुगा डायर नि.पा.
 - ८ लारायण थापा डैराशकाली रो.ह.
 - ९ इयान कृष्ण थापा
 - १० रंगधर बुढाथोडी कातिडे नि.पा.
 - ११ राम क. ड. श्री
 - १२ राम क. काडी गेडागाडी
 - १३ धुव सापकाडी गेडागाडी
 - १४ इन्द्र क थापा फलवापि
 - १५ लाल क. खड्का हाडागाडी
 - १६ गोकुल प्र. न्यौपाने रामकाडी
 - १७ मणिधु थापा डैराशकाली रो.ह. का.पा.
 - १८ किरण खड्का हाडागाडी खा.पा.
 - १९ राम क. खड्का
 - २० फलमती वि. ड.
 - २१ रामा न्यौपाने रामकाडी
 - २२ रामा न्यौपाने
 - २३ लिनापुत्री न्यौपाने

अध्यक्ष
 सचिव

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प्रस्ताव तथा निर्णयहरू
प्रस्ताव नं. १. एकिकृत तहसीर समिति गठन सम्बन्धमा

निर्णय नं. १. प्रस्ताव नं. १ उपर हुनफल गर्दा
घाश भीमेश्वर नगरपालिकाको स्वामिपानी तथा
अरसफाईलाई व्यवस्थित र स्वामी बनाउन
भीमेश्वर नगरपालिका भित्र रहेका स्वामिपानी
उपभोक्ता समितिले तालिमहरू चलाइ
गोर्दीडा स्वामिपानी तथा अरसफाई उपभोक्ता
समिति, चरिकोट स्वामिपानी तथा अरसफाई
उपभोक्ता समिति, जोशबर्दी स्वामिपानी तथा
अरसफाई उपभोक्ता समिति, जुगे च्याँरी धर
प्रघर स्वामिपानी तथा अरसफाई उपभोक्ता समि
ति, जिलु स्वामिपानी तथा अरसफाई उपभोक्ता
समिति, रागकोट स्वामिपानी तथा अरसफाई
उपभोक्ता समिति, चौथाड स्वामिपानी तथा
अरसफाई उपभोक्ता समिति लगायतका यस
भीमेश्वर नगरपालिका भित्रका नं. १ देखि
१५ सम्मका अनेकै ठाउँको स्वामिपानीको
अभाव भएका र नगदमात्र खर्चेर अरस
फाईलाई सोचेरै गरी र डल्लै खर्च
क्षेत्र रहेर गरी स्वामिपानी तथा अरसफाईका
कार्यहरू संचालन गर्न आवश्यक समिति
विधातमा उल्लेख गरेका कार्यहरूको
अभावकारी बनाउन एकिकृत समिति
विधातमा उल्लेख गर्ने गरी एकिकृत समिति
संचालन गर्न एकिकृत तहसीर समिति
गठन गर्ने निर्णय गरियो।

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तदर्थं समिति त्रिमासिक अन्तर्गत गठन गर्ने निर्णय गरियो।

१. अध्यक्ष:- राजकुमार के.सी.
२. उपाध्यक्ष:- कृष्णबहादुर खड्का
३. सचिव:- दुर्गा बस्नेत
४. कोषाध्यक्ष:- अमिता शंकर
५. सदस्य:- कृष्ण बहादुर खड्का
६. सदस्य:- रामबहादुर थापा
७. सदस्य:- मोतीप्रसाद चौलागाई

तदर्थं समिति १ सप्ताहको गठन गरिने गरेको र सारा माहुरी खाेपनी तथा सार सफाई परियोजना सम्बन्धित गर्न तीन जना महिला सदस्य अनिवार्य रूपमा गरिने हुने (१) जना महिला सदस्य समितिमा अगुवा गर्ने, गठित तदर्थ समितिलाई यस परियोजनाको सेवा सुचनाहरू सन्देश गर्ने जनायित गर्ने र जिम्मेवारी तोकन सारको आदि-कार प्रत्याखोजा गर्ने निर्णय गरियो।

प्रस्ताव नं. २. प्रमुख संस्थाको अध्यक्षता गर्ने सम्बन्धमा

निर्णय नं. २. प्रस्ताव नं. २. उपर इतफल गर्दा यस संकित समितिको काम कारवाहीलाई व्यवस्थित र प्रभावकारी बनाउन यस संकित समितिको विभागात्मक प्रमुख संस्थाको अध्यक्षता गर्ने र विभागात्मक प्रमुख संस्थाको काम, कर्तव्य र अधिकार तपसिल अन्तर्गत दुवै निर्णय गरियो।

१. यस खाेपनी तथा सारसफाईको आर्थिक-सांख्यिक प्रमुख संस्थाको अध्यक्षता गर्ने हु।
२. यस संकित समितिको वेड खाेपनी समितिको प्रमुख संस्था, अध्यक्ष र कोषाध्यक्षको संयुक्त दलन्तकत्मा स्थापना गर्ने र लोडि अन्तर्गत कारवाही गर्ने।

तः मिति २०७३/०५/२५

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- 3. यस शकित समितिले स्थानीय गर्ने र यस समिति क्षमतागतो परिचयता एकोमा गफा प्रमुख संरक्षकको वेबसाइटमा गरिने व्यवस्था गर्ने
- 4. यस समितिमा प्रमुख संरक्षक अथवा व्यक्तिमूलक समितिको मानार्थ सदस्यता प्रदान गरिने व्यवस्था गर्ने
- 5. यस शकित समिति वा यस समिति अन्तर्गत एक कार्यकाल यस समितिमा आवद्ध भएका अधिकार सम्पन्न व्यक्तिको वा सोभुदा व्यक्तिगत आधारमा वा पदाधिकारीक रुपले व्यक्तिगत समिति जो सफलताको लागि आवश्यक ती योजना बनाउने व्यक्तिमूलक मात्र यस शकित समितिमा प्रमुख संरक्षक बनाइ राखिने प्रमुख संरक्षकको व्यवस्था गर्ने

प्रस्ताव नं. 3. तदर्थ समितिको संरक्षक र प्रमुख संरक्षक सम्बन्धमा

विषय नं. 3. प्रस्ताव नं. 3 अन्तर्गत बलपत्र गरी यस शकित तदर्थ समितिको प्रमुख संरक्षक कालिठरा चरिष्मा. मानेडाको खासगरी तथा सरसङ्घर्ष अन्तर्गत समितिको अर्थव्यवस्था विषयको प्रति प्रकाशमा रहे पाइनेबलक प्रदान गरी योदि अनुसार जिम्मेवारी प्रदान गर्ने लाग्ने गरियो।

प्रस्ताव नं. 4. शकित समितिको विधान बनाउने र जिल्ला तलकोत समितिमा कर्मा गरी कार्यकाल सम्बन्धमा गर्ने सम्बन्धमा

विषय नं. 4. प्रस्ताव नं. 4 अन्तर्गत बलपत्र गरी

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यस समितिको विधान यस सहित समितिमा
आवद्ध हुने मौजुदा समितिमा विधानमा उल्लेख
गएका कानूनहरूलाई पत्राचारको बगैडामै
छापव्या सहित विधान तयार पार्ने व
जिल्ला प्रशासन समितिमा बर्ना गर्ने उद्देश्य
तर्फ समितिलाई जिम्मेवारी दिने निर्देश
गरियो।

प्रस्ताव नं. २: तेस्रो सप्ता अहरी खागेपनी तथा
सरलापडि आयोगमा सहभाग्य गर्ने सम्बन्धमा
निर्देश नं. २ प्रस्ताव नं. २ अर्को हलफत गर्दा
यस अर्को हलफतको कडा नं. १देखि
१६ सम्मको ब्यवस्थाको व सरलापडि कानून
सहित गर्ने तेस्रो सप्ता अहरी खागेपनी तथा
सरलापडि आयोगमा सम्मालन गर्ने सप्ता
अहरी खागेपनी तथा सरलापडि आयोगमा
ब्यक्ति आकृष्य हुने गरी व इच्छा गरियोपनी
सुदौ साफल्यको विधान तयार गर्ने
२ तेस्रो सप्ता अहरी खागेपनी तथा सरलापडि
आयोगमा सम्मालन गर्ने तर्फ समितिलाई
जिम्मेवारी दिने निर्देश गरियो।

प्रस्ताव नं. ३: शेरपा साभाय सम्बन्धमा
निर्देश नं. ६ प्रस्ताव नं. ६ अर्को हलफत गर्दा सहित त
समितिको सम्बन्ध पदाधिकारी र प्रमुख सम्बन्धको
तेस्रो सप्ता अहरी खागेपनी तथा सरलापडि आयोगमा
सम्मालन गर्ने सम्बन्धमा अर्को निर्देश (सम्मालनको)
निर्देश अधिकतम इच्छाई लेका प्रदान गर्ने कुमठको
सहितमेलाप अर्को कानूनको दस्तावेजको
शेरपा साभाय गर्ने निर्देश गरियो।

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आज मिति २०६२ साल पौष ०८ गतेका दिन
 थला मीमेक्टर नगरपालिका भित्र साता माहरी
 बजारपारी तथा सरसफाई परियोजना सम्बन्धमा
 गर्नु र मीमेक्टर नगरपालिकाको बजारपारी तथा
 सरसफाई कार्यका लागि गर्नु गठन भएको सम्बन्धमा
 समितिमा अध्यक्ष श्री रामकृष्ण के.सी. को
 अध्यक्षतामा कमी तपखिला पलायिकारी सफल
 भएको उपस्थितिमा तपखिला उल्लेख गरेको प्र.
 देताले साथै हलफले गरि निर्णय गरियो
 उपस्थिति

प्रमुख संरक्षक:- विद्युतगति प्रकाशमान सिंह
 पाख्रिा ~~4/20/62~~

अध्यक्ष:- रामकृष्ण के.सी. *[Signature]*

उपाध्यक्ष:- कृष्णकहादुर खडका *[Signature]*

सचिव:- धुवन बज्रने *[Signature]*

कोषाध्यक्ष:- धामिसं खडका *[Signature]*

सदस्य:- कृष्ण बहादुर कार्की *[Signature]*

सदस्य:- रामबहादुर थापा *[Signature]*

सदस्य:- मोतामला *[Signature]*

सदस्य:-

सदस्य:-

अस्तान तथा निर्णयहरू,
 अस्तान नं. १, धाराकाठ दिने सम्बन्धमा
 निर्णय नं. १, अस्तान नं. १ उपर हलफले गर्दा थला
 मीमेक्टर नगरपालिका भित्र साता माहरी बजार
 पारी तथा सरसफाई परियोजना सम्बन्धमा गर्नु

20/11

२. श्रीमंथर नगरपालिकाको अधिष्ठाता वडासक गरी स्वामिनी तथा सरसफाईको ध्यानभरका क्षेपलाई व्यवस्थित गर्ने गठन गरी स्वामिनी तथा सरसफाई उपमोक्षा समितिलाई एकिकृत गरी आगामी कार्य क्रम सञ्चालन गर्ने एकिकृत तदर्थ समिति गठन गरी जिम्मेवारी दिने सम्पूर्ण उपस्थित स्ना-पा समित्त प्रतिनिधि सबै सौख्या तथा कान्ति स्कुलाई ध्यानवाद दिने निर्णय गरियो।

प्रस्ताव नं. २. परामर्शदाता तथा साता माहरी स्वामिनी तथा सरसफाई अधिष्ठातालाई आगकारी गरियो र सम्मन्वय गर्ने सम्बन्धमा

निर्णय नं. २. प्रस्ताव नं. २ उपर हलफल गरी यस श्रीमंथर नगरपालिका सिस स्वामिनी तथा सरसफाई लाई व्यवस्थित र स्वाधीन बनाउन साता माहरी स्वामिनी तथा सरसफाई उप-मोक्षा समितिलाई व्यवस्थित गर्ने साता माहरी स्वामिनी तथा सरसफाई पस्थितका ह्योट में कार्यक्रम सञ्चालन गरि स्वामिनी छुट्ट परिचोजना र परामर्शदातालाई समिति गठन गरीको आगकारी गरि आगामी कार्य क्रम सञ्चालन गर्ने सम्मन्वय गरी आगामी कार्यक्रम सञ्चालन गर्ने निर्णय गरियो।

प्रस्ताव नं. ३. आगामी कार्यक्रम सम्बन्धमा

निर्णय नं. ३. प्रस्ताव नं. २ उपर हलफल गरी तपस्थितमा हलफलेन गरिन्छा उपमोक्षालाई व्यवस्थित रूपमा आगामी कार्यक्रम सञ्चालन गर्ने निर्णय गरियो।

१. विभिन्न समिति, वडा र तेलमा पारयो-नामा सम्बन्धि आन्तरिकीया कार्यक्रम सञ्चालन गर्ने

Handwritten signatures and notes at the bottom of the page.

