



नेपाल सरकार

खानेपानी मन्त्रालय

नेपाल सरकार
खानेपानी मन्त्रालय
सिंहदरबार, काठमाडौं

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दर्ता नं.: १२४४
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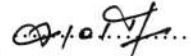
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काठमाडौं, नेपाल ।

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✓ श्री सहरी खानेपानी तथा सरसफाइ (क्षेत्रगत) आयोजना,
पानीपोखरी, काठमाडौं ।

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

प्रस्तुत विषयमा तहां विभाग मार्फत स्वीकृतिका लागि यस मन्त्रालयमा प्राप्त भएको सहरी खानेपानी तथा सरसफाइ (क्षेत्रगत) आयोजना, प्रस्तावक रहेको मिर्चैया सिरहा स्टर्म वाटर ड्रेनेज आयोजना (सिरहा) र देउराली हुप्सीकोट सहरी खानेपानी तथा सरसफाई आयोजना (नवलपुर)को परिमार्जित प्रारम्भिक वातावरणीय परीक्षण (IEE) प्रतिवेदन नेपाल सरकार (सचिवस्तर) को मिति २०६६/११/१५ को निर्णयानुसार स्वीकृत भएको व्यहोरा निर्देशानुसार अनुरोध छ ।


(मधुसुधन खनाल)
इन्जिनियर

बोधार्थ :

श्री खानेपानी तथा ढल व्यवस्थापन विभाग,
पानीपोखरी, काठमाडौं ।

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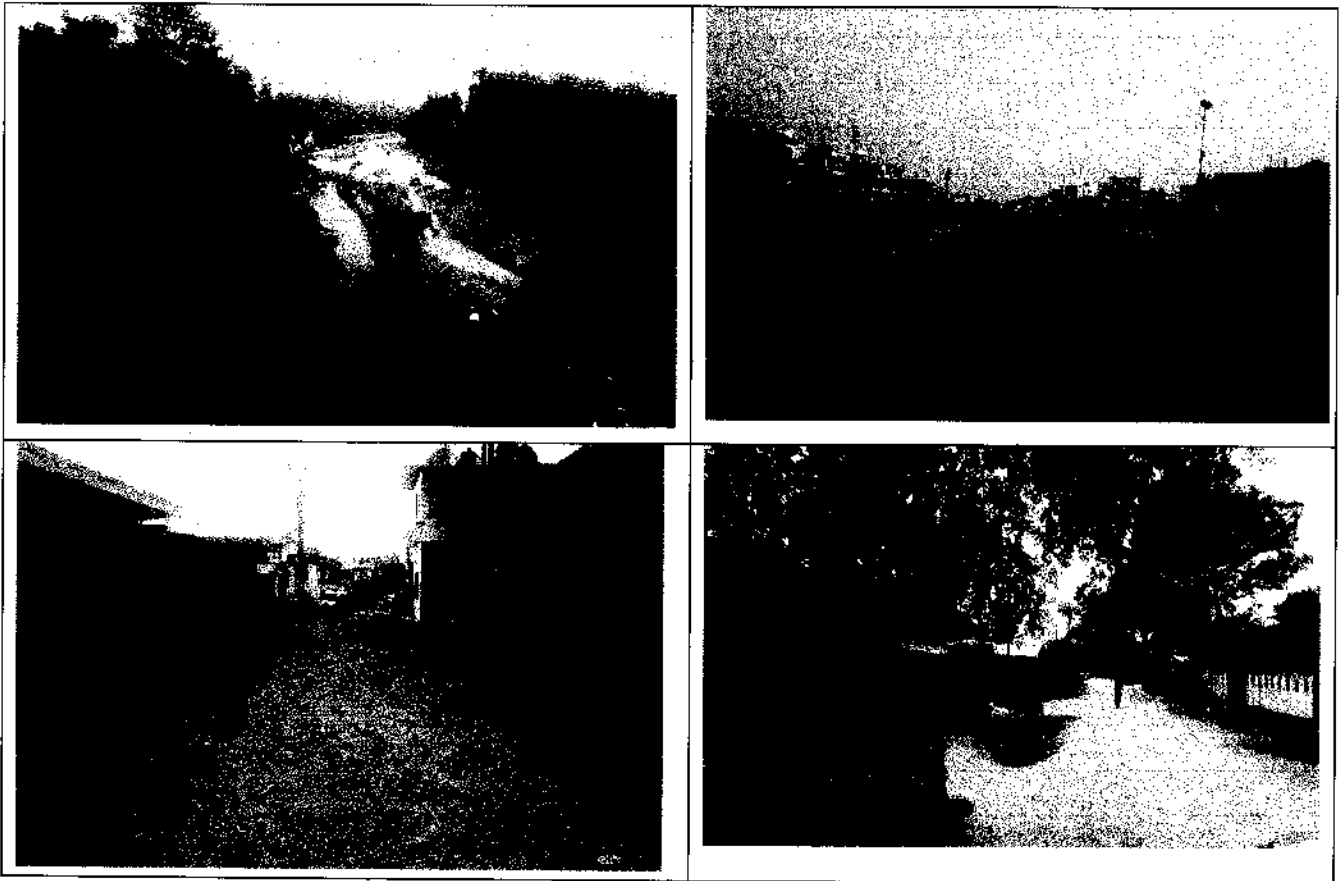
स्वीकृत प्रारम्भिक वातावरणीय परीक्षण (IEE) प्रतिवेदन २ प्रति ।

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कोषाध्यक्ष
११/२०



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

Initial Environmental Examination (IEE)
Of
Mirchaiya Storm Water Drainage Project
Singha, Nepal



FEBRUARY, 2020

SUBMITTED TO: Ministry of Water Supply, Singhadurbar, Kathmandu

SUBMITTED BY: Project Management Office, Third Small Town 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

3R	Reduce, Reuse & Recycle
A.D.	Anno Domini
ADB	Asian Development Bank
AP	Affected Person
B.S.	Bikram Sambat
CBS	Central Bureau of Statistics
C-EMP	Contractor's Environmental Management Plan
CITES	Convention on International Trade in Endangered Species of Wild Fauna & Flora
CSA	Concerned Sector Agency
DCC	District Coordination Committee
DDR	Due Diligence Report
DEDR	Detailed Engineering Design Report
DHM	Department of Hydrology & Meteorology
DI	Ductile Iron
DRTAC	Design Review and Technical Audit Consultant
D/S	Downstream
DSMC	Design, Supervision and Management Consultant
DWSSM	Department of Water Supply and Sewerage Management
EARF	Environmental Assessment and Review Framework
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMR	Environmental Monitoring Report
EO	Environmental Officer
EPA	Environment Protection Act
EPR	Environment Protection Rules
ES	Environmental Specialist
ESA	Environmental Safeguard Assistant
ESE	Environmental Safeguard Expert
ESO	Environmental Safeguard Officer
E-W	East-West
FGD	Focus Group Discussion
GI	Galvanized Iron
GoN	Government of Nepal
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HHs	Households
H ₂ S	Hydrogen Sulphide



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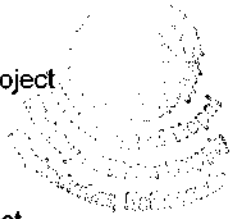
IBAT	Integrated Biodiversity Assessment Tool
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICG	Implementation Core Group
ID	Indirect
IEC	Information, Education & Communication
IUCN	International Union for Conservation of Nature
IEE	Initial Environmental Examination
IS	International Standard
LC	Least Concern
LGs	Local Groups
MoWS	Ministry of Water Supply
MoFE	Ministry of Forests and Environment
NAAQS	National Ambient Air Quality Standards
NEPAP	National Environment Policy & Action Plan
no.	Number
NO ₂	Nitrogen Dioxide
NT	Near Threatened
NTFP	Non Timber Forest Products
NVMES	Nepal Vehicles Mass Emission Standards
NRs.	Nepalese Rupees
OHT	Overhead Tank
OM	Operation Manual
O&M	Operation and Maintenance
PAF	Project Affected Families
PCC	Plain Cement Concrete
PE	Polyethylene
PID	Project Information Datasheet
PM	Particulate Matter
PM _{2.5}	Particulate Matter 2.5 micrometers
PM ₁₀	Particulate Matter 10 micrometers
PMO	Project Management Office
PMQAC	Project Management and Quality Assurance Consultants
PN	Nominal Pressure Rating
PPE	Personal Protective Equipment
RCC	Reinforced Cement Concrete
RDSMC	Regional Design Supervision and Management Consultant
REA	Rapid Environmental Assessment
ROW	Right of Way
RPMO	Regional Project Management Office



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SDG	Sustainable Development Goal
SO ₂	Sulphur Dioxide
SPS	Safeguard Policy Statement
STW	Shallow Tube Well
STWSSSP	Small Towns' Water Supply and Sanitation Sector Project
SSTWSSSP	Second Small Towns' Water Supply and Sanitation Sector Project
TDF	Town Development Fund
ToR	Terms of Reference
TSTWSSSP	Third Small Towns' Water Supply and Sanitation Sector project
U/S	Upstream
USD	United States Dollar
VDC	Village Development Committee
WHO	World Health Organization
WN	Ward Number
WSSDO	Water Supply and Sanitation Divisional Office
WSP	Water Safety Plan
WSSP	Water Supply & Sanitation Project
WUA	Water Users' Association
WUSC	Water Users' and Sanitation Committee



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WEIGHTS AND MEASURES

amsl	Above mean sea level
C	Celsius/centigrade
dba	decibel audible
Ha	hectare/s
HP	Horse Power
Km	kilometer
m	Meter
m ²	square meter/s
m ³	cubic meter/s
mm	millimeter/s



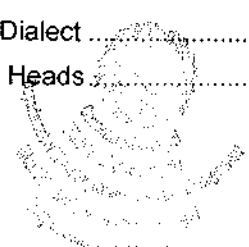
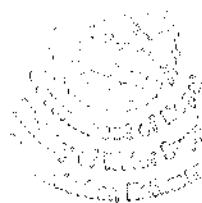
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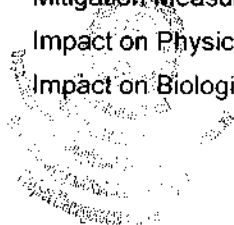
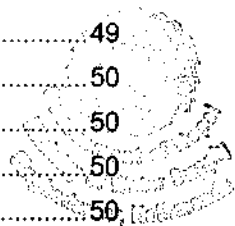

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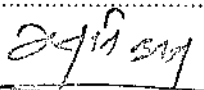
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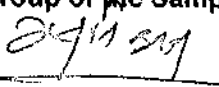


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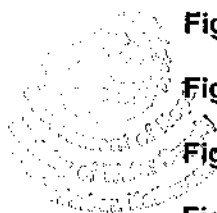


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EXECUTIVE SUMMARY

Introduction

1. Mirchaiya Storm Water Drainage Project is one of the projects proposed under TSTWSSSP, which will build upon the on-going efforts of the Government of Nepal in providing Water Supply and sanitation (WSS) services in urban areas of Nepal. In support of GoN's endeavor, the Asian Development Bank (ADB) funded this Third Small Town Water Supply and Sanitation Sector Project (TSTWSSSP).
2. The field study shows that the existing drainage condition of the project town is unplanned and covers only a small portion of the project area. The existing storm water drains are not functioning properly due to improper design, size and its improper implementation process. Similarly, our study also shows that during monsoons, the project town has been facing flood problems. The flood flows to the settlement from Churiya hills to the proposed service area frequently during rain. The E-W highway passes perpendicularly to hill slope that becomes dyke/ dam/ obstruction of overland flow. The study also shows that the storm water is collected upstream of road. This has been badly affecting people of the project town yearly during every monsoon. They are compelled to lose their property as well as face the problems to have easy access during rains. This indicates the urgent need to implement properly planned drainage system within the proposed 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 any 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. As per our study, the proposed project area lies in Mirchaiya Municipality, Siraha District, a terai district in the Province 2 of Nepal. Out of 12 wards of the project town, the proposed project covers partial areas of wards 4, 5, 6, 7 & 8 along the alignment of E-W(Mahendra) Highway & Mirchaiya - Katari Road.

Description of the Project

6. The catchment area for the proposed project has been divided into number of areas as per the flow consideration. Separate drainage sub system has been proposed for this project. Each sub system has the catchment area less than 40 ha. The proposed project comprises the following components:
 - a) Drains: The proposed drain will be laid within the right of way of the E-W Highway and Mirchaiya-Katari Road. Two types of drains that include Circular Drain & Rectangular

Drain are proposed for this project based on the shape of the drain. The drainage system follows the both side of road.

- b) **Manholes:** The spacing of manhole will be kept (30-50) m apart. Along with this, there will be provision of manholes at each road junction and drop. The top surface of the proposed drain corresponds to the road ground level. Circular brick masonry manholes with CI cover/ MS grating are proposed which will have inside plaster to prevent the leakage and provide smooth flow.
- c) **Outfall:** There are several possible outfalls available for the drainage of the storm water. In total, seven outfalls have been identified and proposed for this drainage project. For Phase 1, three outfalls have been proposed that includes Jiba Khola (U/S of E-W Highway West), Jiba Khola (D/S of E-W Highway West), and Bathaha Khola (Upstream of E-W highway east). For Phase 2, four outfalls have been proposed that includes Bataha Khola (Downstream of E-W highway east) and 3 locations at Bataha Khola (D/S of E-W highway south).
- d) **Rain Water Inlet:** Brick masonry rain water inlets are proposed for this project which has inside plaster to prevent the leakage.
- e) **Blacktopped Road Cutting:** There are total three portion of road cuttings required to lay the drainage pipe for the proposed project that includes along the Mirchaiya – Katari road at across one location and Mirchaiya Bazaar E-W highway at across two locations. The permission from the DoR is mandatory for this.

Policy, Legal & Administrative Framework

7. 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) with its 1st Amendment 2075 B.S. (2018 A.D.) and; iii) Environmental Protection Rules (EPR), 2054 B.S. (1997 AD), and its fifth amendments in 2073 B.S. (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) National Water Plan, 2062 B.S. (2005 A.D.); iv) National Urban Policy, 2063 B.S. (2007 A.D.); v) National Urban Water Supply & Sanitation Sector Policy, 2065 B.S. (2009 A.D.); vi) Updated 15-yr Development Plan for Small Towns Water Supply and Sanitation Sector, 2066 B.S. (2009) A.D.; vii) National Water Supply & Sanitation Policy, 2071 B.S. (2014 A.D.); viii) Land Acquisition, Rehabilitation and Resettlement Policy, 2015 A.D.; ix) Land Use Policy, 2072 B.S. (2015 A.D.); x) National Urban Development Strategy, 2074 B.S. (2017 A.D.); xi) National Forest Policy, 2075 B.S. (2019 A.D.); xii) Fourteen Three Years Plan (2073/74- 2075/76); xiii) Fifteenth Plan Approach Paper (2076/77-2080/81); xiv) Climate Change Policy, 2076 B.S. (2019 A.D.) and xv) National Environmental Policy, 2076 B.S. (2019 A.D.)
 - c) **Laws & Acts:** i) Aquatic Animal Protection Act, 2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.)); ii) Town Development Act , 2045 B.S. (1988 A.D.); iii) Land Acquisition Act, 2049 B.S. (1993 A.D.); iv) Forest Act, 2049 B.S. (1993 A.D.) with amendments 2055 B.S. (1999 AD.); .; v) Child Labor Prohibition and Regulation Act, 2056 B.S. (2001 A.D.); vi) Solid Waste Management Act, 2068 B.S. (2011 A.D.); vii)

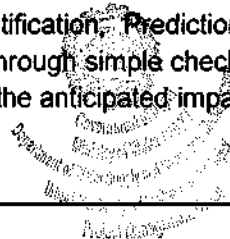
Labour Act, 2074 B.S. (2017 A.D.); viii) Local Government Operation Act, 2074 B.S. (2017 A.D.) and ix) Land Use Act, 2076 B.S. (2019 A.D.)

- d) **Rules & Regulations:** i) Solid Waste (Management & Resource Mobilization) Rules, 2044 B.S. (1987 A.D.) & Amendments 2049 B.S. (1992 A.D.); ii) Solid Waste Management Rules, 2070 B.S. (2013 A.D.); iii) Labor Rules, 2075 B.S. (2018 A.D.)
- f) **Directives, Guidelines & Manuals:** i) National EIA Guidelines, 2049 B.S. (1993 A.D.); ii) WHO Air Quality Guidelines, Global Update, 2061 B.S. (2005 A.D.); iii) National Noise Standard Guidelines, 2068 B.S. (2012 A.D.); iv) Guidelines for Community Noise by WHO, 2055 B.S. (1999 A.D.)

Methodology

8. This IEE study has been carried out in accordance with the requirements of the ADB's Safeguard Policy Statement (SPS 2009) and environmental requirements of GoN i.e., EPA (1997) and EPR (1997 with amendments 1999, 2007 & 2017). The methodology adopted to carry out this IEE study involves;

- a) **Literature Review/ Desk Study:** Relevant Maps , Reports including Feasibility Report, DEDR & DDR and other related published articles were reviewed to collect secondary information regarding the proposed project.
- b) **Impact Area Delineation:** This impact area delineation is carried out to identify the possible areas that may have either significant or insignificant impacts from the project implementation activities. 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.
- c) **Field Study:** The field study was conducted to collect baseline information on physico-chemical, biological, and socio-economic conditions of the core and surroundings areas of the project town.
- d) **Public Notice:** A public notice of 15 days was published in Arthik Abhiyan Dainik, a national daily newspaper on 2076/07/15 to seek written opinions from the concerned people and institutions regarding the possible impacts that may result from the implementation of the proposed project. Prior to this publication, copies of the Public Notice has been pasted at the concerned authorized office as per Environment Protection Regulations (EPR),2017.
- e) **Public Consultation:** This public consultation has been carried out to acknowledge any kind of suggestions from the interested stakeholders regarding public notice.
- f) **Collection of Muchulkas and Recommendation Letter:** Deed of Inquiry (Muchulka) from the concerned offices has been collected right after the public notice at the concerned authority offices has been pasted. Similarly, Recommendation Letter from the local authority office (Municipality) has been collected after the completion of 15 days from the date of publication of public notice.
- g) **Impact Identification, Prediction & Evaluation Method:** This methodology has been carried out through simple checklists method and through expert judgement to determine adversity of the anticipated impacts.



Signature
Engineer

9. The study has followed the procedures outlined in the approved ToR and has covered the issues delineated therein.

Existing Environment

10. 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.
11. Regarding this, details on various physical environmental aspects like Landforms & Topography, Geology & Soil, Water Resources, Climate, Air Quality, Acoustic Environment and biological features like Flora, Fauna, Aquatic Life, Protected Areas & Community Forest Areas were collected through simple checklist, REA checklist, professional judgment and interaction with the locals & the concerned bodies during field study. No existence of protected areas as well as community forest areas within the project area was observed during the field study.
12. During field study, details on the socio-economic environment that includes Demographic Features, Caste/Ethnic Groups, Economic Features, Education & Skills and Community Infrastructures were collected by extracting information from the social survey conducted for Mirchaiya WSSP by PMO that belonged to SSTWSSP.