Handwritten initials

- २. सम्पूर्ण उपभोक्ताको रित्त हुने गरी राम्रा बाली-रकमेपानी तथा सरसफाई सम्बन्धित परियोजनालाई प्रशस्त गर्न लगाउने
- ३. सामाजिक शक्ति तथा भौतिक संरचनाको शक्ति र डिजाइन प्रस्तुत गर्ने र क्षमता र क्रिया गर्ने सम्बन्धित परियोजनाको सम्बन्ध गर्ने।
- ४. परियोजना सम्बन्धित चेतनासूचक कार्यक्रम प्रचलान गर्ने
- ५. विधान तेशले र कर्ता गर्ने
- ६. उपभोक्ता सम्बन्धित वास्तुका उपभोक्ताको राम्रा सम्बन्ध गर्ने डिजाइन रकमेपानी तथा सरसफाई कार्यसम्बन्धित चरिदृष्टिको सम्बन्ध गर्ने
- ७. पापीको मुहान परिचय गरी सेवा क्षेत्र निर्धारण गर्ने।
- ८. यस समितिमा आवद्ध भएका र हुन चाहने रित्त-मार्ग समितिको प्रतिनिधित्व गर्ने उपभोक्ता खेडका मा उपस्थित उवहारी र समितिका अध्यक्षसहित लार्ड सम्बन्धित सदस्यको रूपमा नियमित को लगाउने।

Handwritten signatures and names:
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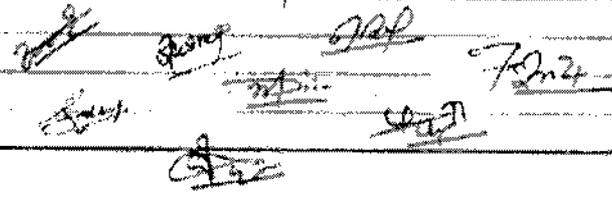
आज दिने २०७४ वैशाख १३ गते नवीन रूपमा
 नाम, पता, जन्म मिति आदि जानकारी सभैसा सभैसा
 मिति आदि जानकारी सभैसा सभैसा सभैसा

क्र.सं.	नाम	पता	सं.सं.
१)	उपस्थित		
२)	साधव फाल्गु कुमारी	प.सं. ३-१०५	९८४४०११६
३)	साधव प्रसाद खोखाला	प.सं. ३-१०५	९८४४०११६
४)	साधव बहादुर खोखाला	प.सं. ३-१०५	९८४४०११६
५)	साधव शिव शर्मा	प.सं. ३-१०५	९८४४०११६
६)	साधव राम शर्मा	प.सं. ३-१०५	९८४४०११६
७)	Ram Krishna K.C.	प.सं. ३-१०५	९८४४०११६
८)	साधव शिव	प.सं. ३-१०५	९८४४०११६
९)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१०)	साधव शिव	प.सं. ३-१०५	९८४४०११६
११)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१२)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१३)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१४)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१५)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१६)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१७)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१८)	साधव शिव	प.सं. ३-१०५	९८४४०११६
१९)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२०)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२१)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२२)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२३)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२४)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२५)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२६)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२७)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२८)	साधव शिव	प.सं. ३-१०५	९८४४०११६
२९)	साधव शिव	प.सं. ३-१०५	९८४४०११६
३०)	साधव शिव	प.सं. ३-१०५	९८४४०११६

प्रदेश क्षेत्र (गड्डा इलाका) वरुने निर्माण करीला ।
 बाध कोहर पानी वा खल निजाम, बाध निजाम
 कोहर पानी प्रयोग करिने निर्माण करिने विषयको
 पानी पुल पुल गरीको उक्त हलफला र डिजाइन
 करिने बाध तथा पारीको Master plan
 अनुसार उगडी वरुने निर्माण करीला ।

(क) प्रस्ताव नं. २ बाधी हलफला गरी विकेचीत
 कोहर पानी प्रयोग करिने निर्माण करिने
 क्षेत्र विभाजन र बाधको डिजाइन करिने विषयको
 अनुमान गरी उक्त निजाम कोषाला यहाको
 स्थानीय प्रयोगीत पानीलाई स्थानीयले सिंचन
 करीला बाधको र स्थानीयलाई पाईलाको देखीले
 कोहर पानीलाई प्रयोग करिने पानी संचालन
 ला उक्तको डिजाइन करिने बाध तथा
 पारीको Master plan अनुसार उगडी
 वरुने निर्माण करीला ।

(ख) प्रस्ताव नं. ३ बाधी हलफला गरी DEWATS
 का लागि प्रयोग करीने जम्मा जमीनको प्रयोग
 बाध स्थानीयको नाम सामाजिक सुरक्षण वातावरण
 विषय बाधी विस्तृत हलफला गरीला ।
 उक्त डिजाइन करिने बाध तथा पारीको
 डिजाइन निर्माण गरी उक्तको तथा पारीको
 सुरक्षणको काम प्रमाण गरीने ह्या उक्त डिजाइन
 बाध निर्माणको बाध आव र उक्त पारीको
 गरी निर्माण कार्य लाई उगडी वरुने
 निर्माण करीला ।



RECOMMENDATION LETTER & CONSENT LETTER



श्रीमेश्वर नगरपालिका कार्यालय
चरिकोट, दोलखा

पत्र संख्या : २०७२/०७३
चलानी नं. : १७६०

मिति २०७२/०९/१९

विषय :- निर्णयको प्रतिलिपि पठाइएको बारे ।

श्री तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजना
यानीपोखरी, काठमाडौं ।

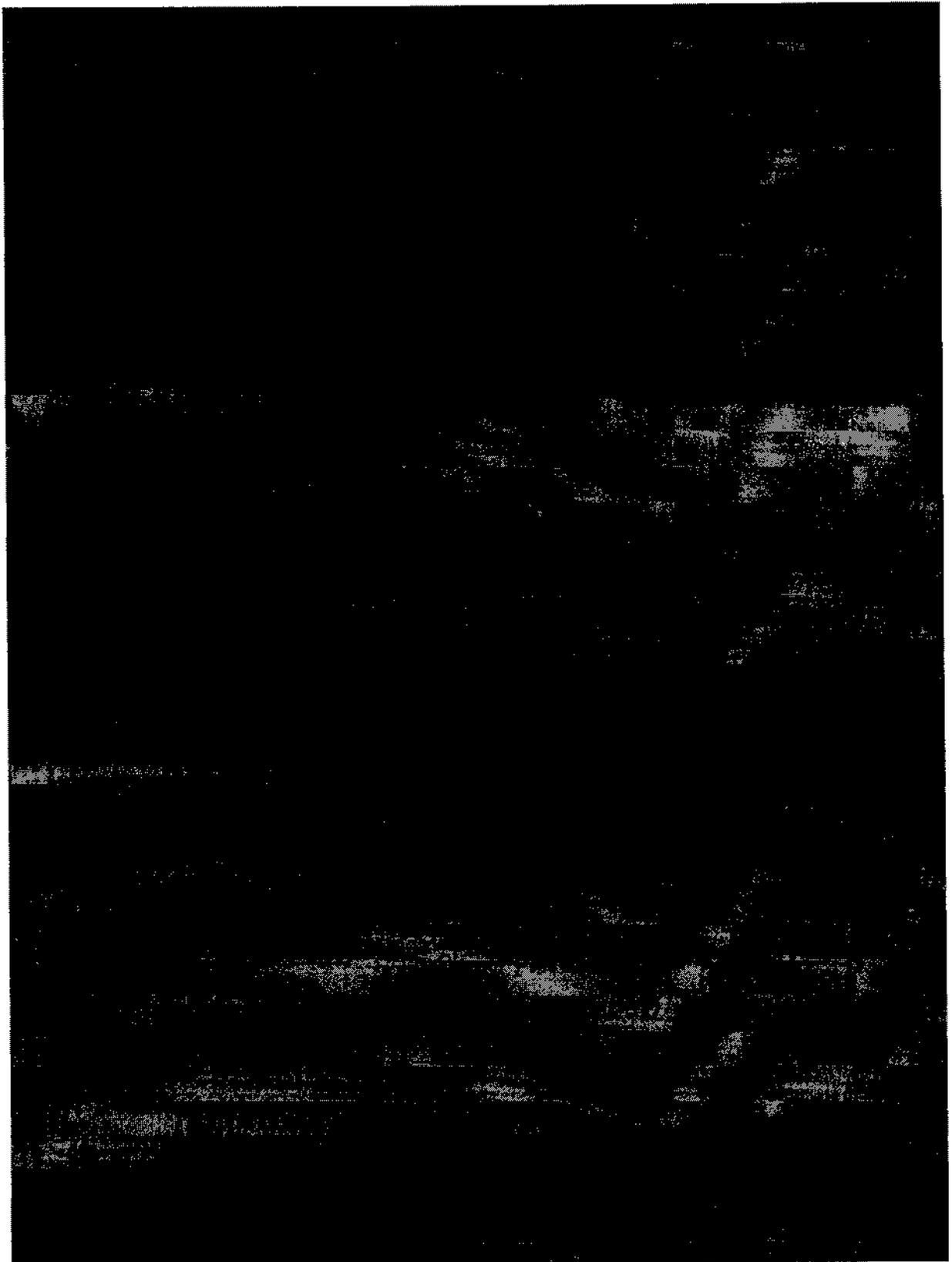
प्रस्तुत विषयमा यस नगरपालिकाको क्षेत्रमा संचालन हुने तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजना कार्यान्वयनका लागि एकीकृत तदर्थ समिति गठन गरी आवश्यक परियोजनाका सम्पूर्ण कार्यहरु कार्यान्वयनका लागि प्राथम्या अर्गाडि बढाउन हुन उपभोक्ता भेलाको निर्णय प्रतिलिपि यसै पत्र साथ पठाइएको व्यहोरा अनुरोध छ ।

बोधार्थ :

श्री तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजना
क्षेत्रीय कार्यालय, ईटहरी
श्री अध्यक्ष, तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजना,
उपभोक्ता तदर्थ समिति, चरिकोट

२०७२/०९/१९
रमणी थापा

नि.



१२/२०१२ पात नं. ६०००१४९७



श्री बुढामीमैना साविक वन उपभोक्ता समूह

सुदूर पश्चिम प्रदेश
लुम्बिनी



संख्या: ०४६/१२
तारीख: ०९/९

जयकपुर अञ्चल
मिति: २०७२/१०/११/१८

विषय: स्तम्भ प्रतिस्थापना गरिएको कुरि।

चरकोट खानेपानी तथा सरसफाई उपभोक्ता संस्था
सुदूर पश्चिम नगरपालिका-३ चरकोट, कैलाली

उपरोक्त विषयमा तय भएको अज्ञातमा यस समूहको
वन उपभोक्ता समूहका उपभोक्ताहरूको माग अनुसार
नयाँको आवश्यकता पर्ने देखियो। त्यसैले यहाँ
सहो रोजावट तथा सरसफाई उपभोक्ता (दान सहोला-
नयाँ) तथा सरसफाई सेक्टर (अपभोक्ता) को संस्थापना हामी
कहुरा, रोखिने, प्रहेलिया, नयाँपिपला प्रहोतलाई अन्य उपभोक्ता
वन क्षेत्र हुँदै खानेपानी नयाँपुर्ने, डाँडै डाँडैमा ट्याङ्की लगा-
यतका विभिन्न संरचनाहरू निर्माण गर्नुपर्ने देखिएको छ।
अपभोक्ता, अपभोक्ता गर्नुपर्ने समय र स्थानमा यस समूहको
वन क्षेत्रभित्र खानेपानीको सम्बन्धित कुराहरू संरचना निर्मा-
णा गर्नुपर्ने भन्नामा नयाँपुर्ने पार्ने र उक्त संरचनाको स्था-
पित्व चरकोट खानेपानी उपभोक्ता संस्थापना ने रहने गरि
संस्थापित समेत उहाँले गर्न यो समूहको वन उपभोक्ता
समूह प्रकृति भएको जानकारी यति यो स्तम्भ प्रति-पत्र
आलोक्य गराएका कारण अनुरोध छ।

तीनाक
(तिनकबहादुर खत्री)
अध्यक्ष

नेपाल
श्री सदा खानेपानी तथा सरसफाई
सेक्टर अपभोक्ता संस्थापना, नेपाल

ANNEX 4: SAMPLE SURVEY QUESTIONNAIRE & CHECKLISTS

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

(आयोजना प्रयोजनको लागिमात्र तथ्यांकको प्रयोग गरिनेछ)

नगर आयोजना: शरीकोट खानेपानी घर नं: १३१
 जिल्ला: सिराहा नगरपालिका: गा.वि.स. ३/सिराहा वडा नं: २
 अन्तरवार्ता लिनेको नाम: शुभ राजा कुशी अन्तरवार्ता मिति: २०७२/०९/१०
 सुपरवेजरको नाम: रजु सर्के मोड नं: २३१४

१ सामाजिक-आर्थिक तथा अन्य विवरण

(उपयुक्त कोठामा (✓) यी बिन्दु जमाउनु वा आवश्यक विवरणहरु भर्नुहोस्)

- १.१ अन्तर्वार्ता लिनेको नाम: शुभ राजा कुशी
- १.२ घरमूल्या नाम: शुभ राजा कुशी लिंग: पुरुष महिला तेश्रो लिङ्ग पेशा
 परिवार सदस्य: पुरुष ० महिला २ तेश्रो लिङ्ग जम्मा: २ एकल महिला घरमूल्या भए
- १.३ यस परिवारमा शारिरिक रूपमा अशक्तता भएका परिवार सदस्य संख्या:
- १.४ जाति: जनजातिमध्ये कुन हो: क) ब्राह्मण ख) जनजाति ग) दलित घ) अन्य
 परिवारको स्वरूप: एकल संयुक्त
- १.५ घर परिवारका सदस्यहरुको विवरण यिनुहोस्

क्र.सं.	घरपरिवारका सदस्यको नाम	उमेर	लिंग	शिक्षा स्तर	पेशा
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१०					

नोट: पेशा: १ कृषि २ व्यापार ३/नीकरी ४ उद्योगधन्दा ५ रेमिटेन्स (वैदेशिक रोजगार)
 ६ ज्याला ७ अन्य ८) कुनै पेशा नभएका आश्रित जस्तै: विधार्थी, गृहिणी, अशक्त बृद्धावृद्धी; ५ बर्ष मुनिका बालबालिका आदि नाट गर्ने)

१.६ शिक्षा: १ निरक्षर २ साक्षर ३ प्राथमिकसम्म ४ माध्यमिकसम्म ५ तिस एल एल सी/उल्लिखित
 ६ आई.ए. ७ बि.ए. ८ एम.ए. ९ अन्य

१.७ यस परिवारमा बसोबास गर्ने अन्य सदस्यहरुको विवरण: सहयोगी देहावाले कुल संख्या

१.८ यस नगर/शहरमा कहिले देखि बस्दै आउनु भएको छ? वर्ष
 स्ववासी बसाइ सरेको बसाइ सरी आएको भए कुन जिल्लाबाट

१.९ बसाइ सनुको कारण: प्राकृतिक प्रकोप व्यापार/व्यवसाय शिक्षा दम्प जिविकोपार्जन

१.१० यो घर आफ्नै हो? हो भाडामा बसेको अन्य भाडामा बसेको भए मासिक कति तिर्नुहुन्छ

१.११ यस घरमा भान्सा कोठा बाहेक अन्य कति वटा कोठाहरु छन्?

१ कोठा २ कोठा ३ कोठा कोठा वा सो भन्दा बढी

१.१२ घरको अवलोकन गरी घरको किसिम लेख्नु। पक्की पक्की कच्ची

(घरको छत ढलान, बाई पक्की, डुहा/डुहाको गाढो, टिनको छाना/ढुहा/स्वेट/फ्लिगोडी टायल आदि कच्ची; माटा गाढो, छर/टायल/खजडोको छापको)

१.१३ यस परिवारमा जसमा जमीन छ? छ छैन छैन भने सम्बन्धीको रूपमा गणना गर्ने।

जग्गा कति छ? ५ रोपती

१.१४ यहाँले गाई/मैसी पाल्नु भएको छ? छ छैन छ भने कतिवटा? एउटा दुवटा वा तर्दी

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

क्र.सं.	सम्पत्ति	संख्या	कैफियत	क्र.सं.	सम्पत्ति	संख्या	कैफियत
१	साइकल/रिक्सा			९	स्टोन/ग्यास/बुली	५	
२	मोटरसाइकल			१०	रेफ्रिजरेटर		
३	बैलगाडा			११	वाशिंग मेशिन		
४	कार/जिप			१२	वाटर फिल्टर		
५	भिभीकल/बस			१३	कम्प्युटर		
६	इयाकल/ट्रक			१४	इमेल/इन्टरनेटको पहुँच		
७	रेडियो/ब्यासेट	४		१५	अन्य भए उल्लेख गर्ने।		
८	टेलिभिजन/भिडियोसेट	१					

१.१६ यदि कुन पेशा कृषि भए कति महिना खात पुग्छ? ३ महिना ६ महिना ९ महिना १२ महिना

यदि नपुग भएमा कसरी ग्रान्तु हुन्छ? १. बजार २. कच्ची ३. उपाधन्दा ४. रमितेज्या (वैदेशिक रोजगार) ५. ज्याला ६. अन्य

१.१७ तपाईंको परिवारको औसत वार्षिक खर्च कति छ उल्लेख गर्नुहोस्।

क्र.सं.	वर्षको औसत खर्च (रु.मा)	मासिक खर्च (रु.)	कैफियत
१	(क) कृषि तर्फ		
१.१	रसायनिक मल, विउ, किटनाशक आदी खरिद गर्न		
१.२	माटोको तैयारी, रोप्ने, गोड्ने, बासी काट्ने, भित्राउने, दुवागी र बिक्री गर्दा हुने खर्च		
१.३	अन्य भए (उल्लेख गर्नुस्)		
	(क) को जम्मा		
२	(ख) गैर कृषि तर्फ		
२.१	खाद्यान्न (अन्न र दैनिक उपभोग्य वस्तु)		
२.२	रुपडा		
२.३	शिक्षा		
२.४	घर भाडा/घर मर्मत		
२.५	यातायात/संचार		
२.६	बिद्युत		
२.७	पाती पीत/मसल/सम्भार		
२.८	श्रीषधि/उपचार (पानीबाट हुने रोग)		वार्षिक खर्च
२.९	श्रीषधि उपचार (अन्य रोग)		वार्षिक खर्च
२.१०	अन्य चाडपर्व/कर्मकाण्ड/संस्कार आदि उल्लेख गर्ने		वार्षिक खर्च
	(ख) को जम्मा		
	सम्बन्धीको कुल जम्मा	१०,०००/-	

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

क्र.सं.	आय स्रोत	सम्बन्धी परिवार पुरव	प्राप्त हुने माय (रु.मासिक)	कैफियत
१	कृषि तर्फ			

१.१	कृषि उत्पादनको विक्रीबाट आउने (मकै, गहुँ, धान, तरकारी, फलफूल)			
१.२	घरका अन्य उत्पादन (दुग्ध, दही, धुँ, चाखा, कुखुरा आदि)			
(क) को जम्मा				
२	(ख) गैर कृषि तर्फ			
२.१	नोकरी / जागिर			
२.२	ज्यासा मजदुरी			
२.३	पेन्सन / उपदान आदि			
२.४	वैदेशीक रोजगार (सम्पत्ति)			
२.५	पसल / ब्यापार			
२.६	उपयोग			
२.७	पसल / घर भाडा			
२.८	गाडी / हवाई व्यवसाय			
२.९	अन्य भए जसलेख गर्ने			
(ख) को जम्मा				
कुल कुल जम्मा				१५००००/-

१.१९. यहाँको परिवारले कुनै ऋण लिएको छ छैन छ भने रकम रु _____

२. खानेपानी तथा सरसफाइ व्यवस्थापन

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

क्र.सं.	व्यवस्थापनमा	✓	मिटर/दैनिक	स्रोत/सुविधा/धातुमा	✓	मिटर/दैनिक
१	इनार / कुवा	<input type="checkbox"/>		इनार / कुवा	<input type="checkbox"/>	
२	ट्यूबवेल / ह्याण्डपम्प / डिप ट्यूबवेल	<input type="checkbox"/>		ट्यूबवेल / ह्याण्डपम्प / डिप ट्यूबवेल	<input type="checkbox"/>	
३	सार्वजनिक धारा	<input checked="" type="checkbox"/>	३००	सार्वजनिक धारा	<input checked="" type="checkbox"/>	३००
४	निजी धारा	<input type="checkbox"/>		निजी धारा	<input type="checkbox"/>	
५	झुल / खोला, नदी, पोखरी	<input type="checkbox"/>		झुल / खोला, नदी, पोखरी	<input type="checkbox"/>	
६	विक्रीत/समेत पानी किनेर	<input type="checkbox"/>		विक्रीत/समेत पानी किनेर	<input type="checkbox"/>	
१०	बसोतीको पानी संकलन गरेर	<input type="checkbox"/>		बसोतीको पानी संकलन गरेर	<input type="checkbox"/>	
११	अन्य	<input type="checkbox"/>		अन्य	<input type="checkbox"/>	

२.२. दैनिक आवश्यक पानी आपूर्ति गर्नका लागि पानी संकलनको निम्न विस्तृत विवरण दिनुहोस् ।

क्र.सं.	विवरण	वर्षा घातमा					मरुत घातमा				
		पुरुष	महिला	बालक	बालक	जम्मा	पुरुष	महिला	बालक	बालक	जम्मा
१	कति खप/पटक					X					X
२	लिटर/खप										
३	कुल परिमाण										
४	पानी ल्याउन लाग्ने समय (मिनेट) - खप										
	• पानीको महान् स्रोत पत्त										
	• महानमा पसल गर्ने समय										
	• फर्कदा लाग्ने समय										
५	पानी ल्याउन लाग्ने समय										

नोट: घरबाटोको निचे आएको पानीको पाइपो हरी मोको समता पकिने गरि परिमाण उल्लेख गर्ने ।

३. निजी धारा जडान

३.१. के तपाईंले घरमा पाइप बाजा जडान गनु भएको छ ? छैन यदि छ भने कस्तो प्रकारको छ ?