Analysis of Alternatives

13. Analysis on the alternatives of the proposed project is another important process of IEE study that will help to assess the feasibility of the project in regard to technical, environmental & social aspects. Primarily, this involves two alternatives that includes "Without Project" or "Do-nothing" Alternative and "With Project" Alternative. The limitation of "Without Project" Alternatives regarding the risks of flooding problems, leads to select the "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 sanitation services through effective drainage system to 26,736 populations as per base year 2016 A.D. This alternative analysis also shows that proposed project is a unique system and there are no alternatives proposed in the proposed project. However, the proposed project has been divided into two phases that includes Phase1 & Phase 2. Depending upon the overland flow and risk factor, the major parts of the proposed drainage lines have been identified and included in the Phase 1 while the remaining parts have been proposed in the Phase 2.

Anticipated Environmental Impacts

14. The analysis on the information collected during field study helps to identify and predict the likely environmental impacts that may result from the proposed project. These predicted impacts are then evaluated using Scoring matrix as per National EIA Guidelines, 1993 to determine the nature, extent and magnitude. This evaluation will further help to propose the appropriate mitigation measure for each impact.

15. The anticipated environmental impacts have been mainly categorized into two viz., Beneficial Impacts and Adverse Impacts on the basis of its negative and positive significance. This has been further categorized into four impacts that includes i) Impact on Physical Environment, ii) Impact on Biological Environment, iii) Impact on Chemical Environment and iv) Impact on Socio-economic Environment, based upon the effects on the existing environment. These impacts has been sub divided into three categories based upon the project phase that includes i) Design Phase, ii) Construction Phase and iii) Operation Phase.
16. Here, Beneficial Impacts includes Employment Generation, Skill Enhancement, Local Trade & Business Opportunities, Improved Health & Hygiene, Increased Economic Opportunity and Social Empowerment. Similarly, Adverse Impacts includes Soil Erosion & Land Surface Disturbances, Spoil Disposal & Gully 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, Haphazard Disposal of Dismantled Debris, Impacts on Water Bodies, Impacts on Flora & Fauna, Impact on Aquatic Life, Impact on Water Quality of nearby rivers, Workers & Community Health & Safety Hazards, and Damage to the existing Utilities, Traffic Hindrance, Public Protests, Disruption to Local Vendor's Business, Mobilization of Child Labour, Occupational Health & Safety Hazards, Pollution in Newly Constructed Storm Water Drains, Blocking/Choking of Drains, Impact on Recipient Water Bodies and Impact of Sustainability of Works.

Mitigation & Augmentation Measures

17. The mitigation & augmentation measures for each & every adverse as well as beneficial 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, Preparation and implementation of Emergency Preparedness and Response Plan etc. If these proposed mitigation measures are effectively implemented, no such significant environmental problems have to be encountered during the construction & operation period of the proposed project. Likewise, various suitable augmentation measures have also been proposed to to maximize the anticipated beneficial impacts.

Information Disclosure, Consultation & Participation

18. Stakeholder Consultation and Community Participation is an essential process in project preparation. It is the process of engaging stakeholders and affected people. This process involves Key Informant interviews, On-site discussions 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 the Municipality.

Grievance Redress Mechanism

19. The Project-specific grievance redress mechanism (GRM) is also an essential process of the IEE study which is meant for persons seeking satisfactory resolution to their complaints on the social and environmental performance of the projects under TSTWSSSP. 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) RPMO social development/environmental (as relevant) officer
- (2) Representative of affected persons,
- (3) DSMC's safeguards specialist (social/environment as relevant),
- (4) a representative of reputable CBO/SHG/organization working in the project area
- (5) Contractor's representative.

Environmental Management Plan

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

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

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

Monitoring & Reporting

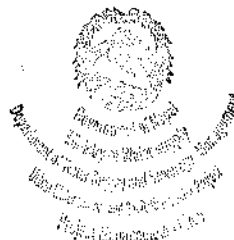
22. PMO & RPMO will be responsible for environmental monitoring & reporting. RPMO will monitor and measure the progress of EMP implementation. RPMO will submit a monthly monitoring and implementation reports to PMO, who will take follow-up actions, if necessary. PMO will submit semi-annual monitoring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

Conclusion

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

- i) the benefits of easy access to rivers for storm water runoff reducing risks of flooding and loss of lives & private property;
- ii) promotion of good hygiene and sanitation practices and reduced health and safety risks; and
- iii) enhanced community health, improved quality of life and safe communities as outcomes.

24. Hence, 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.



[Handwritten Signature]
Engineer

कार्यकारी साराँश

परिचय

१. यस मिर्चैया सतही ढल आयोजना, तेस्रो साना शहर खानेपानी तथा सरसफाई आयोजना अर्न्तगत प्रस्ताव गरिएको परियोजनाहरू मध्ये एक हो । यसले नेपाल सरकारको पन्ध्र वर्षीय विकास योजना अन्तर्गत साना शहरहरूलाई सहयोग गर्नुका साथै नेपालभरिका साना शहर तथा अर्ध-शहरी क्षेत्रहरूमा खानेपानी तथा सरसफाई सेवामा सुधार ल्याउने लक्ष्य राखेको छ । नेपाल सरकारको लक्ष्य अनुरूप एसियाली विकास बैंकले तेस्रो साना शहरी खानेपानी तथा सरसफाई आयोजनाका निमित्त ऋण तथा अनुदान सहयोग गरेको छ ।
२. प्रस्तावित आयोजना क्षेत्रमा अवस्थित सतह ढल निकासको अवस्था अनियोजित रहेको र आयोजना क्षेत्रको थोरै भागमा मात्र समेटेको छ । अनुपयुक्त डिजाइन, आकार र यसको कार्यान्वयन प्रक्रियामा रहेको समस्याको कारण विद्यमान सतही ढलहरू सही ढँगमा काम गरिरहेका छैनन् । प्रत्येक वर्षको वर्षायाममा यस आयोजना भित्र रहेको शहरले बाढीको समस्याको सामना गरिरहेको छ । वर्षाको समयमा बारम्बार चुरिया पहाडबाट बाढी सेवा क्षेत्रतर्फ बग्दछ । पूर्व पश्चिम राजमार्ग डाईक/बाँध बनी पानी बहन अवरोध बनेको छ । आकाशे पानी पनि सडकको सतह तथा सोभन्दा माथिल्लो क्षेत्रमा संकलन हुने देखिएको छ । प्रत्येक वर्षादको याममा आयोजना क्षेत्रका वासिन्दाहरूलाई कतिबेला बाढी आउँछ भन्ने बास रहीरहन्छ । वर्षादको समयमा उनीहरूले आफ्नो सम्पत्ति गुमाउनका साथै आवतजावत गर्न कठिनाईको सामना गर्न बाध्य छन् । यसले प्रस्तावित आयोजना क्षेत्रभित्र सही ढँगले वर्षादको पानी /सतह ढल निकासको लागी प्रणाली लागू गर्न आवश्यक रहेको छ ।
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 पालन गरेको हुनुपर्छ जसले निम्न उल्लेखित बुँदाहरूको सुनिश्चित गर्दछ :
 - आयोजनाहरू वातावरणीय पक्षको हिसाबले राम्रो अवस्थामा हुनुपर्छ ।
 - आयोजनाहरू सम्बन्धित आवश्यकताहरूको पालन गर्दै कार्यान्वयन गर्ने गरी डिजाइन गरिएको छ ।
 - आयोजनाहरूले कुनै उल्लेखनीय वातावरण, स्वास्थ्य वा सुरक्षा सम्बन्धि खतराहरू निम्त्याउने छैन ।
४. एसियाली विकास बैंकको REA चेकलिस्ट अनुसार प्रस्तावित आयोजना, प्रारम्भिक वातावरणीय परीक्षण Category 'B' अर्न्तगत पर्दछ । प्रस्तावित आयोजनाले नेपाल सरकारको वातावरण संरक्षण ऐन, २०५३ र २०७५ मा गरिएको पहिलो संशोधन, वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको पालना गर्नुपर्दछ । प्रस्तावित आयोजना, वातावरण संरक्षण नियमावलीको अनुसूची १ को प्रारम्भिक वातावरणीय परीक्षण (ऐ) खानेपानी क्षेत्र अन्तर्गत पर्दछ । प्रारम्भिक वातावरणीय परीक्षणले एसियाली विकास बैंक तथा नेपाल सरकार दुवैको नीतिहरू पालना गर्दछ ।
५. हाम्रो अध्ययन अनुसार प्रस्तावित आयोजना क्षेत्र सिराहा जिल्ला अर्न्तगत मिर्चैया नगरपालिकामा अवस्थित छ जुन नेपालको प्रदेश २ मा पर्दछ । प्रस्तावित आयोजनाले पूर्व पश्चिम राजमार्ग र मिर्चैया कटारी सडक खण्डमा पर्ने मिर्चैया नगरपालिकाको ४, ५, ६, ७ र ८ नं वडाहरूका आंशिक क्षेत्रहरू समेटेदछ ।



[Signature]
Engineer

आयोजनाको विवरण

६. प्रस्तावित आयोजनाको जलग्रहण क्षेत्र प्रवाहको आधारमा क्षेत्रहरूको संख्यामा विभाजन गरिएको छ । प्रत्येक उप प्रणालीको ४० हेक्टर भन्दा कम जलग्रहण क्षेत्र रहेको छ । प्रस्तावित आयोजनाले निम्न संरचनाहरू समावेश गर्दछ :

क) ढल : प्रस्तावित ढल पूर्व पश्चिम राजमार्ग र मिर्चैया-कटारी सडकको अधिकार क्षेत्र अर्थात् राइट अफ वे (RoW) भित्र राखिनेछ । गोलाकार (Circular) वा आयताकार (Rectangular) ढल प्रस्ताव गरिएको छ । ढल निकास प्रणाली सडकको दुबै तर्फ राखिएको छ ।

ख) म्यानहोल : म्यानहोलहरू (३०-५०) मी को दूरीमा राखिन्छ । यसका साथै प्रत्येक सडकको चोक र बढी गहिराइ (ड्रप)मा म्यानहोलको व्यवस्था हुनेछ । प्रस्तावित ढलको शीर्ष सतह सडकको भूमि स्तर अनुरूप रहेको छ । CI कभर/एम एस ग्रेटिंग सहितको इट्टाबाट बनेका गोलाकार म्यानहोलहरू प्रस्तावित छन् ।

ग) आउटफल (पानी निकास स्थान): आकाश पानीको निकासका लागि धेरै आउटफलहरू उपलब्ध छन् । यस आयोजनाको लागि सातवटा आउटफलहरू पहिचान गरिएको छ । चरण १ का लागि तीनवटा आउटफलहरू प्रस्ताव गरिएको छ जसमा जीवा खोला (पूर्व पश्चिम राजमार्ग पश्चिमको माथि), जीवा खोला (पूर्व पश्चिम राजमार्ग पश्चिमको तल) र बताहा खोला (पूर्व पश्चिम राजमार्ग पूर्वको माथि) समावेश छन् । चरण २ का लागि चारवटा आउटफलहरू प्रस्ताव गरिएको छ जसमा बताहा खोला (पूर्व पश्चिम राजमार्ग पूर्वको तल) र बताहा खोला (पूर्व पश्चिम राजमार्ग दक्षिणको तल) को तीन स्थानहरू समावेश छन् ।

घ) रेन वाटर इनलेट च्याम्बर : यस आयोजनाका लागि आवश्यक संख्यामा इट्टाबाट बनेका रेन वाटर इनलेट च्याम्बर प्रस्ताव गरिएको छ ।

ङ) कालोपत्रे सडक कटिड : जल निकासको लागि (drainage) पाइप बिछ्याउन मिर्चैया-कटारी सडकको एक स्थानमा र मिर्चैया बजार- पूर्व पश्चिम राजमार्गको दुई स्थानहरूमा गरी तीन भाग कालोपत्रे सडक काट्न पर्ने देखिन्छ । यसका लागि सडक विभागबाट अनुमति लिनु पर्दछ । सडक काटेपछि पुर्नस्थापना समेत यस आयोजनाबाट गरिने प्रावधान छ ।

नीति, कानूनी र प्रशासनिक रूपरेखा

७. प्रारम्भिक वातावरणीय अध्ययनको अवधिमा प्रस्तावित आयोजना निर्माणका गतिविधिहरूले सम्बन्धित नीति तथा कानूनको पालना गरेको छ कि छैन भनेर मुल्यांकन गर्नका निम्ति अध्ययन गरिएको सम्बन्धित नीति, कानूनी र प्रशासनिक रूपरेखाहरू निम्न उल्लिखित छन् :

क) प्रमुख कानून, ऐन तथा नियमहरू: i) नेपालको संविधान; ii) वातावरणीय संरक्षण ऐन, वि.सं २०५३ (ई.स. १९९७) र पहिलो संशोधन वि.सं २०७५ (ई.स. २०१८); iii) वातावरणीय संरक्षण नियमावली वि.सं २०५४ (ई.स. १९९७) र पाचौँ संशोधन वि.सं २०७३ (ई.स. २०१७)

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) राष्ट्रिय जल योजना, वि.सं २०६२ (ई.स. २००५); iv) राष्ट्रिय शहरी नीति, वि.सं २०६३ (ई.स. २००७) ; v) राष्ट्रिय शहरी खानेपानी तथा सरसफाई क्षेत्रगत नीति, वि.सं २०६५ (ई.स. २००९); vi) साना शहर खानेपानी तथा सरसफाई क्षेत्रका लागि परिमार्जित पन्ध्र वर्षे विकास योजना, वि.सं २०६६ (ई.स. २००९) तथा २०१५ मा गरिएको संशोधन

i); vii) राष्ट्रिय खानेपानी आपूर्ति तथा सरसफाई नीति, वि.सं २०७१ (ई.स. २०१४); viii) भूमि अधिग्रहण, पुर्नवास र पुर्नस्थापना नीति, वि.सं २०७१ (ई.स. २०१५); ix) भु-उपयोग नीति, वि.सं २०७२ (ई.स. २०१५) x) राष्ट्रिय शहरी विकास रणनीति, वि.सं २०७४ (ई.स. २०१७), xi) राष्ट्रिय वन नीति, वि.सं २०७५(ई.स. २०१९), xii) राष्ट्रिय भूमि नीति, वि.सं २०७५(ई.स. २०१९),xiii) पन्धौ योजना आधार पत्र ९२०७६/७७-२०८०/८१), xiv) जलवायु परिवर्तन नीति, वि.सं २०७६(ई.स. २०१९) र xv) राष्ट्रिय वातावरण नीति, (वि.सं २०७६(ई.स. २०१९)

ग) कानून तथा ऐनहरू i)जलचर संरक्षण ऐन, वि.सं २०१७ (ई.स. १९६१) तथा संशोधन वि.सं २०५५ (ई.स. १९९७); ii) शहरी विकास ऐन, वि.सं २०४५ (ई.स. १९९८); iii) भूमि अधिग्रहण ऐन, वि.सं २०४९ (ई.स. १९९३) ; iv) वन ऐन, वि.सं २०४९ (ई.स. १९९३) वि.सं २०५५ को संशोधन सहित; v) बालश्रम निषेध तथा विनियमन ऐन, वि.सं २०५६ (ई.स. २००१); vi) फोहोर मैला व्यवस्थापन ऐन, वि.सं २०६८ (ई.स. २०११); vii) श्रम ऐन, वि.सं २०७४ (ई.स. २०१७) ; viii) स्थानिय सरकार सञ्चालन ऐन, वि.सं २०७४ (ई.स. २०१७) र ix) भूमि प्रयोग ऐन, वि.सं २०७६ (ई.स. २०१९)

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) फोहोरमैला व्यवस्थापन नियमावली, वि.सं २०७० (ई.स. २०१३); र iii) श्रम नियमावली, वि.सं २०७५ (ई.स. २०१८)

ङ) निर्देशिका तथा पुस्तिका : i) राष्ट्रिय वातावरणीय प्रभाव मूल्यांकन दिशानिर्देश, वि.सं २०५० (ई.स. १९९३); ii) विश्व स्वास्थ्य संस्थाको वायु गुणस्तर दिशानिर्देश , वि.सं २०६१ (ई.स. २००५); iii) राष्ट्रिय ध्वनि मानक दिशानिर्देश, वि.सं २०६८ (ई.स. २०१२) र iv) सामुदायिक ध्वनिका लागि विश्व स्वास्थ्य संस्थाको दिशानिर्देश , वि.सं २०५५ (ई.स. १९९९)

पद्धति

८. एडीवीको सुरक्षा नीति बिवरण (SPS - 2009) र नेपाल सरकारको वातावरणीय आवश्यकताहरू (EPA (१९९७) र EPR (१९९७, सन् १९९९, २००७ र २०१७ मा गरिएको संशोधन सहित) को आधारमा यस प्रारम्भिक वातावरणीय परीक्षणको अध्ययन गरिएको छ । यस अध्ययन गर्नको लागि अपनाइएको पद्धतिहरू निम्न वमोजिम छन् ;

क) लेख-रचनाहरूको समीक्षा : प्रस्तावित आयोजनाबारे नक्शा, सम्भाव्यता प्रतिवेदन, डिटेल इन्जिनियरिङ डिजाइन प्रतिवेदन र ड्यु डेलिजेन्स प्रतिवेदन सहितका प्रतिवेदनहरू र अन्य सम्बन्धित प्रकाशित लेखहरूको समीक्षा गरियो ।

ख) प्रभावित क्षेत्रको चित्रण : आयोजना कार्यान्वयनका गतिविधिहरूबाट हुने महत्वपूर्ण वा नगण्य प्रभावहरूको असर पर्न सक्ने सम्भावित क्षेत्रहरूको पहिचान गर्नका लागि चित्रण गरियो । आयोजनाको पूर्वानुमानित प्रभाव र परिमाणको आधारमा “मूल आयोजना क्षेत्र” (Core Project Area) र “आयोजना आसपासका क्षेत्र”(Surrounding Project Area) को रूपमा प्रभावित क्षेत्रहरूको चित्रण गरिएको छ ।

ग) स्थलगत अध्ययन : आयोजना शहरको मूल र वरपर क्षेत्रहरूको भौतिक-रसायनिक , जैविक र सामाजिक-आर्थिक अवस्थाको बारेमा आधारभूत जानकारी संकलन गर्न स्थलगत अध्ययन गरिएको थियो ।

घ) सार्वजनिक सूचना : प्रस्तावित आयोजनाको कार्यान्वयनबाट हुने सम्भावित असरहरू सम्बन्धि सम्बन्धित व्यक्ति वा संघ-संस्थाहरूबाट लिखित राय लिनको लागि मिति २०७६/०७/१५ मा आर्थिक अभियान राष्ट्रिय दैनिकमा पन्ध्र दिने सार्वजनिक सूचना प्रकाशित गरियो । यस प्रकाशन अघि, सार्वजनिक

सूचनाका प्रतिलिपिहरु वातावरणीय सुरक्षा नियमावली, २०१७ अनुसार सम्बन्धित आधिकारिक कार्यालयमा टाँस गरिएको थियो ।

ड) सार्वजनिक परामर्श : यो सार्वजनिक सूचनाको सम्बन्धमा इच्छुक सरोकारवालाहरुबाट सुझावहरुको पहिचान गर्नको लागि सार्वजनिक परामर्श गरियो ।