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

३.२. तपाईंको घरमा जयोग हुने पानीको गुणस्तर कस्तो छ ? राम्रो ठिकै खराब

३.३ के तपाई आफ्नो घरमा धारा जोड्न चाहनु हुन्छ ? चाहन्छ 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) सार्वजनिक पानी बिल धेरै आउने भएकोले घ) पानीको मात्रा पर्याप्त नभएकोले

ङ) पानीको आपूर्ति विद्यमान नभएकोले च) यस क्षेत्रमा पाइपलाइन जडान गर्ने व्यवस्था उपलब्ध नभएकोले

छ) पानीको गुणस्तर राम्रो नभएकोले ज) अन्य कारण उल्लेख गर्ने क) धारा छैन

३.५ हाल तपाईले पानीप्राप्त बापत महिनामा पानीको महशुल तिर्दै हुनुहुन्छ ? छ छैन

सह-जगान अवधारणा सम्बन्धी प्राथमिकता

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

- | | | | |
|-------------------------------|-------------------------------------|--------------------|-------------------------------------|
| क) सडक बत्ती | <input type="checkbox"/> | ख) विद्युत | <input type="checkbox"/> |
| ख) कालोपत्रे सडक | <input type="checkbox"/> | ज) संचार | <input type="checkbox"/> |
| ग) विद्यालय | <input type="checkbox"/> | झ) सरसफाइ/सुविधा | <input checked="" type="checkbox"/> |
| घ) अस्पताल | <input type="checkbox"/> | ञ) सिंचाइ | <input type="checkbox"/> |
| ङ) व्यक्तिगत खानेपानी प्रणाली | <input checked="" type="checkbox"/> | ट) पाटीपोख घरेलुमा | <input type="checkbox"/> |
| च) वैदलधारी सडक | <input type="checkbox"/> | ठ) अन्य | <input type="checkbox"/> |

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

१	१५००० मन्दा माथि	<input type="checkbox"/>	४	३००१ देखि ६००० सम्म	<input type="checkbox"/>
२	१००१ देखि १५००० सम्म	<input type="checkbox"/>	५	१५०१ देखि ३००० सम्म	<input checked="" type="checkbox"/>
३	६००१ देखि १०००० सम्म	<input type="checkbox"/>	६	१५०० मन्दा कम	<input checked="" type="checkbox"/>

४.३ निजी धारा जडान बापत लाग्ने शुल्क व्याहोर्नु पर्नेछ? मन्जूर छ मन्जूर छैन

४.४ क्या खानेपानी योजना राख्न भएमा आफ्नो घरमा धारा जडान गरी त्यो नियमावलीअनुसार मासिक पानी महशुल निर्यात गर्न तयार हुनुहुन्छ ?

छु छैन यदि इच्छुक हुनु हुन्छ भने तल दिइएको तालिकामा पानी महशुलको सीमामा चिन्ह लगाएर आफ्नो इच्छा व्यक्त गर्नुहोस ।

१	रु ५०० मन्दा माथि	<input type="checkbox"/>
२	रु ३५१ देखि ५००	<input type="checkbox"/>
३	रु ४०१ देखि ४५०	<input type="checkbox"/>
४	रु ३५१ देखि ४००	<input type="checkbox"/>
५	रु ३०१ देखि ३५०	<input checked="" type="checkbox"/>
६	रु २५१ देखि ३००	<input type="checkbox"/>
७	रु २०१ देखि २५०	<input type="checkbox"/>
८	रु १५१ देखि २००	<input type="checkbox"/>

- ४.४ खाँचेपानी वितरण प्रणालीको व्यवस्था हुँदा तपाईंको परिवारबाट प्रतिवद्धता स्वरूप अग्रिम लागतको ५% रकम दिन तयार हुनु हुन्छ? छ छैन
- ४.९ नयाँ सरसफाई सुविधा (सामुदायिक शौचालय तथा सतही ढल) निर्माणको लागि सह लगानी स्वरूप १५% स्थानीय निकाय र उपभोक्ताले सहलगानी गर्ने इच्छुक हुनुहुन्छ? छ छैन

५. लैङ्गिक दृष्टिकोणबाट महिला सहभागिता

(आयोजनाको विभिन्न चरणमा महिला सहभागिता सम्बन्धि गैरलाभन्वित विपन्न वर्गको, आदिवासी जनजाति, रजित तथा पिछाडि एका वर्गको समावेशी सहभागिता सम्बन्धि जानकारी सकलन गर्न प्रत्येक घरबैलोमा सोधिने प्रश्नहरूको प्रस्तुत गरिएको छ।)

क) महिलाहरूको उपस्थिति र सहभागिता

- ५.१ आयोजनाकोबारेमा छलफल गर्न कुनै बैठक बोलाईएको थियो ?
थियो थिएन
- ५.२ के आयोजनाको छनौट गर्न बैठकमा महिला उपभोक्ताहरूको उपस्थिति थियो ?
थियो थिएन
यदि थियो भने महिला उपभोक्ताहरूको भूमिका केस्तो थियो ?
सुन्ने मात्र अन्तर्क्रियात्मक निर्णायक
- ५.३ आयोजनाको क्रियाकलापहरूको 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 कामहरूअक्सर कसले गर्ने गर्दछ? (✓) चिन्ह लगाउनुस् (दैनिक घण्टामा)

क्र.सं	घरायसी क्रियाकलापहरू	पुरुष	महिला	कुल समय
१	खानेपानी पार्ने, बोक्ने, भण्डारण		<input checked="" type="checkbox"/>	
२	मान्छा तयार गर्ने, भाँडा माप्न		<input checked="" type="checkbox"/>	
३	बालबालिका र वृद्धवृद्धाको स्थाहार		<input checked="" type="checkbox"/>	
४	मुगा धुने घर सफा गर्ने		<input checked="" type="checkbox"/>	
५	खाद्यान्न भण्डारण तथा तयारी		<input checked="" type="checkbox"/>	
६	अन्य			

ग) पारिवारिक व्यवस्थापन, आय स्रोत र अन्य विषयमा महिलाहरूको नियन्त्रण र पहुँच

- ५.५ तलको तालिकामा उल्लेखित पारिवारिक विषय वा क्षेत्रहरूमा निर्णय गर्दा यहाँको घर परिवारमा महिलाको भनाई सुन्वाई हुन्छ? उपयुक्त कोठामा (✓) चिन्ह लगाउनुस्

क्र.सं	विषय वा कार्यक्षेत्रहरू	हुन्छ (✓)	हुदैन (✓)
१	आर्थिक सरोकारका कुराहरू	<input checked="" type="checkbox"/>	
२	केटाकेटीको शिक्षा दिा	<input checked="" type="checkbox"/>	
३	केटाकेटी र वृद्धवृद्धाको स्वास्थ्य र स्थाहार	<input checked="" type="checkbox"/>	
४	अचल सम्पति किनवेंच (घर जग्गा)		<input checked="" type="checkbox"/>
५	दैनिक क्रियाकलापहरू	<input checked="" type="checkbox"/>	
६	सामाजिक विधि व्यवहार, विवाह, अंतर्ग्रन्थ, जाडपत्र तथा सामाजिक, पारिवारिक सुसम्बन्धन आदि	<input checked="" type="checkbox"/>	
७	अन्य		

५.६ यहाँको परिवारमा पारिवारिक सम्पत्तिका निम्न विषयमा महिलाको पहुँच र स्वामित्व रहेको छ छैन तलको तालिकामा उपयुक्त कोठामा (✓)चिन्ह लगाउनुस

क्र.सं.	विवरण	पहुँच	स्वामित्व
१	जग्गा जमिन	<input checked="" type="checkbox"/>	<input type="checkbox"/>
२	घर तथा अन्य संरचनाहरू	<input checked="" type="checkbox"/>	<input type="checkbox"/>
३	चल सम्पति/संचित पैसा	<input checked="" type="checkbox"/>	<input type="checkbox"/>
४	दैनिक क्रियाकलापहरू	<input checked="" type="checkbox"/>	<input type="checkbox"/>
५	अन्य	<input type="checkbox"/>	<input type="checkbox"/>

घ) खा.पा.उ.स.स. तथा समुदायमा महिलाको स्तर (हैसियत) (निम्न बुँदाहरू फोकस रुप छलफलको आधारमा जानकारी लिएर टिपोट गर्नुपर्नेछ)

क्र.सं.	विषय	उच्च	मध्यम	निम्न
१	आत्मसम्मानबोध	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
२	आत्मविश्वास, नेतृत्व क्षीप	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
३	दायित्वबोध र क्षमता	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
४	ल्याकत, तर्क संगत, श्रेय र सहनत	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
५	अन्य	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

६. सम विकासमा पहुँचका आधारमा सामाजिक समावेशी सहभागिता

क) आयोजना क्रियाकलापमा गैरलाभान्वित विपन्न बर्गहरू, पिछडिएका वर्ग, जातजाति, दलित, अपाङ्गता भएको व्यक्तिको उपस्थिति

६.१ आयोजनाको चारैमा छलफल गर्ने कुनै भेला/ बैठकमा समावेशी तवरले बोलाइएको थियो ?
थियो थिएन

६.२ के आयोजनाको छनौट गर्ने बैठकमा समावेशीताको आधारमा सहभागीहरूको उपास्थिती थियो?
थियो थिएन

६.३ के खा.पा.उ.स.स.को गठनमा समावेशीता अंगीकार भएको थियो? थियो थिएन

ख) निर्णय प्रक्रियामा समावेशी प्रकृया अपनाइएको थियो ?

६.४ आयोजना छनौट गर्ने जातजातिहरूको कस्तो भूमिका कस्तो थियो ?
उच्च मध्यम निम्न

६.५ साना सहरौ खोजिपानी आयोजना कार्यान्वयन गर्ने सामाजिक समावेशी आधारमा उपभोक्ताहरूको परिचालन गर्न भएको प्रयास कस्तो थियो? राम्रो मध्यम निम्न

७. स्वास्थ्य र सरसफाई

क. खानेपानी

१ तपाईंको विचारमा पानीको गुणस्तर राम्रो (खराब) भएमा के समस्याहरू देखिन सक्छ ?
(एक भन्दा बढी उत्तर आउन सक्ने)

१.१ दुर्गन्ध आउने ममिठो स्वाद १.२ दलित विद्युत/रंगीन
१.३ त्रिशूली ढनाउने १.४ अन्य (उल्लेख गर्नु)

२ के तपाईंलाई पानी भरने र राख्ने भाँडो पानी भरनु र भण्डार गर्नु पूर्व सफा गर्नुपर्छ भन्ने थाहा छ ?
छ छैन

यदि छ भने, पानी राख्ने भाँडो कसरी सफा गर्नु हुन्छ ?

२.१ खाली पानी भाँडो २.२ खरानी पानीले २.३ मुख पिठो र पानीले
२.४ साबुन पानीले २.५ अन्य (उल्लेख गर्नुस)

३ तपाईं घरमा पानी कसरी राख्नु हुन्छ ?

(एक भन्दा बढी उत्तर आउनु सक्ने)

- ३.१) पानी भर्नु पहिले भाँडा सफा गर्ने ३.२) बामी पानी फर्काउने
 ३.३) पानी राख्ने भाँडा राम्रोसँग ढाकेर छोपेर राख्ने ३.४) अन्य उल्लेख गर्ने

ख) तपाईंको घरमा बाँटोबाट पानी कसरी निकाल्नुहुन्छ ?

- ४.१) पानी सानु अथि अम्बोरा लौटा करवा सग छोपेर
 ४.२) गिसास, सिरि, काग भाँडोमा छोपेर
 ४.३) गाघोवाट लौटा, अम्बोरा, करवा, गिसासमा पानी सारि
 ४.४) अन्य (उल्लेख गर्ने)

ख) चर्पी

- १) के तपाईंको घरमा चर्पी छ छैन (यदि छ भने १.३ खाने)
 १.१) यदि छ भने, कस्तो प्रकारको चर्पी छ
 १.१) खान्दा चर्पी ४) सिस्टर्न फलस
 २) भेन्टिलेटेड खान्दा चर्पी ५) अन्य
 ३) वाटर मिल/पोर फलस
 १.२) यदि छ भने, तपाईंको घरमा चर्पी कुसकसले प्रयोग गर्नुहुन्छ ?
 (१) सबैले २) बच्चा बाहेक सबैले ३) न्युस्क ४) पौडले मात्रै ५) विरामी मात्रैले)
 १.३) यदि छैन भने, दिसा गर्ने कहाँ जानुहुन्छ ?
 (के) खोला/जङ्गल/किनार ख बिल्ला/मैदान/डाउ ग/घर/सडक छेउ प जहाँ सजिलो हुन्छ)

- १.४) के तपाईंको समुदाय खुल्ला/अधाम्क क्षेत्र घोषणा भएको छ ? छैन

ग) खानेकुराका सरसफाइ

- १) खाद्यपदार्थ उपयुक्त हुनबाट कसरी बचाउनुहुन्छ ? (एक भन्दा बढी उत्तर आउनु सक्ने)
 १.१) पकाएको खाना छोपेर/ढाकेर राख्ने १.२) सफा हातले खाना पस्कने गर्नाले
 १.३) काँचो खाँदने खानेकुरा राम्रोसँग पखालेर छोपेर १.४) हात गाँडा सफा गरेर मात्र खाना पसेर
 १.५) धेरै आसी ज्ञा सङ्गले खाना, फलफूल बिसजत गर्ने
 १.६) डाइ पन्थु, बाल भाँडाकडा सफा गरेर मात्र खाना पस्कने/खाने
 १.७) चुलो चौकी पकाउने भाँडा ढकनहरू सफा राख्ने
 २) के तपाईं खानेकुरा छोपेर/ढाकेर राख्नुहुन्छ ? राख्नु राखिन

घ) व्यक्तिगत सरसफाइ : घरपरिवारको सँख्या अनुसार क्याकलापमा टिक चिह्न लगाएर सँख्या राख्ने । जस्तो परिवारको परिवार भए हरेक क्याकलापमा टिक सहित घरको सँख्या आउनुपर्ने

- १) तपाईं र परिवारका अन्य सदस्यले कहिले र के गरपछि हात धुनुहुन्छ ? धुने भए गर्नुो चिह्न लगाउनुहोस् र नधुने भए यस्तो चिह्न लगाउनुहोस् । (एक भन्दा बढी उत्तर आउनु सक्ने)

	हाम्रो (✓)	नक्ने (✗)	हो (✓)	नहो (✗)	न/क/स/स/स
१) खाना खान अघि		✓	✓		✓
२) खाना खाएपछि	✓		✓		✓
३) दिसा राखेपछि			✓		✓
४) फोहर मैला छोपेपछि	✓		✓		✓

4	क्रोमब्राट फर्कपाछ			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	केटाकेटीलाई पिसा पिसाव गराइ सकेपछि			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	अन्य (उल्लेख गर्नु)				

तपाईं र परिवारका अन्य सदस्यले के ले हात धुनुहुन्छ ? धुनेमा यस्तो चिन्ह लगाउनुहोस् र तथ्यलेमा यस्तो चिन्ह लगाउनुहोस्।

* चिन्ह लगाउनुहोस्।

7	पानी माथि				
8	खरानी पानी				
9	ब्रस/पिठो पानी				
10	साबुन पानी		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
11	अन्य (उल्लेख गर्नु)				

तपाईं र परिवारका अन्य सदस्यले कहिले कहिले नुहाउनुहुन्छ ?

नुहाउने भए यस्तो चिन्ह लगाउनुहोस् र ननुहाउने भए यस्तो चिन्ह लगाउनुहोस्।

12	प्रत्येक दिन				
13	एक दिन बिराएर				
14	सप्ताहमा २ पटक		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
15	हप्तामा १ पटक		<input checked="" type="checkbox"/>		
16	२ हप्तामा १ पटक				
17	माहमा एक पटक				

फोहोर मैला व्यवस्थापन

तपाईंको घरबाट निस्कने ठोस फोहोर मैला कहाँ बिसर्जन गर्नुहुन्छ ?

१.१ घर नजिक खास्डोमा १.२ निजी फोहोर सफाई कलाइ दिने

१.३ गा वि.स. तालबोलीकाले व्यवस्था गरेको खास्डो वा क्यानोमा १.४ अन्य (उल्लेख गर्नु)

२. ठोस तथा तरल फोहोर वस्तुलाई अव्यवस्थित तरिकाले बिसर्जन गर्नुमा हुने तरामा असुरक्षित रहेको हुनु एक भन्दा बढी उत्तर आउन सक्ने।

२.१ फोहोर बालावरणमा वृद्धि २.२ सामखुटे, फिगा, किराहको वृद्धि

२.३ रोग सन्नेमा वृद्धि २.४ अन्य (उल्लेख गर्नु)

३. तपाईंको घरबाट निस्कने फोहोर पानी कहाँ बिसर्जन गर्नुहुन्छ ?

३.१ खास्डोमा (Soak pit) ३.२ सरकारी बारीमा/करीब बारीमा

३.३ सामुदायिक कुलमा ३.४ अन्य (उल्लेख गर्नु)

घ. बस्तुभाउको फोहोर व्यवस्थापन

१. के तपाईंले बस्तुभाउ पाल्नु भएको छ ? छ छैन छैन भने कुनै अन्य सरुवा रोगमा जान

पाइ छ भने कुन कुन प्रकारका छुट्टा तितीहरूलाई कहाँ राख्नु हुन्छ ?

18	गाई/भैँसी	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
19	बघैर/सगर		
20	बाख्रा		

५	कचरा/हास	
५	अन्य	

२. बस्तुभाउबाट निस्कने फोहोर कहाँ र कसरी विसर्जन गर्नुहुन्छ ?
- २.१ मलखादमा २.२ आगो बाल्ने/गुईठा बनाउने
- २.३ गोबर घास प्लान्टमा प्रयोग गर्ने २.४ अन्य (उल्लेख गर्ने)
३. बस्तुभाउको फोहोर मैलाको जघाभाव अव्यवस्थित तवरले विसर्जन गर्दा हुने खराब असरहरूको के हुन् ? (एक भन्दा बढी उत्तर आउन सक्ने)
- ३.१ बातावरणीय फोहोरमा वृद्धि हुने ३.२ लामखुट्टे, फिफा, किराहरूको वृद्धि हुने
- ३.३ रोगवाधि बढ्ने तथा सन् ३.४ गाँउ, छरीछिमेक तथा नगर अशोभित्व देखिने
- ३.५ अन्य (उल्लेख गर्ने)

३. सेफ्टेज (फोहोरलेदो) व्यवस्थापन (चर्पीबाट सेफ्टीट्याकमा जम्मा भएको फोहोरलेदो थप प्रबन्धन सहित)

- १) चर्पीबाट विसर्जित मलमूत्र व्यवस्थापन (जम्मा) कहाँ गर्ने गरेको छ ?
- खाल्डा रिङ खाल्डा सेफ्टी ट्याक अन्य
- २) सेफ्टी ट्याक खाल्डाको क्षमता कति (ठूलो सानो साइज) छ ?
- ३) हालसम्म कहिल्यै सफा गर्नु भएको छ ? छ छैन छ भने कति वर्षमा भरियो ?
- सफा गर्ने बोन रकम तिनै पैसा र
- ४) सेफ्टी ट्याकबाट निस्कने फोहोर प्रशोधन पछि मलका रूपमा प्रयोग गर्ने तयार हुनुहुन्छ ? छ छैन
- ५) सेफ्टी ट्याकबाट निस्कने फोहोर सफा गर्ने क्रममा रकम तिनै तयार हुनुहुन्छ ? छ छैन
- ५.१ तिनै तयार भए कतिसम्म तिनैहुन्छ ? रु २००० सम्म रु २००० माथि
- ६) तपाईंको घरबाट सेफ्टीट्याकमा जम्मा भएको फोहोर लेदो (सेफ्टेज) कसरी धान्ने गर्नुहुन्छ ?
- १ आफै सफा गर्ने २ सफा गर्ने, मान्छे प्रयोग गर्ने ३ व्यवस्थित कम्पनीको सेवासिने ४ अन्य
- ७) सेफ्टेज(फोहोर लेदो) कहाँ व्यवस्थान गर्ने गरेको छ ?
- १ खुल्ला ठाउँमा २ खोलानाला, खोलाखोल्सीमा ३ वनजंगल सार्वजनिक स्थानमा ४ सडक बाटो किनारमा ५ अन्यकुन अनुसार ६ अन्य
- ८) सेफ्टेज(फोहोर लेदो) व्यवस्थान सुधार गर्न चाहनुहुन्छ ? चाहन्छु चाहन्न
- ९) सेफ्टेज(फोहोरलेदो) व्यवस्थान सुधार गर्न के गर्न चाहनु हुन्छ ?
- १ सेफ्टीट्याक बनाउने २ भएको सेफ्टीट्याक/चर्पीको खाल्डो सुधार गर्ने
- ३ तपाईंको चर्पीबाट ढल जोडी सामुहिक रूपमा सेफ्टेज प्रशोधन प्रणाली व्यवस्थापन गरे सेवासिने तयार हुनुहुन्छ ?
- ४ अन्य (उल्लेख गर्ने)
- १०) सुधार गर्न कति रकम सम्म लगानी गर्न ईच्छा छ ? सोधेर तोट गर्ने रु.