च) मुचुल्का र सिफारिस पत्रको संकलन : सम्बन्धित आधिकारिक कार्यालयहरुमा सार्वजनिक सूचना टाँस गरे लगत्तै उक्त कार्यालयहरुबाट मुचुल्का संकलन गरिएको छ । त्यस्तैगरी, सार्वजनिक सूचना प्रकाशनको १५ दिन पछि स्थानीय आधिकारिक कार्यालय (नगरपालिका) बाट सिफारिस पत्र संकलन गरिएको छ ।

छ) प्रभाव पहिचान, पूर्वानुमान र मूल्यांकन : वातावरणीय प्रभावको प्रतिकूलता निर्धारण गर्न सरल चेकलिष्ट र प्रश्नावली तथा विशेषज्ञको निर्णयको माध्यमबाट गरिएको छ ।

यस अध्ययनले अनुमोदित ToR मा उल्लिखित कार्यविधिको अनुसरण गरेको छ जसमा छलफल गरिएका मुद्दाहरुलाई समेटेको छ ।

वर्तमान वातावरण

९. प्रस्तावित आयोजनाको पूर्वानुमानित वातावरणीय प्रभावहरुप्रति यस आयोजना क्षेत्रको वातावरणीय पक्षहरुको संवेदनशीलताको पहिचान गर्न वर्तमान वातावरणबारे जानकारी आवश्यक पर्दछ । यसै सन्दर्भमा, डेस्क अध्ययनको क्रममा साहित्य समीक्षाको माध्यममार्फत वर्तमान वातावरणको द्वितीयक जानकारी प्राप्त गरिएको छ । वर्तमान वातावरणीय अवस्थाबारे प्राथमिक जानकारी गर्न स्थलगत अध्ययन गरियो ।
१०. यसै सन्दर्भमा स्थलगत अध्ययनको समयमा क) भौतिक वातावरणीय पक्ष अर्न्तगत स्थलकृति, भूमि जमिन प्रयोगको वर्गीकरण, भूविज्ञान, जलस्रोतहरु, जलवायु, वायुको गुणस्तर, ध्वनिक वातावरण, भुक्षय संवेदनशीलता; ख) जैविक वातावरण अर्न्तगत वनस्पति, वन्यजन्तु संरक्षित क्षेत्र, सामुदायिक वन क्षेत्र; बारे आवश्यक विवरणहरु साधारण चेकलिस्ट, REA चेकलिस्ट, विशेषज्ञको निर्णय तथा स्थानिय एवं सम्बन्धित निकाय सँगको अर्न्तक्रिया मार्फत संकलन गरियो । आयोजना क्षेत्रभित्र कुनै पनि संरक्षित क्षेत्र तथा सामुदायिक वन क्षेत्रहरु अस्थित छैनन् ।
११. स्थलगत अध्ययनको क्रममा, सामाजिक आर्थिक वातावरण अर्न्तगत जनसांख्यिक विशेषताहरु, जाति/जातिय समूह, आर्थिक विशेषताहरु, शिक्षा तथा सीप, सामुदायिक पूर्वाधारहरु इत्यादि सम्बन्धित विवरणहरु सन् २०१६ मा मिर्चैया खानेपानी तथा सरसफाई आयोजनाका लागि आयोजना व्यवस्थापन कार्यालयबाट गरिएको सामाजिक सर्वेक्षणको आँकडाबाट लिइएको हो ।

वैकल्पिक विश्लेषण

१२. प्रस्तावित आयोजनाको वैकल्पिक विश्लेषण, यस प्रारम्भिक वातावरणीय परीक्षणको अर्को मुख्य प्रक्रिया हो जसले प्राविधिक, वातावरणीय तथा सामाजिक पक्षहरुको सन्दर्भमा आयोजनाको सम्भाव्यताको परीक्षण गर्न मद्दत पुर्याउँछ । मुख्यतया, यस प्रक्रिया अर्न्तगत “आयोजना विना” र “आयोजना सहित” जस्ता दुई विकल्पहरु समावेश गरिएका छन् । बाढी समस्याहरुको जोखिमको सन्दर्भमा “आयोजना विना” विकल्पको सीमितताले “आयोजना सहित” विकल्पको छनौट तर्फ उन्मुख गराएको छ । प्रस्तावित आयोजनाको सम्भावित फाइदाहरुको मनन मार्फत “आयोजना सहित” विकल्पको विश्लेषण गरिएको छ । आधार वर्ष २०१६ को अनुसार २६,७३६ जनसंख्यामा प्रभावकारी ढल निकास प्रणालीको मार्फत सरसफाई

सेवा प्रदान गर्न प्रस्तावित आयोजना डिजाइन गरिएको छ । प्रस्तावित आयोजना अद्वितीय प्रणाली भएको र यसमा कुनै विकल्प नभएको पनि यो वैकल्पिक विश्लेषणले देखाएको छ । यद्यपि प्रस्तावित आयोजनालाई दुई चरणमा विभाजन गरिएको छ जसमा चरण १ र चरण २ समावेश छन् । स्थलीय बहाव र जोखिमको आधारमा प्रस्तावित ढल निकासी लाइनका मुख्य भागहरू पहिचान गरी चरण १ मा समावेश गरिएको छ भने बाँकी भागहरू चरण २ मा प्रस्ताव गरिएको छ ।

पूर्वानुमानित वातावरणीय प्रभावहरू

१४. स्थलगत अध्ययनको अवधिमा गरिएको विश्लेषणले प्रस्तावित आयोजनाको परिणामस्वरूप देखिने वातावरणीय प्रभावहरूको पहिचान तथा पूर्वानुमान गर्न मद्दत पुर्याउँछ । राष्ट्रिय वातावरणीय प्रभाव मुल्यांकन निर्देशिका, ई. सं. १९९३ अनुसार तयार गरिएको मुल्यांकन विधि प्रयोग गरी अनुमानित प्रभावहरूको प्रकृति, सीमा र परिमाण निर्धारण र मुल्यांकन गरियो । यस मुल्यांकनले उपयुक्त न्यूनिकरण विधि प्रस्ताव गर्न थप मद्दत गर्नेछ ।
१५. यी प्रत्याशित वातावरणीय प्रभावहरूलाई यिनका नकारात्मक 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 तथा आर्थिक वातावरणीय प्रभाव । यी चार प्रभावहरूलाई आयोजनाको चरण अनुसार पुन तीन भागमा विभाजन गरिएको छ जस अन्तर्गत क) डिजाइन चरण, ख) निर्माण चरण र ग) सञ्चालन चरण समावेश छन् ।
१६. लाभदायिक प्रभावहरू अन्तर्गत रोजगार श्रृजना, क्षमता अभिवृद्धि, स्थानीय व्यापार तथा व्यापारिक अवसरहरू, सुधिएको स्वास्थ्य तथा सरसफाई, आर्थिक अवसरहरूमा वृद्धि, महिला सशक्तिकरण समावेश छन् । त्यस्तैगरी, भूक्षय तथा भूमि सतहमा हुने गडबडी, बढी भएको माटोको व्यवस्थापन र जलमार्गको क्षय, ध्वनि प्रदुषण, वायुमा पर्ने प्रभाव, सतही पानीको गुणस्तरमा पर्ने प्रभाव, निर्माण क्षेत्र एवं श्रमिक शिविरबाट फोहोर मैला एवं फोहोर पानीको उत्पन्न, भण्डारण गरिएको ईन्धन/रसायनको आकस्मिक चुहावट, जमिन प्रयोगको वर्गीकरणमा पर्ने प्रभाव, प्राकृतिक ढल निकासमा अवरोध, भत्काइएका अवशेषबाट निस्किएका फोहोरको अनुचित ढंगबाट गरिएको विघटनको प्रभाव, खोला नालामा पर्ने प्रभाव, वनस्पति तथा वन्यजन्तुमा पर्ने प्रभाव, जलचरमा पर्ने प्रभाव, नजिकैको नदीनालाको पानीको गुणस्तरमा पर्ने प्रभाव, संरचनात्मक अस्थिरता, सामुदायिक स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरू, हाल प्रदान भइरहेको सुविधाहरूमा हुनसक्ने क्षति, ट्राफिक रोकावट, जनता द्वारा अवरोध, स्थानिय व्यापार व्यवसायमा अवरोध, बाल श्रमको परिचालन, पेशागत स्वास्थ्य र सुरक्षामा हुनसक्ने जोखिमहरू, नवनिर्मित सतही ढलमा हुने प्रदुषण, सतही ढलमा बाधा/रोकावट, ढलबाट बगेको पानी प्राप्त गर्ने पानीको निकायहरूमा हुने प्रभाव, आयोजनाका कार्यहरूको दिगोपनमा पर्ने प्रभावहरू प्रतिकूल प्रभाव अन्तर्गत समावेश छन् ।

न्यूनिकरण तथा वृद्धि-विकासका उपायहरू

१७. माथि उल्लिखित प्रत्याशित प्रतिकूल वातावरणीय प्रभावहरूको न्यूनिकरण तथा लाभदायिक प्रभावहरूको वृद्धि-विकासका उपायहरूको प्रस्ताव गरिएको छ जसअन्तर्गत मुख्यतः भिरालो ठाउँहरूको सुरक्षाका उपायहरू, वायु गुणस्तर अनुगमन, ध्वनि गुणस्तर अनुगमन, फोहोर मैला व्यवस्थापन, शीघ्र माटो पुर्ने, ईन्धन तथा रसायनको उचित व्यवस्थापन, श्रमिक तथा सामुदायिक स्वास्थ्य एवं सुरक्षा सम्बन्धि हुनसक्ने

खतराहरु सम्बन्धि चेतनामूलक कार्यक्रमहरुको सञ्चालन, आपतकालीन तयारी एवं प्रतिक्रिया योजनाको तयारी र कार्यान्वयन इत्यादि जस्ता उपायहरु समावेश छन् । यी प्रस्तावित विधिहरु उचित ढंगले अपनाउने हो भने आयोजनाको निर्माण तथा सञ्चालन चरणमा वातावरणीय समस्याहरुको सामना गर्नुपर्दैन । प्रस्तावित आयोजनाका प्रत्याशित लाभदायिक प्रभावहरुलाई अझै माथि उकास्नको निम्ति विभिन्न उपयुक्त वृद्धि-विकासका उपायहरुको पनि प्रस्ताव गरिएको छ ।

सूचना प्रवाह, परामर्श तथा सहभागिता

१८. हितग्राहीहरूसँगको परामर्श तथा सामुदायिक सहभागिता यस आयोजनाको तयारीको क्रममा अपनाइने महत्वपूर्ण प्रक्रिया हो । यस प्रक्रियामा प्रमुख सूचनादातासँगको अर्न्तवार्ता, सम्बन्धित उपभोक्ता समितिसँगको स्थलगत छलफल तथा उपभोक्ताहरु सँग गरिने स्थलगत छलफल जस्ता प्रक्रियाहरु समावेश छन् । उपभोक्ताहरूसँगको परामर्श अघि सम्भावित उपभोक्ताहरु र आयोजना कार्यान्वयनप्रति यिनको भुमिकाको पहिचान गर्नको निम्ति उपभोक्ता विश्लेषण र म्यापिङ्ग (चित्रण) गरिन्छ । यस पश्चात् आयोजना सम्बन्धि सूचना प्रवाह गर्न, उपभोक्ताहरुको सुझाव तथा सल्लाह संकलन गर्न र आयोजनाप्रति उनीहरुले देखाएका चासोका विषयहरुलाई जोड दिन सम्भावित उपभोक्ताहरुलाई परामर्शमा संलग्न गराइन्छ । उपभोक्ताहरूसँगको 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 सञ्चार तथा सहकार्य कायम गर्नेछ ।

गुनासो सुनवाई संयन्त्र

१९. यस आयोजनाले निम्त्याएका अप्रत्याशित सामाजिक तथा वातावरणीय असरहरुप्रति भएका गुनासाहरुको समाधानका लागि गुनासो सुनवाई संयन्त्र (GRM) रहेको छ । यो संयन्त्र मुख्य हितग्राहीहरूसँग गरिएको परामर्शबाट निर्माण गरिएको हो जसले निम्न उल्लिखित बुँदाहरुको सुनिश्चितता जनाउनेछ :

- यस आयोजनाले निम्त्याएको प्रतिकूल सामाजिक तथा वातावरणीय प्रभावहरुबाट पीडित हरेक व्यक्तिको आधारभूत अधिकार र चासोको सुरक्षा
 - व्यक्तिहरुको समस्यालाई समयमै प्रभावकारी ढंगले सम्बोधन गर्ने
यस संयन्त्र अन्तर्गत नगरपालिकाको स्तरमा गुनासो सुनवाई समितिको गठन समावेश छन् । यस समितिमा निम्न उल्लिखित सदस्यहरु समावेश रहनेछन् :
- क) खानेपानी तथा सरसफाई डिभिजन कार्यालयको प्रमुख;
- ख) उपभोक्ता समितिका सदस्यहरु ;
- ग) प्रभावित व्यक्तिहरुको दुई प्रतिनिधि, एक पुरुष र एक महिला ;
- घ) जनजाति समुदायको एक सदस्य, प्राथमिकता महिला ;
- ङ) जनजाति समुदायको विकास/अन्य पिछडिएका समुदायहरुमा सक्रिय रूपमा सहभागी भएको गैर-सरकारी संगठन वा समुदाय-आधारित संगठनको प्रतिनिधि, यदि कुनै छ भने ;
- च) स्थानीय सरकारका प्रतिनिधिहरु, अर्थात् नगरपालिका कार्यालय र जिल्ला समन्वय समिति;
- छ) डिजाइन, निरीक्षण र व्यवस्थापन परामर्शदाताको तर्फबाट सामाजिक सुरक्षा
- ज) डिजाइन, निरीक्षण र व्यवस्थापन परामर्शदाताको तर्फबाट वातावरणीय सुरक्षा विद

वातावरणीय व्यवस्थापन योजना

वातावरणीय व्यवस्थापन योजनाको तयारी तथा यसको कार्यान्वयन, प्रारम्भिक वातावरणीय परीक्षणको अर्को अत्यावश्यक प्रक्रिया हो । यस योजनाको मूल उद्देश्य भन्नु नै आयोजनाका गतिविधिहरु विना क्षति जिम्मेवार ढंगले गर्नु हो । 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 गतिविधिहरूका खोज तथा सिफारिशहरूको कार्यान्वयनलाई मार्गदर्शन र नियन्त्रण गर्ने ;
- ग) यस आयोजनाको वातावरणीय प्रभावहरूको न्यूनिकरण गर्न सहयोग पुर्याउनका लागि आवश्यक देखिएका विशेष कार्यहरू विस्तार गर्ने तथा लाभदायिक प्रभावहरूको वृद्धि गर्ने ; र
- घ) सुरक्षा सम्बन्धि दिइएका सिफारिशहरूको पालना गरिएको सुनिश्चित गर्ने ।
२१. यस आयोजनाको लागि तयार पारिएको स्थानिय स्तर निगरानी तथा प्रत्यासित प्रभावको न्यूनिकरणको अनुमानित लागत रु. ५००,०००.०० रहेको छ ।

अनुगमन तथा रिपोर्टिङ

२२. यस आयोजनाको वातावरणीय गतिविधिको निगरानी र रिपोर्टिङका लागि आयोजना व्यवस्थापन कार्यालय (PMO) र क्षेत्रिय आयोजना व्यवस्थापन कार्यालय (RPMO)जिम्मेवार रहनेछ । RPMOले PMO समक्ष मासिक निगरानी र कार्यान्वयनको प्रतिवेदन पेश गर्नेछ । तदनुसार PMO ले आवश्यक भएमा उचित कदम चाल्नेछ । यस पश्चात् PMO ले एसियाली विकास बैंक समक्ष अर्द्ध वार्षिक निगरानीको प्रतिवेदन पेश गर्नेछ । कानूनी कागजातमा सम्झौता भएअनुसार खानेपानी मन्त्रालयले गरेको प्रतिबद्धताको लेखाजोखा गर्न एसियाली विकास बैंकले आयोजनाको गतिविधिहरूको समीक्षा गरिनेछ । आयोजना सम्पन्न प्रतिवेदन जारी नभएसम्म एसियाली विकास बैंकले आयोजनाको निगरानी गर्नेछ । साथै नेपाल सरकार अर्न्तगत रहेको खानेपानी मन्त्रालय एवं वन तथा वातावरण मन्त्रालयले पनि आयोजनाले गरेका कार्यहरूको समीक्षा गर्न, स्थलगत भ्रमणका माध्यमबाट अनुगमन कार्य गर्नेछ ।

निष्कर्ष

२३. निष्कर्षमा, प्रारम्भिक वातावरणीय परीक्षण अध्ययन अनुसार प्रस्तावित आयोजना वातावरणीय हिसाबले गम्भीर प्रकृतिको नभएको देखिएको छ । प्रस्तावित आयोजना र यसका संरचनाहरू वातावरणीय हिसाबले सवेदनशील क्षेत्रभित्र वा वरपर अवस्थित छैनन् । निर्माणको क्रममा सामना गर्नुपर्ने केही प्रतिकूल प्रभावहरू (सम्भवत अधिकतम निर्माण अवधिमा देखापर्ने) अस्थायी र छोटो अवधिका छन् । प्रस्तावित आयोजनाले निम्न उल्लिखित फाइदाहरू दिलाउने छन् :
- क) सतही ढलमा बग्ने पानीको लागि नदीहरूमा सजिलो पहुँचका फाइदाहरू जसले बाढी र जीवन एवं निजी सम्पत्तिको क्षति कम गर्दछ ।
- ख) उचित स्वच्छता र सरसफाई अभ्यासको प्रबर्धन र स्वास्थ्य एवं सुरक्षा सम्बन्धि जोखिममा कमी ।
- ग) परिणाम स्वरुप परिस्कृत सामुदायिक स्वास्थ्य , सुधारिएको जीवन स्तर र सुरक्षित समुदाय ।
२४. यस आयोजना निर्माण पश्चात् कुनै उल्लेखनीय नकारात्मक प्रभावहरू ननिम्त्याएको र एसियाली विकास बैंकद्वारा गरिएको वर्गीकरण अनुसार प्रस्तावित आयोजना Category 'B' अर्न्तगत पर्ने र वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको अनुसुचि-१ लाई पालना गरेको देखिन्छ । २००९ मा लागू गरिएको सुरक्षा नीति विवरण (SPS) तथा वातावरण संरक्षण नियमावली, २०५४ र २०७३ मा गरिएको नयाँ संशोधनको पालन गर्न कुनै विशेष अध्ययन वा वातावरणीय प्रभाव मूल्यांकन (EIA) को आवश्यकता नभएको यस प्रारम्भिक वातावरणीय परीक्षण अध्ययनको निष्कर्ष रहेको छ ।

1. INTRODUCTION

1.1. Background

1. In January 2000 the Government of Nepal (GoN) endorsed the 15-year Development Plan for Small Towns' Water Supply and Sanitation in order to improve the health, economic and environmental living conditions of the people in small towns in Nepal. The project embraces the community managed demand responsive approach, where the community is involved in all aspects of planning and implementation of the town projects. The Asian Development Bank (ADB) has been providing financial assistance to this sector project. The Department of Water Supply and Sewerage Management (DWSSM) is the implementing agency whereas the Ministry of Water Supply (MoWS) is the executive agency.
2. The first phase of the Project, whose duration was 2001-2008, has already been completed and the people of 29 small towns have been benefitted by the Project. Upon the completion of the first phase and after finding positive impacts of the Project, the Government of Nepal decided to implement the second phase, with the name, Second Small Town's Water Supply and Sanitation Sector Project. Simultaneously after the successful completion of second phase DWSSM has brought some changes on this project and named as Third Small Town's Water Supply and Sanitation Sector Project (TSTWSSSP). For the implementation, formulation, and operation and maintenance of the Project, TSTWSSSP aims to have full participation of the users of the respective towns. The cost will also be shared by the users and GON.
3. The Project has many stakeholders such as Project Management Office (PMO) of DWSSM, Water Supply and Sanitation Division/ Sub-division Office, Regional Project Management Office (RPMO), Town Development Fund (TDF), Design and Supervision and Management Consultant (DSMC) are responsible for social mobilization, health and hygiene programs and preparation of social profiles.
4. Both the Nepali law and ADB policy require that the environmental implications of individual developments are taken into account in the planning and decision making process and that action is taken to reduce the adverse impacts to acceptable levels. This is done through the environmental assessment process, which has become an integral part of lending operations and Project development and implementation.

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

1.2.1 Name and Address of the Proponent

5. The name and the address of the proposed project, Mirchaiya Storm Water Drainage Project is as follows:

Name of Proponent

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

1.2.2 Name and Address of the Consultant preparing the Report

6. The name and address of the consultant preparing the report is as follows:

Consultant Preparing the Report

TAEC Consultant P. Ltd. / Integrated Consultants Nepal Pvt. Ltd. JV
 Shankhamul, Kathmandu
 Tel: 977 1 5242846
 Fax: 977 1 5242553
 E-mail: taec@mos.com.np
 Website: www.taecconsult.com.np



1.2.3 IEE Study Team

7. The details of the members involved in the IEE study team is tabulated below:

Table 1-I: Details of IEE Study Team Members

S.No.	Name of the Member	Designation	Educational Qualifications
1	Mr. Ananda Mohan Lal Das	Team Leader	Masters of Science in Public Health Engineering
2	Mr. Srijan Aryal	Design Engineer	Masters in Civil Engineering/Urban Planning
3	Mr. Binod Chandra Devkota	Senior Water Supply & Sanitation Engineer	Masters of Science in Water Resources Engineering
4	Ms. Nirala Kayastha	Environmentalist	Masters of Science in Environmental Management
5	Mr. Shiva Adhikari	Social Safeguard Specialist	Masters in Sociology

Source: IEE Study 2018/019

1.3. Purpose of the IEE

8. The IEE study has been carried out to ensure the environmental sustainability of the Project, to integrate environmental considerations into the Project preparation process, and provide for environmental management during Project implementation. ADB and GoN require all projects to undergo environmental assessments. All projects funded by ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. The rapid environmental assessment using ADB's REA Checklist has indicated that the Project is a Category B undertaking, requiring an 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 and 2073 BS). Based on EPR Schedule 1, the Project is within the threshold of activities under the water supply and sanitation sector that will require an IEE. This IEE fulfils the policy requirements of both ADB and GoN.
9. 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

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

10. Relevant reports/documents, consultations with communities and relevant are included in the report and reference to relevant government policies, laws and regulations and mainly the Terms of References (ToR) approved from MoWS.

1.4. Need for the Project

11. The terrain of the project area is relatively flat and is still to gain momentum to grow into a dense settlement. Being flat terrain, drainage should be a concern. The study shows that the existing drainage condition of the project town is unplanned and covers only a small portion of the project area. The existing drains are not functioning properly due to improper design, size and its improper implementation process. The project area possesses various rivers and rivulets, which could be used as outfall to drain the water out of the project area, but needs proper planning.
12. Our study shows that during monsoons, the project town has been facing flood problems. The flood flows to the settlement area frequently during rain. The E-W highway passes perpendicularly to hill slope that becomes dyke/ dam/ obstruction of overland flow. The storm water is known to be collected upstream of road. This has been badly affecting people of the project town yearly during every monsoon. They are losing their property as well as access during rains. Similarly, regarding this, the passersby's discomfort and the disruption of traffic flow along the highway has been an additional problem of this project town during monsoons. So, to avoid such problems, there is an urgent need to implement properly planned drainage system within the project town.

1.5. Rationale of the Project & IEE

Rationale of the Project

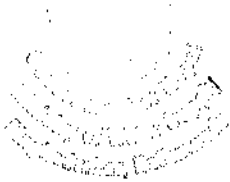
13. The rationale of the project is based on the urgent need of the properly planned drainage system, increased risk of flooding problems during monsoons, public health impacts, policy commitments and various other aspects. This all will be discussed in the following chapters.

Rationale of the IEE

14. The IEE study for the proposed project is needed to be carried out from the environmental point of view as per EPA 1997 AD and EPR 1997 AD, 2054 BS (Amendments 1999 AD, 2007 AD and 2017 AD) and as per ADB Safeguard Policy Statement (SPS), 2009. The regulation stated in Schedule 1 (Clause H) of EPR, 1997 with amendments in 2017 shall only be applicable for this project which states that "Operation of a drinking water supply system with inclusion of sewerage drainage system with treatment system".
15. The Project does not involve the relocation and resettlement of people or households. The proposed project is intended to provide drainage facilities in wards 4, 5, 6, 7 & 8 of Mirchaiya municipality. The project is expected to benefit a base year population of about 26,736 populations (2016) & design year populations of 43,161 (2035) by providing a properly planned drainage facilities and promotion of good hygiene and sanitation practices.

1.6. Overview of the Project

16. The proposed project will facilitate the people of project area with properly planned drainage system that includes partial areas of ward no. 4, 5, 6, 7 & 8 of Mirchaiya municipality of Siraha district.
17. The Project Management Office (PMO) of the Department of Water Supply and Sanitation Management (DWSSM) is the proponent of the proposed project. The implementation period will be two years, including operation and maintenance.



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2. DESCRIPTION OF THE SUB PROJECT

2.1. Location & Accessibility

18. Mirchaiya Storm Water Drainage Project has been proposed for Mirchaiya Municipality -Ward 4,5,6,7 & 8 which lies in Siraha District, Province 2 of Nepal. It is situated in the northern part of the District having about 3 km east-west width and about 10 km north-south length.
19. Geographically, the project area lies in the terai region lies Latitude 26°33' N to 26°55' N and Longitude 86°06' E to 86°26' E with altitudes ranging from 110 m to 120 m above mean sea level (amsl).
20. The climate of the area is sub tropical with the temperature ranging between a maximum of 36°C in summer to a minimum of about 17°C in winter and an annual rainfall of about 1,442 mm.
21. The project area is along alignment of Mahendra Highway & Mirchaiya Katari Road. The project town is just 23km away from the district headquarter, Siraha Municipality. Similarly, the major junction and booming market place of the project area along the Mahendra Highway, is located on all-weather black topped road that is about 29 kilometers from Lahan Municipality.
22. Ramnagar Mirchaiya Bazaar lies on the junction of the Mahendra Highway (E-W Highway) and Sagarmatha Highway. As the project area is linked with National Highway, day and night bus services are easily available. The nearest airport is the Janakpur Airport, where daily flights from Kathmandu are being operated.
23. The project town is one of the main business markets for Katari Municipality and the southern part of Siraha district. Mirchaiya is considered as a trade and economic center of Sagarmatha zone and some parts of Udayapur district after Lahan.
24. The project town is bounded by Triyuga Municipality of Udaypur District in the north, Golbazaar Municipality in the east, Kalyanpur Municipality & Naraha Rural Municipality in the south and Karjanha Municipality in the West. Out of 12 wards of the project town, the proposed project covers partial areas of wards 4, 5, 6, 7 & 8 along the alignment of Mahendra Highway & Mirchaiya Katari Road.
25. This **figure 2-1** below shows that the project area belongs to Mirchaiya Municipality of Siraha District of Province 2 of Nepal. The proposed project covers partial areas of ward no.4, 5, 6, 7 & 8 of Mirchaiya Municipality.



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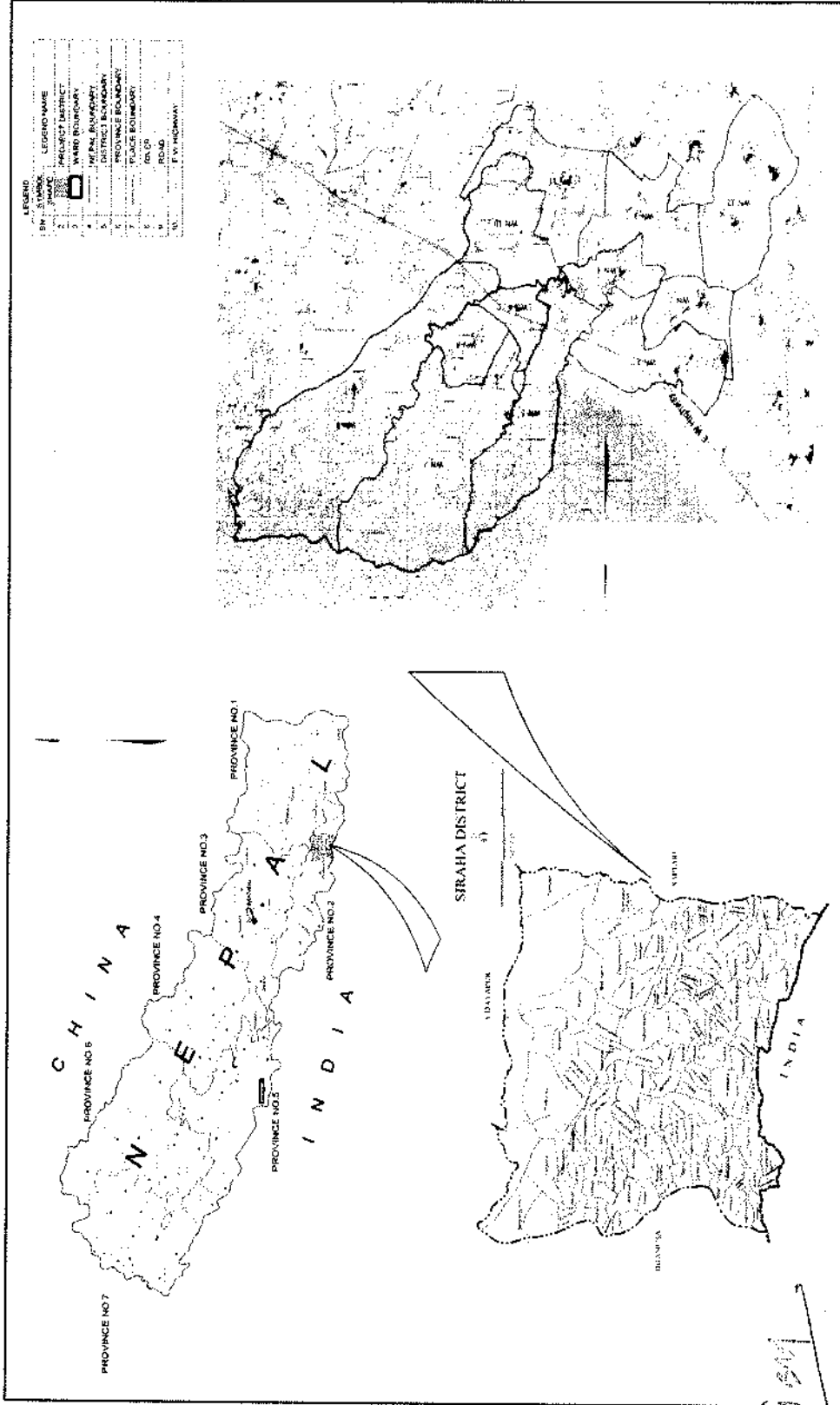


Figure 2-1: Project Location Map

Engineer

26. The **Table 2** given below gives the brief details on the reformed Mirchaiya municipality;

Table 2-I: Mirchaiya Municipality Ward Profile

Former VDC/Municipality	Former Ward No.	Wards of Reformed Mirchaiya Municipality	Wards of Service Areas
Former Mirchaiya Municipality	WN 1	1	
Former Mirchaiya Municipality	WN 2	2	
Former Mirchaiya Municipality	WN 3	3	
Former Mirchaiya Municipality	WN 4	4	Partial Areas of Wards 4, 5, 6, 7 & 8
Former Mirchaiya Municipality	WN 5	5	
Former Mirchaiya Municipality	WN 6	6	
Former Mirchaiya Municipality	WN 7	7	
Former Mirchaiya Municipality	WN 8	8	
Former Mirchaiya Municipality	WN 9	9	
Former Mirchaiya Municipality	WN 10	10	
Former Mirchaiya Municipality	WN 11	11	
Sikron VDC	WN 1 to 9	12	

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

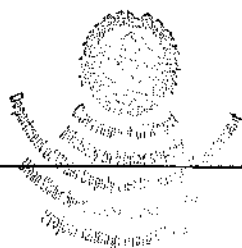
27. The above given table shows that the reformed Mirchaiya municipality has been divided into 12 wards. The wards 1 to 11 of reformed Mirchaiya Municipality belong to wards 1 to 11 of former Mirchaiya Municipality. Similarly, the ward 12 of current Mirchaiya Municipality belong to wards 1 to 9 of former Sikron VDC.

2.2. The Proposed Project

2.2.1 Proposed Area

28. According to the detailed engineering design report, due to the availability of the budget, discussion has been made with Mirchaiya Municipality and PMO to split the area to construct the drain in phase 1 and 2. Depending upon the overland flow and risk factor, the major drain has been identified and kept in phase 1 and the remaining has been kept in phase 2. The design of both phase 1 and 2 have been carried out. The project municipality may precede for the phase 2 construction activities through the utilization of their own resources based on the design or any other possible funding sources. All designed flow of upstream of highway could not carry by phase 1 drain. Hence, the flow is diverted into another side of the road and designed the drain.

29. Further, the flow each 1.71 cumec is diverted into CA-10 to CA16 left and right side of the road. Hence, municipality needs to give top priority to construct this drain first to overcome the problem. However, there may be some overland flow during heavy rain, if the flood comes from the upstream catchment is more than the designed flow. The wards of the project town included under both phases are given below:



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Phase 1

Ward no. 4,5,6,7 & 8

Phase 2

Ward no. 4,5,6,7 & 8

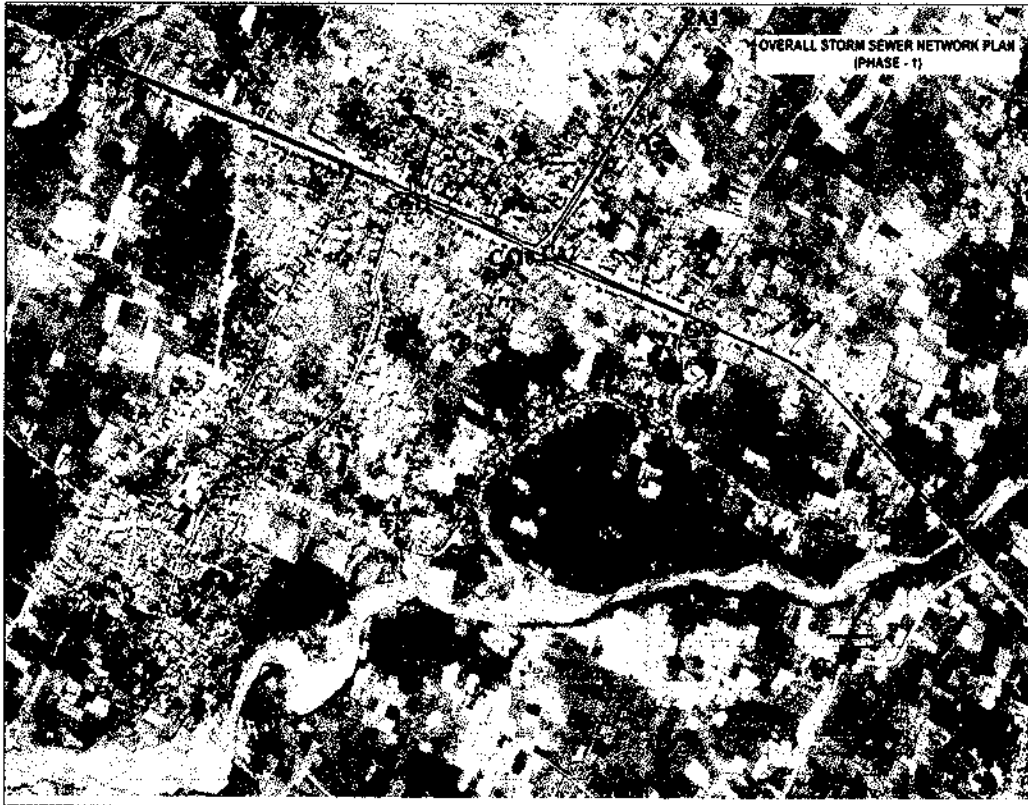
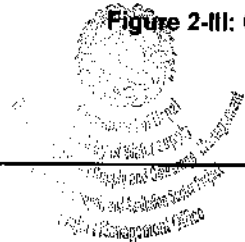


Figure 2-II: Overall Storm Sewer Network Plan under Phase 1



Figure 2-III: Overall Storm Sewer Network Plan under Phase 2



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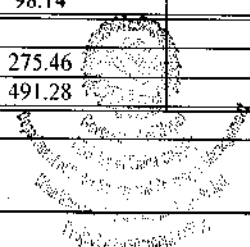
2.2.2 Catchment Area

30. The catchment area refers to the maximum area of land from which rainfall will pass into the point of consideration to determine the runoff. In this concept, the catchment has been divided into number of areas with respect to the flow consideration. Accordingly, the flow at each point has been determined to finalize the size of drain in respective stretch. Separate drainage sub system has been proposed for this project. Each sub drainage has the catchment area less than 40 ha. The catchment area for the proposed project is depicted in the figure given below:

31. The table given below gives brief details on the catchment areas of the proposed project.

Table 2-II: Catchment Area Details

Nodes	Maximum Length Travelled By Water From Farthest Point of Catchment and Converted Length, L m	Catchment area at each side pasture (Right/ Left) km ²	Catchment area at each side built up (Right/ Left) km ²
CA1-CA2			
CA1 (left/ right)	3794.19	0.88	0.58
CA1(Ch 340)(left / right)	2587.54	0.19	0.18
CA2 (left/right)	2771.38	0.12	0.19
CA2-CA7(Outfall)			
J4 at top (left/right)	2435.35	0.04	0.14
J5(Left) end bottom	202.23	0	0.03
J5(Right) end bottom	144.49	0	0
J2 at top(left and right)	2158.19	0.04	0.14
J2(Left) end bottom	219.16	0	0.04
J2(Right) end bottom	245.87	0	0.01
J1 at top(left and right)	1650.15	0.03	0.13
J1-CA6(Left) end bottom	246.74	0	0.04
J1-CA6(Right) end bottom	135.73	0	0.01
CA2-CA4(Outfall)			
J6-J7 at top(left and right)	1299.16	0.04	0.07
J6(Left) -J7 end bottom	155.74	0	0.01
J6(Right) -J7end bottom	126.99	0	0.01
J8 at top (left and right)	804.97	0.02	0.04
J8(Left)-J9 end bottom	166.60	0	0.02
J8(Right)- J9 end bottom	124.56	0	0
J10 (left/ right)	786.42	0.03	0.05
J10(left)-J11 end bottom	160.95	0	0.01
J10(Right) -J11 end bottom	132.29	0	0
J12(left/right)	647.80	0.010	0.05
J12(Left) -CA3 end bottom	331.18	0	0.04
J12(Right) -CA3 end bottom	126.42	0	0
J13 top (left/right)	371.55	0.000	0.03
J13-J14(left) end bottom	112.91	0	0.01
J13-J14(right) end bottom		0	0
Below and at Road (Highway)			
CA9-CA13(Outfall)			
CA9-CA10(Left)	429.11	0	0.03
CA10 left	169.13	0	0.02
CA 10 - CA11 (left)	215.67	0	0.02
CA11(left)	215.67	0	0.02
CA11-CA12 left	129.86	0	0.01
CA12 left	270.24	0	0.03
CA12 - CA13 left	98.14	0	0.01
CA9-CA8(Outfall)			
CA9-CA6(Right)	275.46	0	0.02
CA6-CA8 (right)	491.28	0	0.03
CA9-CA16; CA10-CA16 (Outfall)			



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Engineer

Nodes	Maximum Length Travelled By Water From Farthest Point of Catchment and Converted Length, L m	Catchment area at each side pasture (Right/ Left) km ²	Catchment area at each side built up (Right/ Left) km ²
CA9-CA16 left	1490.66	0	0.18
CA10-CA 16 right	843.95	0	0.15
CA10-CA 16 left	833.49	0.01	0.12
CA11-CA15(left Outfall)			
CA11-CA 14(Right)	1126.19	0	0.14
CA11-CA14(Left)	1000.62	0	0.1
CA14- CA15 left outfall			
CA12-CA15(right Outfall)			
CA12-CA14 left	966.30	0	0.09
CA12-CA14 right	1439.35	0	0.45
CA14- CA15 left	1039.64	0	0.23
CA14- CA15 right outfall			

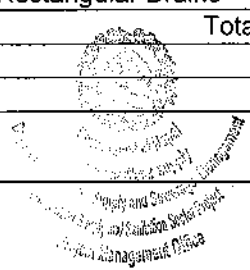
Source: DEDR, 2019

2.3. Salient Features of the Project

32. The salient features of the project is given in **Table 2-III** which is as follows:

Table 2-III: Salient Features of the Project

S.N.	Items	Description	
1	Name of Project	Mirchaiya Storm Water Drainage Project	
2	Type	Sanitation	
3	Study Level	Detailed Engineering Design	
4	Location Area		
	Province No.	2	
	District	Siraha	
	Municipality/Rural Municipality	Mirchaiya Municipality	
	Ward	4, 5, 6, 7, & 8	
5	Available Facilities		
	Road	East-West Highway and Mirchaiya -Katari	
	Supply Water System	DWSSM/ WUSC and Hand pumps and Recently completed Third Small Town Water Supply Project	
	Drainage	Few locations	
	Electricity	Available	
	Communication	Available	
	Health Services	Available	
	Banking Facilities	Available	
6	Type of Structures	Phase I	Phase II
	Headwall (nos)	2	-
	Circular Drains		
	Total Length (m)	5,519.90	4313.66
	Size (mm)	NP3 (600-1600)	NP3 (600-1600)
	Minimum Cover (m)	0.60	0.60
	Rectangular Drains		
	Total Length (m)	854.34	9609.94
	Width (m)	0.50 to 1.45	0.50 to 1.45
	Depth (m)	0.70 to 1.45 including 0.3m	0.70 to 1.45 including 0.3m



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S.N.	Items	Description	
	Total Drain length(m)	6,374.24	13,923.60
	Ending Point of Drain/Outfall	3 nos. • Jiba Khola (U/S of E-W Highway West) • Jiba Khola (D/S of E-W Highway West) • Bataha Khola (U/S of E-W Highway East)	4 nos. • Bataha Khola (D/S of E-W Highway East) • Bataha Khola (D/S of E-W Highway South) at 3 locations
	Circular Manholes		
	Number	117	58
	Internal Diameter (mm)	Average (1.0-2.0)	Average (1.0-2.0)
	Depth (m)	Varying (2.5-8.0)	Varying (2.5-8.0)
	Spacing (m)	30-50	30-50
	Rainwater inlet box (no)	30	20
	Gabion Outfall (nos)	3	4
7	Construction Period	2 years	2 years
8	Social Status (Based on Water Supply Component)		
	Surveyed Year Population (2014)	25,497	25,497
	Present Year Population (2016)	29,396	29,396
	Design Year Population (2035)	43,161	43,161
	Weighted Growth Rate %	2.4	2.4
9	Environment		
	ADB Category	B, Only IEE necessary	B, Only IEE necessary
	IEE finding	No significant adverse impact	No significant adverse impact
10	Project Cost of Storm Drainage including (NRs)	527,676,109.89	632,581,115.11
	GON Contribution (85 %)	448,524,693.41	537,693,947.84
	Local Authority / Users' Contribution (15 %)	79,151,416.48	94,887,167.27

Source: DEDR, 2019

2.4. Sub Project Components

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

2.4.1 Drains

34. Two types of drains that include Circular Drain & Rectangular Drain are proposed for this project based on the ground elevation and depth of the drain. The drainage system follows both sides of road. The RCC Hume pipes of class NP- 3 of sizes 600mm to 1600mm has been used where circular section is chosen. The pipes are joined/ tightened with rubber gaskets. The minimum cover of the pipe will be 0.60m at blacktopped road. Depending upon the road and site condition, the cover becomes high. Likewise, the rectangular section of 0.50 m to 1.45m width and 0.70m to 1.45m depth are used including 0.3m free board. In rectangular drain, the depth of drain becomes higher than the design depth based on the ground topography. The rectangular drain has been covered either by RCC slab or by MS grating for safety point of view and allows discharge to flow from ground surface. About 150-160m length close to outfall, there is no manhole and drain cover.



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35. The proposed drain will be laid within the right of way of the E-W Highway and Mirchaiya-Katari Road. It is considered that there will be 2-3m footpath on either side of highway. The drain will be laid parallel and joining to the footpath. The drain is covered with some gap either by cover slab or MS grating to flow all the water into drain and provide access to light traffic also.
36. Since, all phase 1 drains/ activities fall under DoR jurisdiction, it is necessary to take the permission from Department of Road (DoR) before entering in to construction. It is envisaged that the PMO/ RPMO will take care on it. Further, in phase 2 activities lies in both highway and local roads. The permission from DoR and local authority required.

2.4.2 Manholes

37. Circular brick masonry manholes with CI cover/ MS grating are proposed for this project, which will have provision of inner plastered surface to prevent the leakage and provide smooth flow. Depending upon the size of drainage, the manhole will have internal diameter of average (1.0-2.0) m and varying depth (2.5m to 8m). The spacing of manhole will be kept (30-50) m apart. Along with this, there will be provision of manholes at each road junction and drop. The top surface will correspond to the road ground level. If the footpath needs to be constructed in the future, the manhole height needs to be raised to the level of footpath and the flow inlet will be from sidewall of the manhole.
38. The manhole cover will have either heavy duty CI or MS grating. Every alternate, MS grating will be provided to allow the overland flow. Likewise, 2 PE100, PN10 pipes of each 0.30 m diameter are will be provided at wall side to allow the access of the flood into drain.

2.4.3 Outfall

39. There are several possible outfalls available for the drainage of the storm water. In total, seven outfalls are identified and proposed for this drainage project. For Phase 1, three outfalls have been proposed while for Phase 2, four outfalls have been proposed. Its brief details are given in **Table 2-IV**. There will be provision of gabion wall over the proposed outfalls to secure the drainage at its position.

Table 2-IV: Outfall Structures

Outfall Gabions	Riverbed level	Pipe invert level	Foundation bottom level	Height of gabions	Phase of construction
Jiba Khola Outfall- 1 (CA-4), Upstream of E-W highway west	96.80	100.48	95.48	5.00	1
Jiba Khola Outfall -2 (CA-13), Downstream of E-W highway west	96.70	99.52	95.52	4.00	1
Bataha Khola Outfall-3(CA-7) Upstream of E-W highway east	98.60	100.20	97.20	3.00	1
Bataha Khola Outfall-4(CA-8), Downstream of E-W highway east	98.00	106.57	96.57	10.00	2
Bataha Khola Outfall-5(CA-16), Downstream of E-W highway south	92.03	93.01	91.01	2	2
Bataha Khola Outfall-6(CA-15 L), Downstream of E-W highway south	89.06	90.18	88.18	2	2

proposed ari Road. In n will be la	Gabions	Riverbed level	Pipe invert level	Foundation bottom level	Height of gabions	Phase of construction
cover slab Batah Down	all-7(CA-15 L), W highway south	89.06	90.07	88.07	2	2

Source: 019

40. The proposed table shows that the invert level of outfall is much higher than the riverbed level at four outfalls; this will not have backwater effect. While in last three, the outfall is above river bed level and may have some effect or water may be back while the river will rise above drain invert level. This will not have effect to the settlement of outfall. After the water level of river go down the stagnant water in the pipe will flow into the river. These outfalls are located at the downstream of the settlement will not affect to the public.

2.4.4 Rainwater Drainage (1.0-2.50) m apart

41. Rainwater inlets are proposed which will have inside plaster to prevent the leakage. The top is rectangular box in shape and this is equipped with iron grating on top. The rainwater inlets at certain intervals will be provided for a manhole at built up areas only to allow low inlet water.

2.4.5 Black Manhole Road Cutting

42. Altogether are required road cuttings along the Mirchaiya – Katari road at across one local Mirchaiya Bazaar E-W highway at across two locations to lay the drainage pipe. The fall from the DoR is mandatory.

2.5. Construction Planning

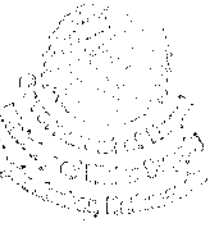
43. It has been proposed as a basis for the fulfillment of the requirement during construction period of the project. It involves the following described requirement of the project;

a) Land Requirement for the project area

44. According to the engineering final design report and drawing all sewerage pipelines will be constructed within road width of public road stated as right of way (RoW) of the roads. No need for acquisition of any private land or structures and have not envisaged any adverse impact on the business and livelihood of local resident. The drainage main pipe lines goes through the east - west highway along the footpath within right of way of public roads. The hand rain water inlet chambers will be built at the sides of roads within existing clearances. Similarly, there is also temporary requirement of land for worker's camp site as well as for the piling site. For this, barren land is preferred and the land is managed by the municipality. No acquisition of private land is adopted for this.

b) Energy Requirement

45. There is no requirement of energy use either for any construction activities or for workers camp. 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 will be prohibited. Instead, cooking fuel like kerosene or gasoline fuel should be provided to 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

46. 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 51,302 and 301,120 respectively that is required for the whole project implementation period. Similarly, during operation phase, human resources for operation & maintenance should be mobilized by the Municipality.

d) Construction Materials

47. 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.

48. The materials other than Stone, Aggregate and sand have been envisaged to procure from Katari town, Udaypur which includes Bricks, Cement, Iron bar and Iron sections. It is about 27 km from Mirchaiya Bazaar. Other miscellaneous construction materials like pipe materials are purchased from the available and nearest market areas.

49. 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: 90 m³

Sand: 2894.29 m³

Aggregate: 1087.00 m³

Cement: 1332.585 tonnes

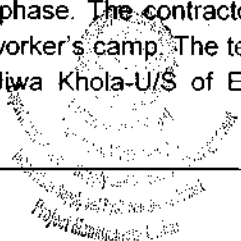
Bricks: 258983 nos.

Reinforcement Bars: 22.415 tonnes

50. Other miscellaneous construction materials like pipe materials, manhole cover etc. will be purchased from the available and nearest market areas. As per the detailed design, NP3 Tongue and Groove Hume Pipe with gasket is used for drainage pipeline works that includes i) 1400mm diameter: 535.00RM and ii) 1600 diameter : 4984.90 Rm. Similarly, 300mm diameter pipe of 10kg/cm² is used for drainage pipeline works. Its total estimated quantity is calculated as 384.00 Rm.

e) Camp Site

51. 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 tentative locations of the proposed camp site includes a) Near Outfall-1 (Jiwa Khola-U/S of E/W Highway West) and b) Near Outfall-3 (Bataha



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Khola-U/S of E-W Highway east) which has been depicted in the **Figure 2-IV** 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. The area of the land required for the camp site is approximately 100m². The land that is used for this camp site is barren and belongs to the government.

f) Stockpiling Site

52. 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. The tentative locations of the proposed camp site includes a) Near Outfall-1 (Jiwa Khola-U/S of E/W Highway West) and b) Near Outfall-3 (Bataha Khola-U/S of E-W Highway east) which has been depicted in the **Figure 2-IV** 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. The area of the land required for the stockpiling site is approximately 600m². The land that is used for this stockpiling site is barren and belongs to the government.

g) Cut and Fill Volume of Muck

53. 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 102256.08 m³ and of fill volume of muck is 95940.24 m³. Hence, the remaining volume of muck after backfilling will be 6315.84 m³ which will remain as excess spoil. This will be managed by disposing into the proposed spoil disposal site.

h) Spoil Disposal Site

54. There will be also provision of Spoil Disposal Site at various tentative locations that includes a) Near Outfall-2 (Jiwa Khola-D/S of E/W Highway West) and b) Near Outfall-3 (Bataha Khola-U/S of E-W Highway East) . The location of each Spoil Disposal Site is depicted in the **Figure 2-IV** 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 .

2.6. Project Impact Area

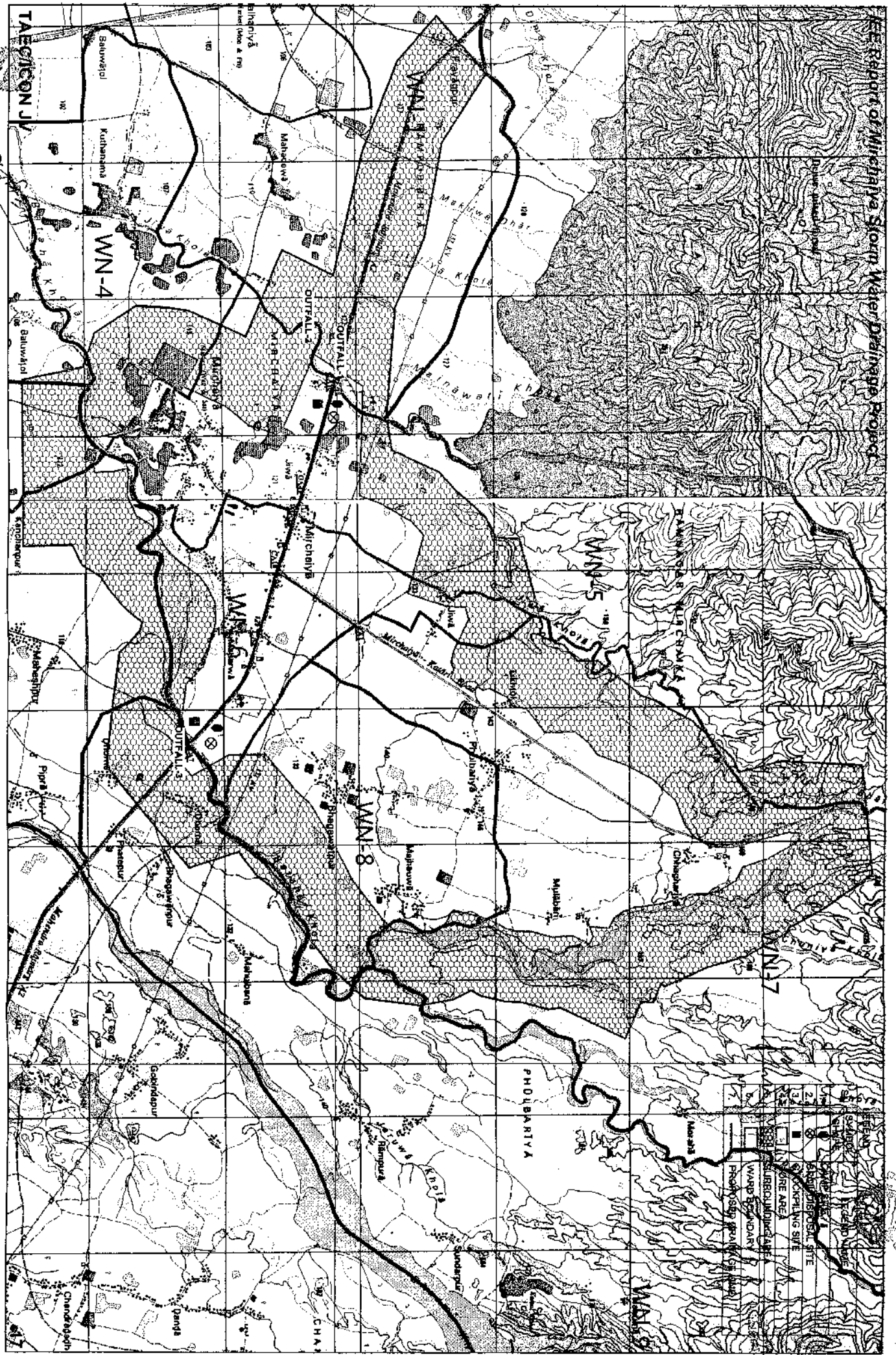
55. The project impact area refers to the area of the project town which is susceptible to either significant or insignificant impacts by the proposed project. This impact areas is delineated by demarcating the geographical boundary of the impact area on the topographical map. The impact areas has been 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.

56. Here, the Core Project Area indicates the area required permanently as well as temporarily for the proposed project. This area refers to the service area as well the area where the construction of the project components will be carried out. The core area is considered to be high magnitude impact area. Hence, here, regarding this proposed project, this core area includes the service area of the proposed project which comprises partial area of ward no. 4, 5, 6 7 & 8 of Mirchaiya Municipality.