३. पानीजन्य सत्त्वा रोगहरू

१. पानीजन्य सत्त्वा रोगको कारणहरूको के हुन् ? (एक भन्दा बढी उत्तर आउन सक्ने)
- १.१ दूषित पानी प्रयोग गर्दा १.२ दूषित खाना खाँदा
- १.३ घर तथा सार्वजनिक स्थलमा फोहोर बढ्नाले १.४ मानिसको मलमूत्र जघाभावी विसर्जन गर्नाले
- १.५ फोहोर मैला जघाभावी फ्याँके गर्दा १.६ स्वास्थ्य शिक्षा तथा स्वस्थ बानीको अभाव
- १.७ सरसफाई र स्वास्थ्य सम्बन्धी ज्ञान र जेतकाको अभावले १.८ अन्य
२. तपाईंको परिवारमा कोही बिरामी प्रसमा के गर्नुहुन्छ ? (प्राथमिकता अनुसार नम्बर लेख्ने)

- २.१ घरायसी उपचार गर्ने २.२ धामी फाँकी/पुजारी कहाँ लाने
 २.३ औषधि परखमा जाने २.४ स्वास्थ्य चौकी वा अस्पतालमा जाने
 २.५ अन्य (उल्लेख गर्ने)

३. यदि परिवारमा कुनैलाई भाडापखाला लागेमा के गर्नुहुन्छ ? (प्राथमिकता अनुसार नम्बर लेख्ने)

- ३.१ जीवनजल खुवाउने ३.२ घरायसी उपचार गर्ने
 ३.३ धामी, फाँकी वा पुजारी कहाँ जाने ३.४ औषधि परखमा जाने
 ३.५ स्वास्थ्य चौकी वा अस्पतालमा जाने ३.६ अन्य (उल्लेख गर्ने)

४. गत एक सालभित्रमा तपाईंका परिवारका सदस्यहरू भाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरूबाट प्रभावित थिए ? प्रभावित भएका भए कति जना थिए तलको तालिकामा सख्या नाँटि गर्नु

क्र.सं.	रोग/संकेत	१	२	३	४	५	६	७	८	९	जम्मा
१	भाडापखाला										X
२	आँसु										
३	ज्वर										
४	सोँतफाँट										
५	दस्त										
६	खाला सम्बन्धी रोग										
७	डोसोबिग (डिजेरिया)										
८	कमजोरिपन (जिउडेस)										
९	अन्य										
	जम्मा										X

५. गत एक वर्षभित्र तपाईंका परिवारमा भाडा पखाला तथा पानीजन्य अन्य सरुवा रोगहरूबाट कुनैको मृत्यु भएको छ ? (मृत्यु जसस्थान)

रोग/संकेत	१	२	३	४	५	जम्मा
भाडा पखाला						X
आँसु						
पानीजन्य अन्य सरुवा रोगहरू						X
जम्मा						X

६. गत एक वर्षभित्र तपाईंको परिवारका सदस्यलाई भाडापखाला र पानीजन्य अन्य सरुवा रोगहरूको उपचारमा कति रकम खर्च गर्नु भयो

रोग/संकेत	१	२	३	४	५	जम्मा
भाडापखाला						
पानीजन्य अन्य सरुवा रोगहरू						X
जम्मा						X

अन्यबारे

Checklist for Physico-chemical Environment

Parameters	Description
Topography	Hilly region, Extensive Terraces and Steep Gorges
Geology (Rock and Soil Types)	Gneiss, Schist, grey to greenish-grey phyllites and quartzite Colluvial Deposits, Alluvium Deposits
Erosion and Sedimentation	No such events recorded and observed
Climate	Sub-tropical to Temperate Climate
Quarry Sites (If any)	No
Land Use	Agriculture: 39.63% Forest: 52.52% Residential: 4.72% Others: 3.13%
Air Quality	Not that severe
Water Quality	Moderate
Noise Level	Not that severe
Drainage Network	No proper drainage system

Project: Charikot WSSP

CHECKLIST OF FLORA

Date: August, 2015

S.No.	Name of plants	Uses			Others
		Fuel-wood	Fodder	Medicine	
1.	Ainsetu			✓	Fruit, Agroforestry
2.	Amala	✓		✓	Edible
3.	Angeri	✓		✓	
4.	Ashare. Ful			✓	
5.	Asuro			✓	
6.	Bakaino			✓	Edible fruits, Agroforestry
7.	Ban			✓	" "
8.	Basso			✓	Fodder
9.	Bel			✓	Fruit, Agroforestry, Religious
10.	Bhatayo			✓	Edible Oil
11.	Bhote Pipal	✓	✓	✓	Paper Manufacturing
12.	Bhot Dhayaro			✓	Edible gum, other
13.	Chibaune			✓	Agroforestry, Dyeing
14.	Chunui	✓		✓	Edible fruits, Agroforestry
15.	Churo			✓	Fruit, Dyeing, Alcohol
16.	Dias	✓		✓	Fruit for flavouring
17.	Dadabe			✓	Edible fruit, Agroforestry, Salad vegetable
18.	Dhobeni			✓	
19.	Dhusure			✓	
20.	Gristha			✓	
21.	Gumulo	✓		✓	Edible fruit
22.	Harunde			✓	Edible leaves, Agroforestry
23.	Haro			✓	Edible fruit, Dyeing
24.	Jamun	✓		✓	Edible fruit, Agroforestry
25.	Thonkot Syaula	✓		✓	Agroforestry
26.	Kabao			✓	
27.	Kadam			✓	Edible fruit, Agroforestry
28.	Kafal			✓	Edible fruit, Dyeing
29.	Karam			✓	
30.	Khayor	✓	✓	✓	Edible seeds, Dyeing, Tanning
31.	Khanayo			✓	Edible seeds
32.	Kuirro			✓	
33.	Kumbui	✓		✓	Agroforestry, Edible fruit
34.	Kuturo			✓	Timber, Edible fruit
35.	Loampate			✓	Edible fruit
36.	Mauloa			✓	Agroforestry, Medicinal
37.	Phalado			✓	Agroforestry
38.	Pipal	✓		✓	Religious

CHECKLISTS FOR FOCUS GROUP DISCUSSION

A. FOCUS GROUP DISCUSSION 1

Date: 21 June, 2015

Project: Charikot Water Supply & Sanitation Project

Venue: Charikot WUSC Office

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:

1. Do you know about Urban Water Supply & Sanitation (Sector) Project? If yes, can you please share the information you know about this project?
2. How do you feel about the project proposed in your town? Do you think that this proposed project is important for your town?
3. How familiar are you with the term "Environment"?
4. Are there any community forests and protected areas within this project area?
5. Do you have any idea about the environmental concerns regarding the proposed project?
6. Do you have any objection regarding the project activities that will be carried out at core bazaar area?
7. As a stakeholder, how can you contribute from your side to minimize the anticipated environmental issues?
8. Lastly, what would you say are the most important issues you would like to express about this project?


Engineer

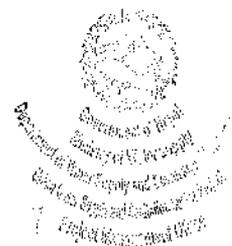


FINDINGS OF FOCUS GROUP DISCUSSION 1

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. Thus, they expect this proposed project to improve the existing water system.
3. The participants are also found aware about the environment.
4. No such protected areas are known to be existing within the project area. However, it is known that few community forests falls within the project area.
5. Their main concerns regarding the environmental aspects are Dust Emissions, Water Quality, Noise Pollution, Community Forest Conservation, Traffic Congestion, Obstruction to the vendors & passersby, Damage to the existing facilities and Construction Waste & Solid Waste Management during construction period. They are also concerned about effective operation & management and anticipated leakage problems during operation phase.
6. They stated "No Objection" regarding the project activities that will be carried out at core bazaar area. However, they urged to carry out the project activities at this area with proper care and prompt actions regarding excavation & backfilling works.
7. After assuring about the mitigation measures for the environmental concerns they raised, they committed to contribute to support safeguard implementation of the proposed project.
8. Their positive response towards the implementation of the proposed project indicates Willingness to Pay for this project. The most important issue they raised about the proposed project is the assurance for the provision of safe, reliable and sufficient water supply system.



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Engineer



B. FOCUS GROUP DISCUSSION 2

Date: 22 August, 2015

Project: Charikot Water Supply & Sanitation Project

Venue: Charkot WUSC Office

Number of Participants: 8

Purpose Statement: Information Dissemination to the participants regarding preparation of technical & social survey works , Discussions regarding the proposed project and Roles & Responsibilities of various Stakeholders

Questions/Issues:

1. You must be familiar with UWSSSP as we had already discussed about it in our earlier discussion program dated June 21, 2015. Now, we are here to carry out technical & survey works of the proposed project. Do you have to say anything regarding this?
2. The issue you raised regarding service area is not now possible to consider as the service area has already been delineated earlier in consultation with WUSC & local community and for your information we have already discussed about it during our earlier discussion program also. But, we assure you that all the parts of the proposed service area will not be missed out during our survey. During survey, we urged all of you to provide full support.
3. Our design shows that some project components need to be constructed within the community forest. Hence, during survey, we want you to help us to establish coordination with the concerned community forest users group.
4. We are happy that you all are very aware of the conservation of the community forests. We are pleased to inform that our design does not involve any kind of destructive works within the community forest areas.
5. 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, however, those issues will not be either extreme or permanent.
6. As a stakeholder, how will you contribute from your side to minimize the anticipated environmental issues?
7. Lastly, what would you like to say about this project?



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FINDINGS OF FOCUS GROUP DISCUSSION 2

1. According to the participants, they are happy that their desire for the reliable, safe & potable water supply is being fulfilled sooner. Now, the only thing they want is that the proposed project should cover almost all the areas of Bhimeshwore municipality. They requested our team to consider this during technical design works.
2. After giving assurance regarding service area, they showed positive response towards provision of full support during survey works.
3. The participants assured us to fulfill our urge to establish coordination with the concerned community forest users group as soon as possible. They also assured us to provide consent letter from the concerned forest groups for our convenience. However, they entail assurance from us regarding the conservation of the community forests.
4. They are happy to know about the community forests regarding the proposed project.
5. They still showed concerns regarding the environmental aspects that includes 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 as like in the earlier discussion programs. We assure them about the mitigation of these likely environmental impacts by adopting the proposed mitigation measures.
6. As a responsible stakeholder, they committed to contribute to support safeguard implementation of the proposed project.
7. Lastly, the participants expressed their aspiration to get adequate, safe, reliable and potable water supply service from the proposed project along with the mitigated environmental impacts.



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C. FOCUS GROUP DISCUSSION 3

Date: 23 August, 2015

Project: Charikot Water Supply & Sanitation Project

Venue: Budhabimsen Community Forest Users' Group Office, Dharamghar

Number of Participants: 7

Purpose Statement: Discussions regarding the proposed project

Questions/Issues:

1. We all are here to carry out technical & survey works of the proposed project. As WUSC must have already disseminated information to you all about the construction of the project components within this community forest area. Do you have anything to share regarding this?
2. We now believe that you are quite clear about the layout plan of the proposed project within this community forest area. For our convenience, we request you to provide the Consent Letter or No Objection letter regarding the construction activities of the proposed project.
3. It will be more easier for us to carry out the survey works in your presence as we expects to get positive outcomes through your guidance during survey.
4. As you are the active members of this users' group, you must be well known about the likely adverse environmental impacts of the proposed project during construction phase. Do you have any problem regarding this?
5. Your fear is rational but we assure you that this will not happen at any cost as we have proposed the proper mitigation measures for each adverse imapcts and we have also prepared the environmental management plan to effectively implement the proposed mitigation measures. If you are still in doubt, we are here with the proposed EMP, please have a look at this and if you have any queries please don't hesistate to share with us
6. Besides being secondary stakeholders, as you are the inhabitants of this project town, you are also the primary stakeholders or we can say "Beneficiaries". As a beneficiary, how will you contribute from your side to minimize the anticipated environmental issues?
7. Lastly, what would you like to say about this project?



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Engineer



FINDINGS OF FOCUS GROUP DISCUSSION 3

1. They are aware about the proposed construction activities within their community forest area. They requested to observe the layout drawing of this area to be ensured that the proposed layout does not require to cut the trees. As per their request, we demonstrated the layout and clarify their doubts regarding conservation of forest resources.
2. They seemed appreciative towards us regarding the clarification of the layout drawing. However, before providing the consent letter, they demanded to allow them to get involved during survey works in their area to be fully ensured whether the survey works are carried out as per the proposed layout drawing or not.
3. They seemed enthusiastic towards getting involved in the survey works.
4. They are quite aware about the likely adverse environmental impacts of the proposed project. However, they expects us to either minimize or mitigate these impacts during construction phase as they are in doubt or worry that the expected adverse impacts will be overlooked.
5. After observing the EMP we had prepared, they seemed satisfied with this.
6. As a beneficiary, each of them showed their commitment to contribute to support safeguard implementation of the proposed project as per their capability as far as it is the matter of provision of efficient water supply service.
7. Lastly, the participants expressed their aspiration to get adequate, safe, reliable and potable water supply service from the proposed project and committed to provide full support during survey works and construction period.