57. The Surrounding Project Area indicates the area within the immediate surroundings of the core area of proposed project. The Surrounding Area is considered to be minimal impact area which has spill-over effects of the impacts that occur within the core area. However, impacts during construction phase are likely in these areas due to various construction activities. Hence, this area can be considered as medium/low magnitude impact area. It includes the area of the project town which is closely associated with the core area of the project. Hence, here in this proposed project, the surrounding area covers partial areas of wards 1,3, 4, 5, 6 7, 8, 9, 10 & 11 of Mirchaiya Municipality.
58. The Core Area & Surrounding Area of the proposed project is depicted in the figure given below:







1	BOUNDARY
2	ROAD
3	RAILROAD
4	WATER
5	WATER TOWER
6	WATER PUMP
7	WATER TREATMENT PLANT
8	WATER RESERVOIR
9	WATER CONDUIT
10	WATER MAIN
11	WATER SERVICE LINE
12	WATER VALVE
13	WATER METER
14	WATER TAP
15	WATER PIPING
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2.7. Project Activities

59. 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:

2.7.1 Construction Activities

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

- a) Establishment of Temporary Facilities for workers
- b) Establishment of the Stockpiling Areas
- c) Establishment of the Spoil Disposal Sites
- d) Movement of Construction Vehicles
- e) Transportation of Construction Materials
- f) Loading/Unloading of Construction Materials
- g) Earthworks Excavation & Prompt Backfilling with Compaction
- h) Haulage & Disposal of Spoils to Spoil Disposal Site
- i) Laying of Hume Pipes
- j) Construction of Project Components that includes Drains, Manholes and Rain Water Inlet
- k) Use of Diesel Generators
- l) Use of On Site Concrete Mixers
- m) Waste Generation from the construction sites and worker's camp
- n) Stockpiling of Construction Materials
- o) Storage of Fuels/Chemicals
- p) Dismantling of existing brick masonry works with safe disposal of broken down materials wherever necessary
- q) Dismantling of existing PCC/RCC structures with safe disposal of broken down materials wherever necessary
- r) Dismantling of Temporary Facilities after the completion of construction works

2.7.2 Operation Activities

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

- a) Dumping of solid waste to the proposed storm water drains
- b) Blocking & Chocking of Drains
- c) Mixing of household waste water to the proposed drains

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

62. The IEE study has followed the necessary policy, legal and administrative framework outlined in the approved ToR. However, some of them mentioned in ToR are updated in this IEE study.

3.1. Nepal's Environmental Policy and Legal Framework

3.1.1 Constitution of Nepal

63. 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.

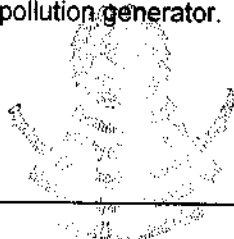
64. Beside this, the Government of Nepal has passed a series of environmental laws, policies and implementing regulations and standards. Among these, the basic legislations that provide the framework within which environmental assessment is carried out in Nepal are the:

3.1.2 Environmental Protection Act, 2053 B.S. (1997 A.D.) with 1st and Latest Amendment 2075 B.S. (2018 A.D.)

65. As per Environmental Protection Act (EPA), 2053 B.S. 1997 A.D., with latest amendment 2075 B.S. (2018 A.D.), it requires a proponent to undertake IEE or EIA of the proposed project. Regarding the approval of IEE or EIA, the concerned sectoral agency shall carry out necessary examination of the proposal and forward the proposal to the concerned ministry for the approval prior to implementation.

66. It specifies that in case it appears from the IEE or EIA report that significant adverse impacts to be caused on the environment while implementing the proposal can be mitigated or controlled, the concerned ministry may grant approval, with prescription of necessary terms, to the proponent to implement the proposal; 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.



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

67. 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.

3.1.4 Other Environmental Policies, Laws, Rules, Conventions & Standards

68. Other environmental policies, laws, rules, conventions & standards that provide general context in the environmental assessment of water supply & sanitation works are presented in *Table 3-1*.



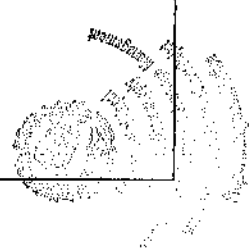
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Table 3-1: Other Relevant Environmental Act, Rules, Plan, Policies, and Guidelines of Nepal

Act/ Rule Policy/Law/Guidelines 1.Plans, Policies & Strategies	Year	Relevant Provisions	Remarks
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.
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 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. 	This has been considered in IEE study.
National Urban Policy	2063 B.S. (2007 A.D.)	The policy gives importance to environment conservation while carrying out urban development works and natural resource use; thus, supporting the required environmental conservation and protection in donor-assisted development	The IEE study will meet the provisions of this policy.

Act/ Rule/ Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
National Urban Water Supply & Sanitation Sector Policy	2065 B.S. (2009 A.D.)	<p>projects.</p> <p>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.</p>	<p>The IEE study will meet the provisions of this policy.</p>
Updated 15-yr Development Plan for Small Towns Water Supply and Sanitation Sector	2066 B.S. (2009 A.D. Amendments in 2015A.D.)	<p>The Plan emphasizes monitoring and evaluation as an important component of a project to determine the overall impact of a project.</p>	<p>EMP prescribes performance monitoring & evaluation to minimize the anticipated environmental impacts.</p>
National Water Supply & Sanitation Policy	2071 B.S. (2014 A.D.)	<p>The Policy addresses the need in the protection of property and human health by providing storm water drains in densely populated urban centers.</p>	<p>The proposed project is also committed to provide drainage facilities for storm water in emerging towns like Mirchaitiya.</p>
Land Acquisition, Resettlement and Rehabilitation Policy	2071 B.S. (2015 A.D.)	<ul style="list-style-type: none"> • Contribute to overall development of the nation and its citizens by creating a conducive environment for implementation of infrastructure development projects • Facilitate timely execution (completion) of development projects by minimizing adverse impacts on economic, social and cultural aspects of affected families/people and the project area • Improve social and economic status of project-affected families by providing fair and adequate compensation, appropriate resettlement and rehabilitation assistances/allowances. 	<p>There is no issue of any kind of Land Acquisition, Rehabilitation and Resettlement in this project.</p>
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. 	<p>The proposed project will maintain balance between construction activities and environmental aspects of the project town.</p>

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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
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. 	The IEE study has duly followed this.
National Forest Policy	2075 B.S. (2019 A.D.)	It guides sub sectoral programmes relating to forests, plant resources, wildlife, biodiversity, medicinal plants, and soil and watershed conservation. It also covers periodic assessment and updating of information on forest resources of the country.	The proposed project does not have to deal with forest related adverse issues as there is no requirement of occupying forest areas for the proposed project construction.
National Land Policy	2075 B.S. (2019 A.D.)	It has the provisions of ensuring proper access and management of land and land resources for the sustainable prosperity of the development of country. The general objective of this policy is to bring the economic prosperity of the country with land distribution to marginalize people, the maximum utilization and good governance of the land.	The IEE study has duly followed this policy.
Fifteenth Plan Approach Paper (2076/77-2080/81)	2076/77-2080/81	This plan also has separate provision for water supply & sanitation sector. Regarding this sector, this plan aims to ensure access to safe water supply & sanitation service and to enhance quality service. This plan has also its own strategy, working policy and expected positive outcomes through various development works in the field of water supply & sanitation service.	The successful implementation of the proposed project shall be the expected outcome of this plan.
Climate Change Policy	2076 B.S. (2019 A.D.)	This has various objectives that includes i) advancing capacity on CCA, ii) developing ecosystem resilience, iii) promoting green economy by adopting low carbon economic development concept, iv) mobilizing national and international financial resources, v) making effective information service, vi) mainstreaming climate change into relevant policy, strategy, plan and programmes, and vii) also mainstreaming gender and social inclusion, including in climate change mitigation and adaptation programmes	This will be followed during project implementation as per requirement.

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Act/Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
National Environmental Policy	2076 B.S. (2019 A.D.)	<ul style="list-style-type: none"> This encourages the state to control pollution, manage wastes and promote greenery so as to ensure citizens' right to live in a fair and healthy environment. This was framed to guide the implementation of environment related laws and other thematic laws, realize international commitment and enable collaboration between all concerned government agencies and non-government organizations on environmental management actions. The policy has entrusted the federal government with the responsibility for looking after national-level policy, law and standards related works for environmental protection and management. 	This will be followed during the proposed project implementation phase.
2.Laws & Acts			
Aquatic Animal Protection Act	2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.))	This act renders punishment to any party introducing poisonous, noxious or explosive materials into a water source or destroying any dam, bridge or water system with the intent of catching or killing aquatic life. It also emphasizes that GoN empowers to prohibit catching, killing and harming of certain kinds of aquatic animals by notification in Nepal Gazette.	Information of this act will be delivered to the construction workers, as they may get involved in fishing during construction period.
Town Development Act	2045 B.S. (1988 A.D.)	This act has provision of services and facilities like road, transport, electricity, drainage, sanitation and open space based on density of such area.	The proposed project is solely for provision of storm water drainage system.
Forest Act	2049 B.S. (1993 A.D.) with Amendments - 2055 B.S. (1999 A.D.)	The Act prohibits the extraction of boulders, rocks, pebbles, sand or soil from national forests, defined as all forests, excluding private forests, whether marked or unmarked with forest boundary, to include waste or uncultivated lands, or unregistered lands surrounded by the forest or situated near adjacent forests as well as paths, streams rivers, lakes, riverine lands within the forest.	No trees will be cut. EMP stipulates no quarrying of natural aggregate materials.
Land Acquisition Act	2049 B.S. (1993 A.D.)	It guides the compulsory acquisition of land. It also describes that GoN can acquire land at any place and in any quantity by giving compensation pursuant to the act for the land acquired for any public purposes or for operation	There is no requirement of land acquisition of private land. All the land required are under the ownership of GoN.



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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Child Labor Prohibition and Regulation Act	2056 B.S. (2001 A.D.)	of any development project initiated by GoN. 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.
Solid Waste Management Act	2068 B.S. (2011 A.D.)	Article 4 provides that the management of hazardous, medical, chemical or industrial waste rests upon the generators of such wastes. Management should be as prescribed in the Act. Article 5 provides that individuals and entities must reduce the amount of solid waste generated while carrying out work or business. • The Act has provisions for the rights, interest, facilities and safety of workers and employees working in enterprises of various sectors. • The Act emphasizes on occupational health and safety of workers and stipulates provision of necessary safety gears and adopting appropriate precautionary measures against potentially hazardous machine/equipment in the workplace. • It also specifies to arrange such as removal of waste accumulated during production process and prevention of dust, fume, vapor and other waste materials, which adversely affect the health of workers. • It specifies the provision of controlling the communicable diseases at the construction site. It also prohibits mobilization of child as a labor. It emphasizes on the provision of temporary camp, safe drinking water and necessary food supplies to the workers.	EMP prescribes eco-friendly management of solid and hazardous wastes.
Labour Act	2074 B.S. (2017 A.D.)	The Act gives Province Government the functions, duties &	These provisions are stated in EMP.
Local Government Operation Act	2074 B.S. (2017 A.D.)		Provides a basis for Local

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Act/ Rule Policy/Law/Guidelines	Year	Relevant Provisions	Remarks
Land Use Act	2076 B.S. (2019 A.D.)	<p>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>The main aim of the act is to ensure that land is properly used and managed and that land set aside for one purpose is not used for other. The act has assigned the responsibility for implementing the act to not only the federal government but also to the provincial and local governments.</p>	<p>Government to monitor the environmental performance of the projects. EMP provides the responsibilities of LGs in EMP implementation.</p> <p>Information on this act is necessary for this project to avoid misuse of land for the construction of project components. However, as this project requires RoW of the public road for the proposed components, land misuse may not be a serious issue.</p>
<p>3.Rules & Regulations Solid Waste (Management & Resource Mobilization), Rules</p>	2044 B.S. (1987 A.D.) Amendments 2049 (1992A.D.) B.S.	<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 pollution from solid waste. 	<ul style="list-style-type: none"> This act needs to be reviewed during construction phase. EMP covers the requirement of this rule for the proposed project.
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. 	EMP for this proposed project covers this matter focused by this rule.
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. 	EMP for this proposed project covers this matter focused by this rule.
<p>4.Directives, Guidelines & Manuals National EIA Guidelines</p>	2050 B.S. (1993 A.D.)	This guidelines aims to assess the environmental impacts likely to be caused by a project, and promote its positive	This has been followed for evaluation of the anticipated



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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.)	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.	environmental impacts.
WHO Guidelines for Drinking-water Quality, Fourth Edition	2073 B.S. (2017 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 guideline will be followed.
National Noise Standard Guidelines	2068 B.S. (2012 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 guideline will be considered and followed
Guidelines for Community Noise by WHO	2055 B.S. (1999 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 guideline will be followed.

Source: IEE Study 2018/019

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3.2. Environmental Agreements

3.2.1 International Environmental Agreements (Conventions & Treaties)

69. 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

70. 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.

71. The Mirchaiya Storm water Drainage Sub Project does not and will not break or go against Nepal's commitment to these international agreements.

3.3. Environmental Standards

72. 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 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 3-II** and their details on the acceptable level criteria of these standards are featured in **Annex 2B**.

Table 3-II: 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	

Source: IEE Study, 2018/2019

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73. As shown in the above **Table 3-II** 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:

Table 3-III: Standards for Ambient Air Quality

Parameter	Averaging Period	Nepal's Ambient Air Quality Standard (µg/m ³) ^a	WHO Air Quality Guidelines (µg/m ³) ^{**}	
			Global Update 2005	Second Edition [†]
TSP	Annual	-	-	-
	24-hour	230	-	-
PM ₁₀	Annual	-	20	-
	24-hour	120	50	-
PM _{2.5}	1-year	-	10	-
	24-hour	-	25	-
SO ₂	Annual	50	-	-
	24-hour	70	20	-
	18-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.

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

Table 3-IV: 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 _{avg} in dBA)	
	Day	Night	07:00 - 22:00	22:00 - 07:00
Industrial area	75	70	-	-
Commercial area	65	55	70	70
Rural residential area	45	40	-	-
Urban residential area	55	50	55	45
Mixed residential area	63	55	-	-
Quiet area	50	40	-	-
Water pump	65		-	-
Diesel generator	90		-	-

^{*} Guidelines for Community Noise, WHO, 1999.

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



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75. *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 3-V: 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

3.4. Environmental Assessment Requirements

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

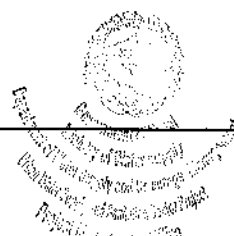
3.4.1 Environmental Assessment Requirements of the ADB

77. All projects funded by the ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects funded under ADB loan are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. Concerning the environment, the SPS 2009 is underpinned by the ADB Operations Manual, Bank Policy (OM Section F1/OP, 2010). The policy promotes international good practice as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines¹.
78. ADB's Environmental Safeguards policy principles are defined in SPS (2009), Safeguard Requirements as per *Table 3-VI* given below and the IEE is intended to meet these requirements.

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

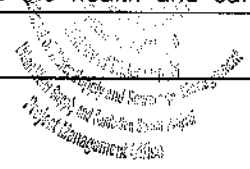
Table 3-VI:SPS 2009 Safeguard Requirements

SPS 2009 - Safeguard Requirements	Remarks
<p>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.</p>	<p>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.</p>
<p>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.</p>	<p>IEE has been undertaken to meet this requirement. (Chapter 6 & 7). No transboundary & global impacts, including climate change.</p>
<p>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.</p>	<p>Analysis of alternatives is presented in Chapter 6</p>
<p>Avoid, and where avoidance is not possible, minimize, mitigate, &/or offset adverse impacts and enhance positive impacts using environmental planning & management. Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.</p>	<p>An EMP has been prepared to address this requirement.</p>
<p>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.</p>	<p>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.</p>



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SPS 2009 - Safeguard Requirements	Remarks
<p>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.</p>	<p>The draft IEE will be disclosed on ADB's website before Project appraisal. The GoN has approved the IEE Report. Copies of both SPS-compliant IEE and GoN-approved IEE will be made available at the offices of the PMO, ICG and municipality for public consultation.</p>
<p>Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.</p>	<p>EMP implementation, reporting and disclosure of monitoring reports are in this IEE.</p>
<p>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.</p>	<p>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.</p>
<p>Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phase-outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.</p>	<p>This requirement is only minimally applicable to the Project in the aspect of waste generation, e.g., effluent from septic tanks and generated sludge and sludge disposal from water supply and sanitation structures. The Project will not involve hazardous materials subject to international bans/phase-outs.</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</p>	<p>EMP provides measures to mitigate health and safety hazards during construction and operation.</p>



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

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

3.4.2 Environmental Impact Assessment Requirements of Government of Nepal

79. 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 3-VII** given below.

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

Steps in the Process	Remarks
Proponent refers to EPR Schedules 1 & 2 for the required environmental assessment (IEE or EIA) to carry out.	The project requires an IEE.
If proposed project requires an IEE, Proponent prepares an IEE schedule of work/ToR using the format prescribed in Schedule 3 of the EPR and submit this to the CSA for approval.	The project has secured an approved ToR.
Proponent carries out IEE according to the approved work schedule/ToR and prepares an IEE Report following the format prescribed in EPR Schedule 5 and incorporating stakeholders' feedback applying the consultation procedure specified in the EPR.	The project carried out IEE and prepared the IEE Report accordingly.
Proponent submits 15 copies of the IEE Report along with the project proposal and recommendation of the Municipality to the CSA.	Project submitted documents accordingly for review and approval.
CSA conducts review and grants approval of IEE Report.	
> If the review reveals project implementation to have no substantial adverse impact on the environment, CSA approves within 21 days from receipt of the report.	
> If the review reveals the necessity to carry out an EIA, Proponent conducts an EIA following the prescribed EIA process.	
Proponent implements approved IEE Report and any terms and conditions given 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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4. METHODOLOGY

80. 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 Mirchaiya Storm Water Drainage Project. The IEE study has followed basically the procedures outlined in the approved ToR.
81. The IEE study was conducted as per provisions of the Environmental Protection Rules (1997) following the provision of Rules 5, 7, 10 & 11 in compliance with the schedule 1, 3 & 5.
82. 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

4.1. Literature review

83. 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. The key documents & reports collected and reviewed to determine the nature and scope of activities of the project that influences the environmental conditions of the proposal area are listed below:
- Final Feasibility Study of Mirchaiya Storm Water Drainage Project, 2019
 - Detailed Engineering Design Report of Mirchaiya Storm Water Drainage Project, 2019
 - Due Diligence Report of Mirchaiya Storm Water Drainage Project, 2019
 - Final Socio-Economic Profile of Mirchaiya Storm Water Drainage Project, 2019
84. 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.

4.2. Impact Area Delineation

85. 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 have 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.
86. **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.

87. **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.

4.3. Field Study

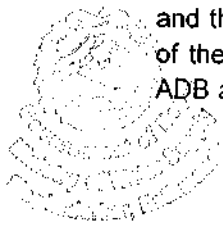
88. The field study was carried out in the project service areas in an extensive manner by a multidisciplinary team, comprising a) an Environmental Specialist; b) Water Supply & Sanitation Engineer; c) Sociologist; d) Geo-hydrologist and e) Botanist. During the visit, baseline information on physico-chemical and biological conditions of the core area and surrounding areas of the project area were collected using Simple Checklists method. Information on Socio-economic & cultural aspects were extracted from the social survey conducted for Mirchaiya WSSP by PMO that belonged to SSTWSSSP. 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 briefly describes the various approaches and methodological tools used during the field study.

4.3.1 Physico-Chemical Environment

89. 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. 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.
90. Similarly, information on air quality and noise quality condition was 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.
91. The information on the Physio-chemical environment helps to identify and analyse the impacts on the Physio-chemical environment. The qualitative analysis on the impacts on Physio-chemical environment was carried out through the Checklists method as well as Stakeholder's Consultation as mentioned above, whereas, the quantitative analysis was carried out using expert/professional judgement method as the quantitative physical modelling cannot be adopted due to limited data availability.