Engineer



**ANNEX 5:
CHLORINE USE GUIDELINES**



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GUIDELINE VALUE

In humans and animals exposed to chlorine in drinking-water, specific adverse treatment related effects have not been observed.

Chlorine in drinking water is safe for consumption .The small amount of chlorine typically used to disinfect water does not pose risks to human health. The World Health Organization (WHO) has established a guideline value of 5 mg/L for chlorine in drinking water, meaning that such concentrations are considered acceptable for lifelong human consumption. Furthermore, WHO concludes that this value is "conservative," as no adverse effects from chlorine in drinking water were observed in studies reviewed by WHO.

Guideline values for chlorine WHO Guidelines for drinking water quality (2004)

Chlorine	below 5 milligrams per liter (mg/L)*
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*For effective disinfection, there should be a residual concentration of free chlorine of 0.5 mg/L after at least 30 min contact time at pH<8.0

Chlorination does not harm aquatic environments

Chlorinated drinking water is unlikely to be harmful when discharged into aquatic environments. An extensive risk assessment conducted under European Union guidelines examined potential harm from various processes to make drinking water using sodium hypochlorite. This assessment found no significant environmental risks from chlorine or byproducts formed during drinking water chlorination. The DBPs formed in drinking water depend on the nature and quantity of organic matter present as well as on the disinfectant and other treatments used. In drinking water the principal byproducts are trihalomethanes (THMs; mainly chloroform) and haloacetic acids (HAAs), with smaller amounts of other byproducts. Direct 'whole effluent' experiments representing various uses, including drinking water, have shown that no significant amounts of persistent and potentially bioaccumulative substances are formed. Toxicity tests on these mixtures demonstrated that the presence of DBPs did not increase the toxicity.

A major concern from the past was the formation of some highly-chlorinated, high-hazard molecules, such as dioxins, resulting from chlorine used in paper pulp bleaching. However, dioxins were only formed from 'active chlorine' under specific conditions: acid pH and in the presence of certain phenols such as those abundant in the lignin component of wood. There is no significant formation of dioxins or other high-hazard molecules at neutral or alkaline pH. All current uses of 'active chlorine' for microbial control and cleaning take place at alkaline or neutral pH.

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Engineer



**ANNEX 6:
WATER QUALITY TEST REPORTS**



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Engineer



NS Lab Accreditation No.: 09-2068/69

Regd. No. 53875/064/065



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(Center for Complete scientific solution)

Test Report/Certificate

Report No. : 24/2073
Entry No. : AASTHA - 14- 2073
Sample : Surface Water
Client : ICON - TAEC JV
Location : Hattichhare, Dolakha



Date received : 10 - 01 - 2073
Date completed : 18 - 01 - 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, 22 nd Edition	7.4	6.5 - 8.5
2.	Electrical Conductivity, (umhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22 nd Edition	162	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22 nd Edition	2.1	5 (10)
4.	Taste and Odor		N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22nd Edition	0.15	5(15)
6.	Total Hardness as CaCO ₃ , (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22 nd Edition	80	500
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22nd Edition	98	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, 22 nd 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, 22 nd Edition	0.89	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22nd Edition	<0.01	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22nd Edition	0.51	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO ₄ ²⁻ C, APHA - AWWA - WEF 2012, 22nd Edition	9.7	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, 22 nd Edition	12.8	200
17.	Iron*, (mg/l)		<0.05	0.30(3)
18.	Manganese*, (mg/l)		<0.01	0.20
19.	Lead*, (mg/l)		<0.003	0.01
20.	Cadmium*, (mg/l)	3111 B, APHA - AWWA - WEF 2012, 22nd Edition	<0.05	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.02	1.0
23.	Zinc*, (mg/l)		<0.01	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.

Zhita
Analyzed By

Zhita
Checked By

AASTHA
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 invoiced instruments 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 accredited by NBSM.



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(Center for complete scientific solution)



Report No. : 22/2073
Entry No. : AASTHA-14-2073
Sample : Surface Water
Client : ICON-TAECJV
Location : Jhapre, Dolakha

Date received : 10-01-2073
Date completed : 18-01-2073
Sampled By : Client

S. N.	Parameters	Method	Observed Values	National Drinking Water Quality Standard
1.	pH at 25°C	4500-H, APHA-AWWA-WEF 2012, 22 nd Edition	7.0	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22 nd Edition	31	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22 nd Edition	2.0	5 (10)
4.	Taste and Odor		N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA - AWWA - WEF 2012, 22 nd Edition	0.09	5(15)
6.	Total Hardness as CaCO ₃ , (mg/l)	2390 C, APHA-AWWA-WEF 2012, 22 nd Edition	20	500
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA - AWWA - WEF 2012, 22 nd Edition	19	1000
8.	Total Residual Chlorine, (mg/l)	4500-Cl B, APHA - AWWA - WEF 2012, 22 nd Edition	<0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl B, APHA-AWWA-WEF 2012, 22 nd Edition	<0.50	250
10.	Ammonia, (mg/l)	4500-NH ₃ D, APHA, AWWA, WPCF, 17 th Edition	0.45	1.5
11.	Nitrate, (mg/l)	4500-NO ₃ -B, APHA-AWWA-WEF 2012, 22 nd Edition	0.80	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22 nd Edition	<0.01	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA - AWWA - WEF 2012, 22 nd Edition	0.15	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO ₄ ²⁻ C, APHA - AWWA - WEF 2012, 22 nd Edition	4.2	250
15.	Mercury*, (mg/l)	3500-Hg C, APHA-AWWA-WEF, WPCF, 17 th Edition	<0.001	0.001
16.	Calcium, (mg/l)	3500-Ca B, APHA-AWWA-WEF 2012, 22 nd Edition	4.8	200
17.	Iron*, (mg/l)		0.21	0.30(3)
18.	Manganese*, (mg/l)		<0.05	0.20
19.	Lead*, (mg/l)		<0.01	0.01
20.	Cadmium*, (mg/l)	3111-B, APHA - AWWA - WEF 2012, 22 nd Edition	<0.003	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.05	1.0
23.	Zinc*, (mg/l)		<0.02	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA - AWWA - WEF 2012, 22 nd Edition	<0.01	0.05

Remarks: Water quality meets NDWQS required limit.

Shita
Analyzed By

Shita
Checked By

MSL
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 invoiced determinands 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 accredited by NBSM.



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(Center for complete scientific solution)

Test Report/Certificate

Report No. : 23/2073
Entry No. : AASTHA-14-2073
Sample : Surface Water
Client : ICON - TAEC JV
Location : Odare, Dolakha



Date received : 10-01-2073
Date completed : 18-01-2073
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, 22 nd Edition	7.7	6.5 - 8.5
2.	Electrical Conductivity, (µmhos/cm)	2510 B, APHA-AWWA-WEF 2012, 22 nd Edition	272	1500
3.	Turbidity, (NTU)	2130 B, APHA-AWWA-WEF 2012, 22 nd Edition	2.1	5 (10)
4.	Taste and Odor		N. O.	Not Objectionable
5.	Color, (TCU)	2120 C, APHA-AWWA-WEF 2012, 22 nd Edition	0.14	5(15)
6.	Total Hardness as CaCO ₃ , (mg/l)	2340 C, APHA-AWWA-WEF 2012, 22 nd Edition	124	500
7.	Total Dissolved Solid, (mg/l)	2540 C, APHA-AWWA-WEF 2012, 22 nd Edition	165	1000
8.	Total Residual Chlorine, (mg/l)	4500-Cl B, APHA-AWWA-WEF 2012, 22 nd Edition	<0.10	0.1-0.2
9.	Chloride, (mg/l)	4500-Cl-B, APHA-AWWA-WEF 2012, 22 nd Edition	<0.50	250
10.	Ammonia, (mg/l)	4500-NH3 D, APHA, AWWA, WPCF, 17th Edition	0.47	1.5
11.	Nitrate, (mg/l)	4500-NO ₃ -B, APHA-AWWA-WEF 2012, 22 nd Edition	0.84	50.0
12.	Aluminum, (mg/l)	3500-Al B, APHA, AWWA, WEF, 22 nd Edition	0.02	0.20
13.	Fluoride, (mg/l)	4500-F- D, APHA-AWWA-WEF 2012, 22 nd Edition	0.13	0.5-1.5
14.	Sulfate, (mg/l)	4500-SO ₄ -C, APHA-AWWA-WEF 2012, 22 nd Edition	12.4	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, 22 nd Edition	24	200
17.	Iron*, (mg/l)		<0.05	0.30(3)
18.	Manganese*, (mg/l)		<0.01	0.20
19.	Lead*, (mg/l)		<0.003	0.01
20.	Cadmium*, (mg/l)	3111 B, APHA-AWWA-WEF 2012, 22 nd Edition	<0.05	0.003
21.	Chromium*, (mg/l)		<0.05	0.05
22.	Copper*, (mg/l)		<0.02	1.0
23.	Zinc*, (mg/l)		<0.01	3.0
24.	Arsenic, (mg/l)	3500-As B, APHA-AWWA-WEF 2012, 22 nd Edition	<0.01	0.05

Remarks: Water quality meets NDWQS required limit.

Zhita
Analyzed By

Zhita
Checked By

[Signature]
Authorized By

Note : 1. The issued report refers only to the tested sample and applicable parameters. Endorsement of products is neither inferred nor implied.
2. Liability of our institute is limited to the invoiced 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 months.
4. Parameters in * are not accredited by NBSM.

ANNEX 7: PHOTOGRAPHS


Engineer







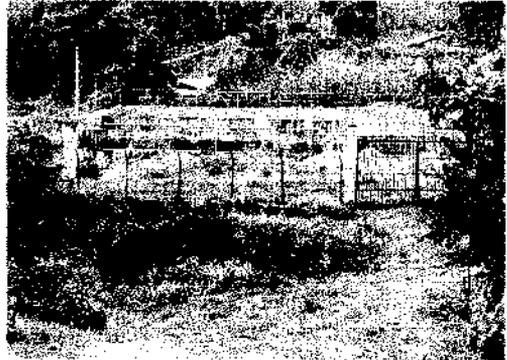
1. Odare Source



2. Hattichhahara (D/S of Intake)



3. Existing Condition of Distribution Pipelines



4. Existing WTP (WTP-E)



5. Proposed WTP Area (WTP-2) near Tower



6. Proposed RVT at Lower Jillu

K. B. J. K.
Engineer





7. Existing WS Scheme near Tower



8. Proposed RVT area for Upper Dolakha System



9. Existing RVT and Proposed RVT Site at Barsedanda



10. Charikot Bazaar (Satdobato Chowk)



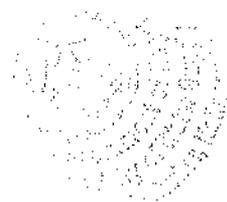
11. D/S of Ghatte Khola of SS-3



12. View of the Project Area

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Engineer

Government of Nepal
Ministry of Water Resources and Irrigation
Charikot Water Supply Project
Charikot, Nepal



ANNEX 8: COMMENT INCORPORATION MATRIX

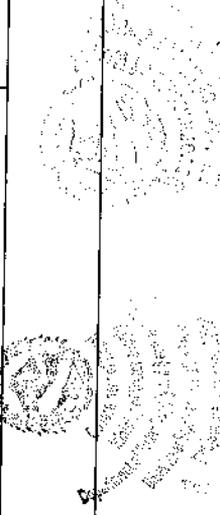


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Comment and Response Matrix
Charikot Water Supply & Sanitation Project, Dolakha