4.3.2 Biological Environment

92. 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



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the expert judgement. Similarly, information on the aquatic species were also collected through the expert judgement and discussions with the locals.

93. The data on the existing wildlife/mammals, birds, herpetofauna (Reptiles/Amphibians) were collected through field observation and interaction with the locals. The checklists as given in **Annex 4** were filled up accordingly. The status of each of these species were identified as either threatened or near threatened or endangered species or least concern as per IUCN Red Book, IBAT Report of ADB, CITES Appendices and GoN list species. This were affirmed by the expert review.

4.3.3 Socio-economic and Cultural Environment

94. Information on the socio-economic & cultural environment that includes demography, ethnicity, education, health & sanitation, drinking water condition of the project area, religions, land use patterns, incomes & expenditures and to acquire their perception towards the proposed project, etc. were collected by extracting information from the social survey conducted for Mirchaiya WSSP by PMO in 2016 A.D.. This also includes Information on Migratory patterns of the local people, the Impact of river on settlements & agricultur and Information on the people residing within the core area of the proposed project town.
95. 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**. Transect Walk Method was also adopted to ascertain the existence of the cultural sites, and public institutions such as temples, cremation grounds, historical & archaeological sites, schools, and health posts within the project core areas and to determine the effect on their existence due to project construction activities. During this, findings on the existence of Project Affected Families (PAFs, families whose land or property will be impeded by the project construction activities) were made. Our findings show that no such PAFs exist as the project construction activities will not hinder any of the families residing within the project area. The Consultations with the village elites and Group discussions were done to assess the current situation of the project area community.

4.4 Public Notice

96. A public notice of 15 days was published in Arthik Abhiyan Dainik, a national daily newspaper on 2076/07/15 after getting approval of ToR from the Ministry of Water Supply. 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 concerned authority. This is also attached in **Annex 3**.

4.5 Public Consultation

97. The public consultation program was organized at Katari Chowk of Mirchaiya Municipality on 2076/08/01 which concludes that there is no dissatisfaction from the concerned stakeholders regarding the environmental aspects of the proposed project. The minutes of this consultation is attached in **Annex 3**.

4.6 Collection of Muchulkas (Deed of Inquiry) and Recommendation Letter

98. Deed of Inquiry (Muchulka) from the concerned authorities has been collected right before the date of publication of public notice. This has been included in **Annex 3**.
99. Similarly, Recommendation Letter from the local authority (Municipality) has been collected after the completion of 15 days from the date of publication of public notice.

4.7 Impact Identification, Prediction & Evaluation Methods

100. The information regarding Physico-chemical, Biological and Socio-economic & Cultural aspects as mentioned above was 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 helps in the qualitative analysis of the anticipated impacts. This has been carried out by using Rapid Environmental Assessment (REA) Checklist prepared by ADB (*Refer Annex 2A*) and Other Simple Checklists (*Refer Annex 4*). These checklists explains the environmental features or factors that need to be addressed when identifying the impacts of projects and activities. Along with this Checklist Method, Stakeholder/Public Consultation also helps in the qualitative analysis of the environmental impacts.
101. Along with the qualitative analysis, the impact assessment requires Quantification or quantitative analysis. Here, Expert Judgement/Professional Judgement is adopted for the quantification of impacts which is based on the professional option of experts that have considerable experience in the areas of assessed impacts such as on water, soil, biodiversity and communities. This method has been preferred due to limited data and information availability that did not allow for predictive modelling to explore the impacts.
102. Once all the important impacts had been identified, their potential characteristic were predicted. The baseline data on physical, biological, socio-economic and cultural aspects were used to estimate the likely characteristics and parameters of impacts that includes Nature, Magnitude, Extent and Duration.
103. 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).
104. 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.
105. 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.
106. The scoring of impacts as per *National EIA Guidelines 1993* is tabulated below:

Table 4-I: 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)	65/61/

S. No.	Likely Parameters of Impacts	Type	Scoring as per National EIA Guidelines, 1993
		Medium/Moderate (M)	20
		Low (L)	10
3.	Extent	Regional (R)	60
		Local (L)	20
		Site Specific (SS)	10
4.	Duration	Long Term (LT)	20
		Medium Term (MT)	10
		Short Term (ST)	5

Source: National EIA Guidelines 1993

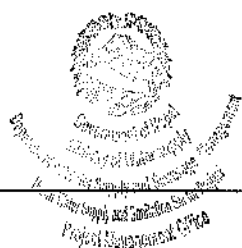
107. Then, the significance level of Impact rated will be assessed as per the following table:

Table 4-II: 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

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



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5. DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1. Physical Environment and Resources

5.1.1 Landforms and Topography

109. The subproject area is located within the latitude 26°33' N to 26°55' N and longitude 86°06' E to 86°26' E. The project area lies in the plain terai region of Nepal. The topography of project area is characterized by plain and flat land. Hence, the project area is generally flat with an average elevation is 110 to 120 m above the mean sea level. Chure (Churiya) and Shiwalik Hills are the natural border of the Province 2 which falls in northern side. However, the project area does not lie in this Chure & Shiwalik hilly region.

5.1.2 Geology and Soils

110. The Project area consists of main sediments of the Gangetic Plain. Basically, sand, silt, and clay are the main sediments of the soils of this area. This area is composed of finer sediments. The sediments become finer and also show a change of faces. It is characterized by porous soils, with boulders and gravel and a low water table. It is recent alluvial and the soils are loamy and deep.

5.1.3 Land use pattern

111. Generally, the agricultural land dominates the land use pattern of the project area. This is followed by residential and commercial areas. Likewise, the remaining area has been used by rivers & rivulets and forests. No primary data on the land use pattern could be obtained during field study.

112. However, the secondary data on the land use pattern of the project district is available which is tabulated as follows:

Table 5-1: Land Use Pattern of Project District

S. No.	District	Total Area	Forest	Shrub	Agricultural Land/Grass	Water Bodies	Barren Land	Snow	Others	Total
1.	Siraha	20202		679	94268	818	4201	0	0	120168

Source: Compendium of Environment Statistics Nepal, 2015

5.1.4 Climate

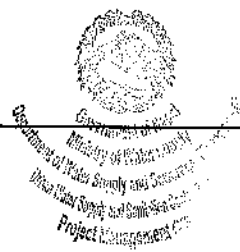
113. The Siraha district has a subtropical climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of 1442 mm. The maximum temperature averages 36° C and the minimum 17° C. The Subproject area lies in Sub-Tropical Climatic Zone. The temperature of this area varies from 17° C in winter to 36° C in summer. This region is heavily influenced by the monsoon (June-September) with an average annual rainfall of 1442 mm.

114. There are two rainfall stations situated at Lahan(station no. 1215) and Siraha(station no.1216) nearby the project site. The design team has collected daily rainfall data of both stations from the year 1991 to 2017 (27 years records) and maximum daily rainfall of each year from DHM and they are summarized in the table given below:

Table 5-II: Maximum daily rainfall of the year, Lahan

MM/DD/YY	Station Value(day of the year and rainfall)	Maximum Rainfall of daily the Year (mm/day)	Maximum Rainfall/Day (mm)	Maximum Rainfall/Hour (MM/Hr)
07/11/91	192 126.0	126	222	9.25
06/22/92	174 120.0	120		
08/13/93	225 116.0	116		
09/20/94	263 94.5	94.5		
08/13/95	225 222.0	222		
07/13/96	195 150.0	150		
07/12/97	193 217.0	217		
07/21/98	202 0.0	0		
10/19/99	292 63.1	63.1		
09/15/00	259 27.9	27.9		
10/06/01	279 170.0	170		
09/22/02	265 82.0	82		
06/09/03	160 98.5	98.5		
05/18/04	139 62.0	62		
09/08/05	251 42.5	42.5		
01/01/06		DNA For the Year		
09/12/07	255 42.5	42.5		
08/25/08	238 41.3	41.3		
05/29/09	149 56.2	56.2		
09/12/10	255 41.2	41.2		
09/26/11	269 43.2	43.2		
07/15/12	197 42.3	42.3		
06/18/13	169 78.5	78.5		
06/03/14	154 66.0	66		
08/08/15	220 84.5	84.5		
08/02/16	215 90.5	90.5		
08/14/17	226 107.0	107		

Source: DHM, 2019



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Table 5-III: Maximum daily rainfall of the year, Siraha

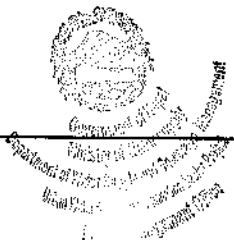
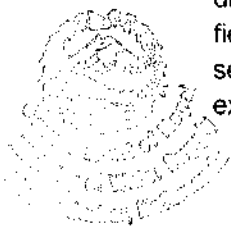
MM/DD/YY	Station Data	Day of the Year	Maximum Rainfall of the Year	Maximum Rainfall/Day (mm)	Maximum Rainfall/Hour (MM/Hr)
08/26/91	238 117.4	238	117.4	274.6	11.44
07/07/92	189		77		
07/21/93	202 149.3	202	149.3		
08/08/94	220 163.2	220	163.2		
08/12/95	224 218.4	224	218.4		
07/17/96	199 134.5	199	134.5		
07/11/97	192 168.2	192	168.2		
08/18/98	230 224.4	230	224.4		
10/19/99	292 168.2	292	168.2		
06/22/00	174 210.4	174	210.4		
08/21/01	233 156.4	233	156.4		
07/21/02	202 274.6	202	274.6		
07/19/03	200 120.3	200	120.3		
07/07/04	189 141.4	189	141.4		
08/06/05	218 125.3	218	125.3		
09/24/06	267 165.4	267	165.4		
07/28/07	209 144.6	209	144.6		
06/05/08	157 98.1	157	98.1		
08/16/09	228 133.5	228	133.5		
10/22/10	295 58.4	295	58.4		
09/26/11	269 128.2	269	128.2		
06/28/12	180 72.2	180	72.2		
06/29/13	180 128.4	180	128.4		
10/15/14	288 140.2	288	140.2		
08/21/15	233 148.2	233	148.2		
09/17/16	261 95.4	261	95.4		
08/13/17	225 116.6	225	116.6		

Source: DHM, 2019

115. During monsoons, the project area has been facing flooding and ponding problems since decades. Various flooding events were recorded yearly in this area resulting the loss of property & lives and access.

5.1.5 Water Resources

116. Bataha Khola and Jiwa Khola is the boundary of the project area on the eastern and western side respectively. Both streams flood heavily during the monsoons and both go dry during the dry season. Both rivers are used as outfalls for the proposed drainage system. During our field study, it is observed that apart of rainy seasons, these rivers get almost dry during other seasons. Hence, there is no such remarkable use of these rivers observed at the downstream except for irrigation purposes at some locations.



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117. Presently, the flood water during monsoons flows towards the rivers that has been proposed as outfalls for this proposed project. The entry of storm water to the proposed outfall does not deteriorate the water quality of the outfalls as the storm water is free of pollutants in comparison to the flooded water. The field observation also shows that the outfall rivers are not contaminated except during rainy seasons. However, to avoid the possibility of mixing wastewater into the drains, prior to the implementation of the project, water quality monitoring of the outfalls should be carried out such that during O & M phase, the level of contamination as well as the overlooked illegal entry of wastewater into the drains can be identified.
118. As the locations of these rivers are near the settlement area, the main source of pollution of these rivers is human behaviours that includes dumping wastes, littering activities, throwing sewage etc. Along with this, animal intrusion also pollutes the water bodies. Similarly, during monsoons, the flood events results in the pollution of river to which the flood water gets ultimately drained.

5.1.6 Air Quality

119. There are few industries in project town. Air pollution is caused by fugitive dust from vehicle movements, particularly over unpaved roads and other unpaved grounds, construction activities, and wind action on unpaved exposed surfaces. Gas emissions come from household cooking, open burning, and moving vehicles. Emissions from these sources are scattered/spread apart, both in terms of locations and timing.

5.1.7 Acoustic Environment

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

5.2. Existing Biological Environment

5.2.1 Flora

121. The major plant life forms species available in the project area are given in **Table 5-IV** below:

Table 5-IV: Plant Life Forms Found in the Project Area

S.No.	Scientific Name	Local Name	Family	Life Forms
1	<i>Shorea robusta</i>	Sal	Dipterocarpaceae	Trees
2	<i>Acacia catechu</i>	Khair	Leguminosae	Trees
3	<i>Terminalia tomentosa</i> or <i>T. alata</i>	Indian laurel/Asan	Combretaceae	Trees
4	<i>Adina cordifolia</i>	Karma or haldu	Rubiaceae	Trees
5	<i>Syzygium cumini</i>	Jaamun	Myrtaceae	Trees
6	<i>Dalbergia sissoo</i>	Sisau	Fabaceae	Trees
7	<i>Albizia procera</i>	Seto Siris	Fabaceae	Trees
8	<i>Melia azedarach</i>	Bakena/Bakaino	Meliaceae	Trees
9	<i>Tectona grandis</i>	Teak, Sagaun	Lamiaceae	Trees
10	<i>Aegle marmelos</i>	Bel (Wood Apple)	Rutaceae	Trees
11	<i>Lagerstroemia parviflora</i>	Bot Dhayaro	Lythraceae	Trees
Non-Timber Forest Products				
1	<i>Bambusa</i>	Baans	Poaceae	Grass
2	<i>Emblica officinalis</i>	Amala (Indian Gooseberry)	Euphorbiaceae	Trees

S.No.	Scientific Name	Local Name	Family	Life Forms
3	<i>Terminalia chebula</i>	Harro	Combretaceae	Trees
4	<i>Terminalia bellirica</i>	Barro	Combretaceae	Trees
5	<i>Azadirachta indica</i>	Neem	Meliaceae	Trees
6	<i>Ziziphus nummularia</i>	Jhar Beri	Rhamnaceae	Shrubs
7	<i>Magnifera indica</i>	Aamp (mango)	Anacardiaceae	Trees
8	<i>Psidium guajava</i>	Amba (guava)	Myrtaceae	Shrubs
9	<i>Bombax ceiba</i>	Simal (silk cotton tree)	Malvaceae	Trees
10	<i>Ficus religiosa</i>	Pipal	Moraceae	Trees

Source: IEE Field Study, 2018

5.2.2 Fauna

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

Table 5-V: Mammals in the Project Area

S. No.	Scientific Names	Common Names	Local Name	Status
1	<i>Herpestes edwardsii</i>	Common Mongoose	Nyauri Musa	LC
2	<i>Vulpes vulpes</i>	Fox	Fyauro	LC
3	<i>Canis aureus</i>	Golden Jackal	Syaal	LC
4	<i>Lepus nigricollis</i>	Hare	Kharayo	LC
5	<i>Felis Chaus</i>	Jungle Cat	Ban Dhade	LC
6	<i>Bandicota indica</i>	Jungle Rat	Jungli Musa	LC
7	<i>Taphozous longimanus</i>	Long-winged Tomb Bat	Lampakhete Chamero	LC
8	<i>Macaca mulatta</i>	Rhesus Monkey	Rato Bandar	LC
9	<i>Funambulus sp.</i>	Squirrel	Lokharke	LC

Source: IEE Field Study, 2018

123. Some of the birds reported in the forest areas are listed in Table 5-VI given below:

Table 5-VI: List of Birds in the Project Area

S.No.	Scientific Names	English Name	Local Names	Status
1	<i>Psittacula roseata</i>	Blossom headed parakeet	Gulafi Tauke Suga	NT
2	<i>Gallinula chloropus</i>	Common Moor Hen	Bagale Simkukhra	LC
3	<i>Culicicapa ceylonensis</i>	Grey-headed Canary-Flycatcher	Chanchale Arjunak	LC
4	<i>Cuculus micropterus</i>	Indian Cuckoo	Kafal Pakyo	LC
5	<i>Lophura leucomelanos</i>	Kalij Pheasant	Kalij	LC
6	<i>Corvus macrorhynchos</i>	Large Billed Crow	Kaalo Kag	LC
7	<i>Anas acuta</i>	Northern Pintail (Duck)	Suiropuchhre	LC
8	<i>Gallus gallus</i>	Red Jungle Fowl	Luinche	LC
9	<i>Pycnonotus jocosus</i>	Red whiskered bulbul	Shwet Bakchhya Jureli	LC
10	<i>Psittacula krameri</i>	Rose ringed parakeet	Kanthe Suga	LC

S.No.	Scientific Names	English Name	Local Names	Status
11	<i>Picus squamatus</i>	Scaly-bellied Woodpecker	Thulokatle Kathfor	LC

Source: IEE Field Study, 2018

124. The commonly found Herpito-fauna (reptiles & amphibians) observed in the project area are shown in Table 5-VII.

Table 5-VII: List of Reptiles and Amphibians Found in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1.	<i>Pseudoxenodon macrops</i>	Large Eyed False Cobra	Goman	LC
2.	<i>Bungarus caeruleus</i>	Common Karait	Karet	LC
3.	<i>Zootoca vivipara</i>	Common Lizard	Mausuli	LC
4.	<i>Duttaphrynus melanostictus</i>	Common Toad	Paha	LC
5.	<i>Sitana ponticeriana</i>	Fan Throated Lizard	Chheparo	LC
6.	<i>Ranacyanophylectis</i>	Stream Frog	Bhyaguta	LC

Source: IEE Field Visit, 2018

5.2.3 Aquatic Biodiversity

125. The river that flows nearby the settlement area is Bataha & Jiwa Khola. The natural hazard such as flooding from these rivers during monsoons contributes towards degradation of cultivated land, bank cutting and loss of human life during the rainy season and its subsequent impact on the environment.
126. Similarly, other common fishes found in the project area are given in Table 5-VIII.

Table 5-VIII: List of Fishes Found in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Monopterus albus</i>	Rice Swampeel	Bam	LC
2	<i>Channa gachua</i>	Dwarf Snakehead	Garahi	LC
3	<i>Cirrhinus mrigala</i>	Mrigal	Rohu	LC
4	<i>Labeo bata</i>	Minor Carp	Rohu	LC

Source: IEE Field Visit, 2018

5.2.4 Protected Area

127. The Subproject will not encroach into, or be in close proximity to, any protected area or any physical cultural resources.

5.2.5 Forest Area

128. There are altogether eight community forests which fall under the project area as shown in the table below. The impact due to project implementation will be negligible on forest resources.



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Table 5-IX: Community forests of Mirchaiya

S. No.	Community Forest	Ward No.	HH	Population	Total Forest Area
1	Hattimuda Community Forest	Mirchaiya-7,8	386	1272	634.44
2	Ramnagar Khoriya Community Forest	Mirchaiya-6	93	403	154
3	Hariyo Danda Community Forest	Mirchaiya-7	205	1188	228.2
4	Chure Danda Community Forest	Mirchaiya-7	193	1137	212.28
5	Ram Krishna Community Forest	Mirchaiya-8	106	612	227.4
6	Laxmi Community Forest	Mirchaiya-7	73	299	118.8
7	Jiwa Thakur Community Forest	Mirchaiya-5, 6.	83	476	131.7
8	Jay Bajarangbali Community Forest	Mirchaiya-5, 7.	147	788	104.5

Source: DEDR, 2019

129. However, the field study shows that the Subproject does not encroach into any forest area.

5.3. Socio-economic and Cultural Environment

5.3.1 Demographic Features

5.3.1.1 Settlement Pattern

130. The core area of project town comprising wards 4, 5, 6, 7 & 8 is relatively densely populated except for some outskirts areas within ward 7 and 8, which are still growing. Most of the households in the area are pucca houses with few rural households as well. Relatively cluster settlements are found. Ramnagar Mirchaiya is the main market place of the district, so population pressure is naturally high. The settlement pattern within the bazaar area is quite compact in the both sides of road corridor while outside the bazaar area the settlement pattern is semi-scattered and looks like rural village type of livelihood pattern.