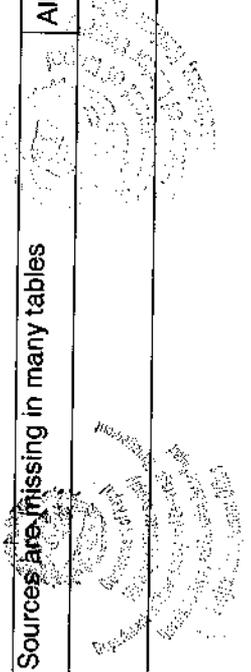
S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
A. By Mr. B.R. Manandhar (Environmental Engineer & Freelancer)				
1	Executive Summary	The Executive Summary is quite comprehensive and thus gives a complete picture of the entire report.	Executive Summary	Sincere thanks for the appreciation.
2	Chapter 2, Section 2.5, Figure 3, Page 24	A project layout map superimposed on topo-map also showing locations of all temporary construction facilities such as camps, stockpiling sites, muck/spoil disposal sites, quarry sites (if applicable) etc. with clear legends need to be presented as well	Chapter 2, Section 2.4.16, Figure 3, Page 33	This has been incorporated.
3	Chapter 2, Section 2.4.14 d), Page 22	It should be clearly stated whether or not a crusher plant and internal access roads are also among the project components. If yes, this IEE study should have covered adverse impacts due to them as well.	Chapter 2, Section 2.4.15 d), Line 94, Page 29 Chapter 7, Sub Section 7.2.1.2, Line 252, Page 90 and Sub Section 7.2.2.1, Line 266, Page 94	This has been incorporated.
4	Chapter 2	A categorical list of project construction and operation activities needs to be presented in a separate sub-chapter of Project Description.	Chapter 2, Section 2.5, Page 34 & 35	This has been incorporated.
5	Chapter 3, Section 3.7, Page 28	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 2.4.16, Page 31 & 32 Chapter 3, Section 3.2, Page 39 & 40	This has been incorporated and included in Chapter 2 under sub chapter Project Area Delineation instead of Chapter 3



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S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
		covered within the core area.		
6	Chapter 3, Section 3.1, Line 91, Page 25	The detailed Engineering Design Report seems to be left out of the literature reviewed.	Chapter 3, Section 3.1, Line 121, Page 39	This has been incorporated.
7	Whole Chapter 3 Page 25 to 28	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.	Whole Chapter 3 Page 39 to 45	This has been incorporated.
8	Chapter 3, Section 3.2.1, Page 26	It is confusing how data on climate, rainfall and other meteorological conditions were collected as primary information/data through field survey as mentioned in section 3.2.1.	Chapter 3, Section 3.3.1, Line 127, Page 40	This has been incorporated.
9	Chapter 5, Section 5.1, Sub Section 5.1.2, Page 38	It'd be better to present the existing land use pattern with % distribution of various land uses at least for the core area.	Chapter 5, Section 5.1, Sub Section 5.1.3, Page 64	This has been incorporated.
10	Chapter 7 & 8 	Adverse impacts of (i) mismanaged/haphazard disposal of debris from dismantled temporary facilities, (ii) disruption to natural drainage particularly in the service area, (iii) accidental leakage/spillage of stored fuel/chemicals and (iv) disposal of raw sludge from the sedimentation tanks need to be included as well in chapter 7. The above suggested adverse impacts need to be addressed in the following chapter with appropriate MMs described.	Chapter 7, Section 7.2, Sub Section 7.2.1.2, f) Page 92, h) Page 93 & i) Page 93 & Sub Section 7.2.3.2 b), Page 96 Chapter 8, Section 8.1.1.2, f) Page 107, h) & i) Page 108 and Sub Section 8.1.3.2 b), Page 111	This has been incorporated.

Engineer

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change
11	Chapter 3	A simple checklist or a simple interaction matrix should have been used as a standard tool for identification of issues/impacts during preparation of the ToR itself.	Chapter 3, Section 3.3, Line 125, Page 40	This has been incorporated in the IEE report.
12	Chapter 7, Section 7.2, Sub Section 7.2.1.2 (f), Page 55	It'd be desirable to explain the anticipated adverse impact on current land use in terms of anticipated land-use change within the core area.	Chapter 7, Section 7.2, Sub Section 7.2.1.2, g), Line 259, Page 92	This has been incorporated.
13	Chapter 8, Section 8.1.2 (e), Page 65	Mitigation measures for preventing/arresting spilled/leaked fuel/chemicals are missing. Also, separate measures for management of biodegradable SW and non-biodegradable SW need to be provided.	Chapter 8, Section 8.1, Sub Section 8.1.1.2 e) & f) Page 106 & 107	This has been explained.
14	Chapter 8, Section 8.1, Sub Section 8.1.2 c) & d), Page 64 & 65	Ensuring use of equipment/machinery and vehicles complying with applicable emission standards of GoN could be an effective MM to control air/noise pollution particularly during construction phase.	Chapter 8, Section 8.1, Sub Section 8.1.1.2 c) & d) Page 105 & 106	This has been incorporated.
15	Chapter 8	MMs for preventing water and soil contamination due to accidental leakage/spillage of stored fuel/chemicals do not feature in the list of MMs.	Chapter 8, Section 8.1, Sub Section 8.1.1.2 f) Page 107	This has been incorporated.
17	Chapter 11, Section 11.2, Page 85 to 92	Monitoring parameters should be selected based on source oriented monitoring approach rather than sink oriented monitoring approach.	Chapter 11, Section 11.3, Table 42, 5 th Column, Page 133 to 149	This has been incorporated.
b)				
All Chapters with tables			All Chapters with tables	This has been



TAEC/ICON/JV

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
2	Annex 3	Unnecessary repetition of project location map and schematic diagrams of transmission/distribution systems of the project could have been avoided.	Annex 3	Project Location Map & Schematic Diagrams have been omitted from the Annex 3 as per expert's suggestion.
B. By Mr. Kamal Adhikari (Sociologist/DWSSM)				
1		Disclaimer: Needed? Fine but more focus to be given on field findings		This has been omitted. This has been incorporated.
2	Chapter 2, Section 2.4, Sub Section 2.4.14 d) Page 22	Illegal cutting down of trees	Chapter 2, Section 2.4, Sub Section 2.4.15 d) Page 29 & 30	This has been incorporated.
3	Chapter 3, Section 3.3, Page 37	Overwhelming response of the local people: What sorts of response-categorically?	Chapter 3, Section 3.4, Page 43	This sentence has been deleted as it seems unnecessary in this chapter and The response of the locals has been briefly described in Annex 4 (Checklists of FGD).
4	Chapter 3, Section 3.7, Page 28	Impact Area ("Core Project Area", "Surrounding Project Area" and "Outlying Area"): Are field findings and mitigation measures located accordingly?	Chapter 2, Section 2.4.16, Page 31 & 32	This has been incorporated as per expert's suggestions during presentation.

Kamal Adhikari

 Engineer
 TAEC/CON JV

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change
5	Chapter 5, Section 5.1.6, Line 118, Page 39	Water Quality: Good (21%), Moderate (78%) and Bad (1%)-basis of categorization?	Chapter 5, Section 5.1.6, Line 172, Page 65	This has been incorporated.
6	Chapter 5, Section 5.3, Sub Section 5.3.6.2 b) & c), Page 47	Drainage/WWT: No proper mechanism and system. What about land?	Chapter 5, Section 5.3, Sub Section 5.3.6.2 b) & c), Page 769	The description regarding drainage & WWT has been included just to deliver the information of the existing condition of the project town. This does not fall under the scope of the project. Hence, detailed study has not been carried out for this.
7	Chapter 7, Section 7.1, Page 51 to 53	Impact in people's life: Which segment/category of community is likely to be benefitted and what specific actions will benefit them?	Chapter 7, Section 7.1, Page 85 to 88	This has been incorporated.
8	Chapter 7, Section 7.2, Sub Section 7.2.4.3 e) Page 61 Chapter 8, Section 8.4, Sub Section 8.4.3 e) Page 71	Sustainability issues: Environmental (impact of climate change), social (ownership and affordability), institutional (capacity and policy compliance) and management (business of WUSCs)	Chapter 7, Section 7.2, Sub Section 7.2.4.3 d) Page 100 Chapter 8, Section 8.1, Sub Section 8.1.4.2 f) Page 114	This has been incorporated.
9	Chapter 9, Section 9.1, Page 72	Role of Municipality, WASH-CCs and security personnel: Need to be explored further specially for addressing policy compliance, coordination and public protest respectively.	Chapter 9, Section 9.1, Table 40, Page 117 to 119	This has been incorporated.
10	Annex 5B, 8	Questionnaires/checklist of study as well as data: To	Annex 4	This has been incorporated.

TAE/COON JV

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
		be annexed in the report		incorporated.
C. Comments by MoWS				
	Table of Contents	Table of content formatting should be uniform.	Table of Contents	This has been incorporated.
	Chapter 2, Section 2.1, Line 18, Page 6	Page 6, Point no 18; Please correct lower value of altitude 950m instead of 5950m.	Chapter 2, Section 2.1, Line 18, Page 6	This has been incorporated.
	Chapter 2, Section 2.4, Sub Section 2.4.11, Line 67, Page 19	Page 19, Point no 67; A chamber constructed by brick masonry wall has been provided in non-vehicular areas and rural areas. Is it not possible to construct chamber with stone? If yes, which one is cost effective should be analyzed.	Chapter 2, Section 2.4, Sub Section 2.4.11 f), Line 76, Page 24	This has been explained.
	Chapter 8, Section 8.4.2 e), Page 70	In mitigation measure section 8.4.2 point e point 223, mostly addressed about pipe damage and not stated about mitigation of other physical damage like paved, unpaved road so mention about third party damage clearly.	Chapter 8, Section 8.1.4.2 g), Line 328, Page 114	This has been incorporated.
	Chapter 2, Section 2.3, Table 4, SN 8, Page 10	In Salient feature of the project section, state clearly source name along with tributary name, specify exact location of source do not write within the municipality	Chapter 2, Section 2.3, Table 4, SN 8, Page 12	This has been incorporated.
	Chapter 2, Section 2.3, Table 4, SN 8, Page 10	Please keep source name clearly along with the tributary name and yield of source.	Chapter 2, Section 2.3, Table 4, SN 8, Page 12	This has been incorporated.
		Make uniformity data, there is different data of base	Chapter 2, Section 2.3, Table	This has been incorporated.

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Engineer

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change
		year population within the report	4, SN 6, Page 12	
	Chapter 1, Section 1.5, Line 15, Page 4	Correct EPA 1996 with 1997	Chapter 1, Section 1.5, Line 14, Page 4	This has been incorporated.
	Chapter 7, Table 25, Page 61 & 62	Please revise impact scoring ; significant and insignificant impact as follows: Significance of Impact Total Score More than 75: Very Significant 50-75 : Significant Less than 50 : Insignificant	Chapter 7, Table 39, Page 101 & 102	This has been incorporated.
		Incorporate all the comments given by Urban Towns Water Supply & Sanitation previously	Relevant Chapters	This has been incorporated.
	All Relevant Chapters	Revise report according to new government structure like Revise VDC, DDC etc. Please specify where and how much land of forest area is required for project; do not write certain land of forest is cover	All Relevant Chapters Chapter 2, Sub Section 2.4.15 a), Table 10 & Line 90, Page 27 & 28	This has been incorporated.
	Chapter 9, Section 9.1, Page 73 & 74	Please categorize issues raised by stakeholders like as given below: Issues raised by expert Issues raised by others etc.	Chapter 9, Section 9.2, Page 120, 121 & 122. Also summarized in Annex 4 (Checklists of FGD)	This has been incorporated.
D.	Beside these comments, some other changes within the report were made as per the report requirement that was felt necessary during the report incorporation.			

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