5.3.1.2 Population Distribution

131. The project area comprises of the ward 4, 5, 6, 7 and 8 of the newly established Mirchaiya Municipality. The municipality was established on 18 May 2014 by merging existing Rampur Birta, Malhaniyakhori, Radhopur, Ramnagar Mirchaiya, Phulbariya, Sitapur Prada and Maheshpur Gamharia VDCs.

Table 5-X: Project Area Delineation

Ward No of the Municipality	Ward No. of Former VDC	No. of HHs
4	7, 8 and 9 of Mirchaiya VDC	397
5	1, 2 and 3 of Mirchaiya VDC	1543
6	4, 5 and 6 of Mirchaiya VDC	1635
7	7, 8 and 9 of Phulbariya VDC	433
8	4, 5 and 6 of Phulbariya VDC	244
Total		4252

Source: Socio-economic survey, 2016

132. The growth of the project area population stands out quite impressive upon the analysis of the growth scenario. The population growth rate of the project area is 2.82% of last three decades (1981-2011).

133. As per CBS census data, the total population of the project area was about 8603 in the year 1981 and increased to 11,399 in the year 1991 with an annual growth rate of about 2.85%. In

the year 2001 population of the project area was 14,642 with an annual growth rate of 2.54%. During the 2011 A.D. censal year the population of the project area reached 19,799 with the annum growth rate of 2.82%.

Table 5-XI: Population & Growth Rate in the Project Area

Name of VDCs	Year in AD				Growth Rate in Censal Year (%)			
	1981	1991	2001	2011	81-1991	91-2001	2001-11	81-2011
All Wards of Former MirchaiyaVDC	5421	7238	9386	13477	2.93	2.63	3.68	3.08
Ward Nos. 4 to 9 of Former Phulbariya VDC	3182	4161	5256	6322	2.72	2.36	1.86	2.31
Total of Project Area	8603	11399	14642	19799	2.85	2.54	3.06	2.82
Siraha District (in 000)	375	461	570	673	2.09	2.15	1.67	1.97
Nepal (in 000)	15023	18491	23151	26495	2.1	2.27	1.36	1.91

Source: Socio-Economic Survey, 2014

134. The growth rate of 2.82% during 1981-2011 censal periods of the project area mainly attributed for pull factor, especially for comparatively better infrastructure and services availability after the construction of Mahendra Highway. The main striking reason for a strong pull factor of the project town during 1981-2011 can be attributed to their relatively better proximity and linkage to the fast growing towns such as Lahan, Inaruwa, Itahari, Damak, which have average annual growth rates in the order of 3.03%, 2.92%, 4.47% and 3.72% respectively during the last three decades (1981 to 2011 A.D.). With these backgrounds, Mirchaiya area enlarged rapidly as other highway towns and became as small urban center. The smooth operation of a regular vehicle on Sagarmatha Highway made this urban center as a nodal town.

5.3.1.3 Male/Female Ratio

135. Out of total 4252 HHs, 81.3% household head is male and 18.7% households head is female. The household head of the project area is presented in the table given below:

Table 5-XII: Gender/Sex Ratio

Household Head Gender	Percentage
Male	81.3
Female	18.7
Total	100

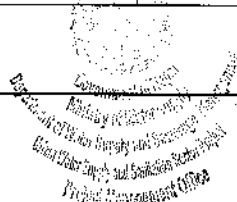
Source: Socio-Economic Survey, 2014

5.3.1.4 Agewise Distribution

136. According to the survey, the most economically active population by age group between 16 to 59 years of ages has been reported about 61percentage in water supply service area. The percentage of old aged group i.e. 60 years and above is about 4 percentage of the total population of the households. The following Tables presents the total population, household size and age groups of the households surveyed:

Table 5-XIII: Population by Age Group of the Sampled Households

Age Group	Age wise Population					Total	Percentage
	Ward						
	4	5	6	7	4		
Below 6 years	28	19	27	30	27	131	5.69
6-15 years	88	255	133	104	85	665	28.89
16-59 years	101	580	301	271	167	1420	61.69



Age wise Population							
Age Group	Ward					Total	Percentage
	4	5	6	7	4		
Above 60 years	9	23	29	11	14	86	3.74
Total	226	877	490	416	293	2302	100.00

Source: Socio-Economic Survey, 2014

5.3.2 Caste/Ethnicity Groups

5.3.2.1 Caste/Ethnicity

137. The ethnic composition in the project area is very diverse due to the influx of the population from outside. Brahmin/Chhetri, Yadav, Muslim, Janajati, and Koire are major ethnic groups in the project area. According to the survey, more than 63 percentage of the total households constitute terai based ethnic groups. Besides these groups, Dalit contribute about 15 percentage, Muslims 9 percentage and Brahmin/chhetri and Janajati are equal as more than 6 percentage. The details are presented in the table given below:

Table 5-XIV: Distribution of Population by Ethnic Group

Ethnic Groups	Ward										Total	
	4		5		6		7		8		Pop	%
	Pop	%	Pop	%	Pop	%	Pop	%	Pop	%		
Brahmin/Chhetri	5	2.21	75	8.55	29	5.92	17	4.09	16	5.46	142	6.17
Janajati	0	0	64	7.3	28	5.71	30	7.21	20	6.83	142	6.17
Dalit	108	47.79	31	3.53	21	4.29	141	33.89	40	13.65	341	14.81
Muslim	0	0	99	11.29	53	10.82	57	13.7	0	0	209	9.08
Terai Others (Madhesi, etc.)	113	50	608	69.33	359	73.27	171	41.11	217	74.06	1468	63.77
Total	226	100	877	100	490	100	416	100	293	100	2302	100.00%

Source: Socio-Economic Survey, 2014

5.3.2.2 Religion

138. Majority of people of the project area follow Hindu Religion. Hence, the famous festival of Mirchaiya is Durgapuja (Dashain, Vijaya Dashami), Jhanda Mela, Holi, Chhat puja, Shreepanchami and Dipawali. Besides this, there are also people following other religions like Muslim, Christian exist in this area.

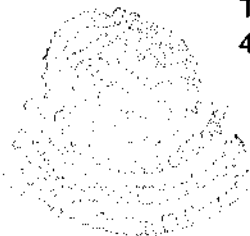
5.3.2.3 Language/Dialect

139. The frequently used Language of Mirchaiya is Maithali. However, People of this locality is well educated they can speak English, Nepali, Hindi and some other local language according to their ethnicity (language carry forward from ancient period).

5.3.3 Household Heads

5.3.3.1 Male/Female

140. Among the surveyed households the population of male is higher than the female population. The average household size of the households is 5.71 which is higher than national average 4.88.



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Table 5-XV: Population of the Sampled Households

Name of the Project	Male	Female	Total	Household	Family Size
Ramnagar Mirchaiya Water Supply Project	1178	1124	2302	403	5.71

Source: Socio-economic Survey, 2014

5.3.4 Economic Features

5.3.4.1 Landholding Size and Ownership

141. The land holding size is very unequal among the dwellers of the service area. The majority of the households (57.78%) have less than 6 kattha of land, whereas more than 20 percent have more than 20 kattha of land. The distribution of land holding size indicates that majority of households have small size of land and few households have larger size of land. The table below shows the distribution of land among household of service area.

Table 5-XVI: Distribution of Land Holding Size

Size of Land	Ward					Total	Percentage
	4	5	6	7	8		
Below 6 Kattha	302	930	921	223	81	2457	57.78
6Kattha - 10 kattha	15	154	261	98	42	570	13.41
11Kattha - 20 Kattha	13	147	125	23	42	350	8.23
1 Bigha - 3 Bigha	57	250	265	76	67	715	16.82
Above 3 Bigha	10	62	63	13	12	160	3.76
Total	397	1543	1635	433	244	4252	100.00

Source: Socio-economic Survey, 2014

5.3.4.2 Economy: Occupation/Employment

142. Similarly, details on the occupational status has also been assessed during socio-economic survey. Among the surveyed population about 49% are engaged in productive economic activities while the remaining 51% are engaged in non-economic activities. Most of them are students, housewives and economically inactive populations. The survey reveals that about 23.81% of the total 2302 population are reported to be engaged in agriculture and 10% covers the population involved in foreign employment. Similarly, among the economically active population, about 8.5% are dependent on daily wage, 4% are engaged in trade & business whereas only 2% are serviceholders. On the other hand, about 16% are students, 6% are children and 2% are unemployed. The detail shows in the table given below.

Table 5-XVII: Occupational Status of Household Head

Occupational Status	Distribution of Population by occupation											
	Ward										Total	
	4		5		6		7		8			
Pop	%	Pop	%	Pop	%	Pop	%	Pop	%	Pop	%	
Agriculture	39	17.26	221	25.2	105	21.43	114	27.4	69	23.55	548	23.81
Trade/Business	7	3.1	45	5.13	24	4.9	8	1.92	6	2.05	90	3.91
Service	6	2.65	21	2.39	7	1.43	7	1.68	5	1.71	46	2
Entrepreneurship	0	0	5	0.57	3	0.61	0	0	2	0.68	10	0.43
Foreign Employment	26	11.5	68	7.75	46	9.39	61	14.66	31	10.58	232	10.08
Wage Labour	21	9.29	92	10.49	31	6.33	32	7.69	19	6.48	195	8.47
Student	55	24.34	226	25.77	156	31.84	98	23.56	90	30.72	625	27.15
House-wife	44	19.47	147	16.76	78	15.92	50	12.02	47	16.04	366	15.9

Distribution of Population by occupation												
Occupational Status	Ward										Total	
	4		5		6		7		8			
	Pop	%	Pop	%	Pop	%	Pop	%	Pop	%	Pop	%
Children	21	9.29	42	4.79	27	5.51	34	8.17	16	5.46	140	6.08
Unemployed	7	3.1	10	1.14	13	2.65	12	2.88	8	2.73	50	2.17
Total	226	100	877	100	490	100	416	100	293	100	2302	100

Source: Socio-Economic Survey, 2014

5.3.4.3 Income and Expenditure

a) Monthly Income Details

143. Among the 403 sampled households of the service area, about 26% household's yearly income is less than Rs. 10,000. The survey data reveals that out of this 403 sampled HHs of the project area, about 5% of HHs have monthly income less than Rs. 50,000 per year. Majority of the households i.e., 43% have the monthly income in the range of Rs. 1,00,001 to 20,00,000 and about 23 % of HHs have income ranging from Rs. 2,00,000 to 3,00,000 whereas 9.45% households' income level is above Rs. 4,00,000 per year. The detail is presented in the table given below:

Table 5-XVIII: Income Level of 403 Sampled Households of Beneficiaries

Expenditure Level	Ward					Total	percentage
	4	5	6	7	8		
Below 50,000	1	9	4	4	2	20	4.98
50001-100000	8	22	20	21	7	78	19.40
100001-200000	17	66	34	32	24	173	43.03
200001-300000	4	25	9	3	7	48	11.94
300000-400000	3	22	8	6	6	45	11.19
Above 400,000	2	23	7	3	3	38	9.45
Total	35	167	82	69	49	403	100.00

Source: Socio-economic Survey, 2014

b) Monthly Expenditure Details

144. A study of the economical status of the community has been carried out on level of expenditure and income. According to the survey data, about 27.5 percent of the HHs makes expenses less than Rs. 100,000 of a year. The HHs having expenditure ranging from Rs. 100,000to 200,000per month was found to be 44.17 percent. About 12 percent of the HH had expenses between Rs. 200,000 to 300,000 per month and about 9 percent between Rs. 300,000 to Rs.400,000. The household with expenditure above Rs. 400,000 comprises of 7.44 percent. The detail data is presented in the table given below:

Table 5-XIX: Expenditure Level of Head of Beneficiaries Households

Expenditure Level	Ward					Total	percentage
	4	5	6	7	8		
Below 50000	1	15	4	4	2	26	6.45
50001-100000	8	29	20	21	7	85	21.09
100001-200000	17	71	34	32	24	178	44.17

Expenditure Level	Ward					Total	percentage
	4	5	6	7	8		
200001-30000	4	25	9	3	7	48	11.91
300000-400000	3	13	8	6	6	36	8.93
Above 400000	2	14	7	3	4	30	7.44
Total	35	167	82	69	50	403	100.00

Source: Socio-economic survey 2014

5.3.5 Education and Skills

5.3.5.1 Literacy Rate

145. The overall literacy rate of the households covered by the survey is more than 74 percent and the illiteracy rate is about 26 percent. Among the literate population, in-completed primary level education comprises of 5.69 percent of the total population and 24.54 percent population has completed primary level. Likewise 18.11 percent secondary level and 9.69 percent have completed the SLC level education. Similarly 7.43 percent have completed the intermediate level education. Diploma, degree holders are 2.65 percent & 0.83 percent respectively. The details are presented in the table given below:

Table 5-XX: Distribution of Population by Educational Status

Educational Attainment	Ward										Total	
	4		5		6		7		8		Pop	%
	Pop	%	Pop	%	Pop	%	Pop	%	Pop	%		
Illiterate	63	27.9	172	20.4	109	23.5	147	35.3	92	31.4	583	25.33
Literate	6	2.65	61	7.24	46	9.91	14	3.37	4	1.37	131	5.69
Up to Grade 5	65	21.7	212	19.1	97	17	105	16.8	86	20.5	565	24.54
Grade 5-10	47	28.8	161	25.2	79	20.5	70	25.2	60	29.4	417	18.11
S.L.C.	12	5.31	101	11	69	14.9	25	6.01	16	5.46	223	9.69
Intermediate	11	4.87	92	10.9	45	9.7	12	2.88	11	3.75	171	7.43
Bachelor	1	0	30	3.56	16	3.45	11	2.64	3	0.68	61	2.65
Masters	0	0	14	1.66	3	0.65	0	0	2	0.68	19	0.83
Children	21	8.85	34	4.03	26	5.6	32	7.69	19	6.48	132	5.73
Total	226	100	877	100	490	100	416	92.3	293	93.5	2302	100

Source: Socio-economic survey 2014

5.3.6 Health and Sanitation

5.3.6.1 Health Posts/Hospitals

146. General medical facilities for diagnosis and treatments are available in the service area. For medical counselling most of the population go to Health Centres as well as private nursing home. Health care centres and private Nursing Homes are delivering the services with the help of medical doctors and paramedical.

5.3.6.2 Incidence of Water-Borne Diseases and Infectious Diseases

147. The survey also collected the information on Morbidity status including Prevalence of Water Borne Diseases. This information was collected from the record of the year 2010. The details are tabulated below:

Table 5-XXI: Morbidity Status during the Year 2010

Diseases	children Below 5 Year		Women		Men	
	Population	%	Population	%	Population	%

Diseases	children Below 5 Year		Women		Men	
	Population	%	Population	%	Population	%
Diarrhea	457	36.71	322	31.91	228	28.93
Dysentery	52	4.18	21	2.08	31	3.93
Worms Infestation	384	30.84	64	6.34	42	5.33
Typhoid	218	17.51	229	22.7	270	34.26
Cholera	21	1.69	20	1.98	10	1.27
Skin Diseases	62	4.98	166	16.45	52	6.6
Malaria	10	0.8	21	2.08	31	3.93
Jaundice	10	0.8	83	8.23	62	7.87
Others	31	2.94	83	8.23	62	7.87
Total	1245	100	1009	100	788	100

Source: Socio-economic survey 2014

5.3.7 Community Infrastructure

5.3.7.1 Water Supply and Sanitation/Sewer Line

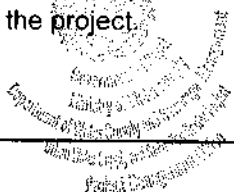
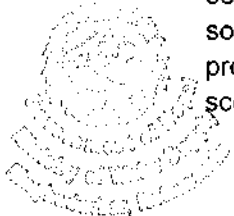
148. Previously, people were dependant on shallow handpumps. Now, after the implementation of Mirchaiya Water Supply & Sanitation Project under TSTWSSSP, the project area has provision of piped water supply system that supplies water to each household connection.
149. The existing sanitation facilities are quite basic in the Mirchaiya Municipality. The socioeconomic survey shows that there were 436 pucca toilets and 254 kutcha toilets within the project town. Out of total 690 toilets, 454(65%) good sanitary toilets are in operation and use. Nonetheless, the semi-urban area in the periphery of the project town including parts of some clusters within the proposed service area lack adequate sanitation and Open defecation is prevailing.

5.3.7.2 Drainage Facilities

150. The municipality do not have effective drainage system. However, there are few existing surface drains to drain off the street run-off. The existing few drains are not functioning well due to improper size and design. Every monsoon, the flash floods break out resulting from the continous and heavy rainfall. The flood flows directly to the settlement from Churiya hills to the service area frequently during rain. The E-W highway passes perpendicularly to the hill slope becomes dyke/ dam/ obstruction of overland flow. The water is collected upstream of road. This has been creating pondage problems within the settlement area of the project town resulting loss of lives & properties and access blockage. Every year during monsoons, the project town is under the risk of flooding problems due to lack of proper access for the storm water to drain out. Hence, the existing drainage system of the project town demands the need of effective and properly planned storm water drainage system.

5.3.7.3 Wastewater Management Practices

151. There is no proper sewerage system in the project area. The survey shows that most of the households have provision of Septic tank in the urbanized areas of the town. Nevertheless, it should not be misunderstood that the waste water or sewerage from the septic tank will be drained out or mixed into the proposed drains. The proposed drain is solely for the access of storm water drain in order to get rid of the flooding & pondage problems of the project town. Mixing of the waste water to the proposed drain is beyond the scope of the project.



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5.3.7.4 Solid Waste Management

152. The municipality do not have systematic collection, conveyance and disposal of solid waste from the town area. Newly established Mirchaiya municipality suffers from a lack of infrastructural and technical resources to tackle the problem of waste management. CBOs, NGOs that are playing effective roles in waste reduction at source, collection, processing and recycling should adopt public-private-partnership (PPP) model.

5.3.7.5 Irrigation

153. There are two existing canal irrigation projects in the project area, out of which one is functional and another one is filled with sand and not in operation. The details are mentioned in the table given below:

Table 5-XXII: Irrigation Facilities in Project Area

Irrigation Project	Semi irrigated	Irrigated	Total	Remark
Jaruwa Canal Irrigation Project, Phulbariya	-	125Ha	125Ha	
Bataha Khola Irrigation Project				Sand Filled, Not working

Source: Socio-economic survey 2014

5.3.7.6 Transportation

154. The mode of transportation mostly used include: bus, car, bike, bicycle, rickshaw, tempo, and mini bus. The Project area has provision of all weather blacktopped road, some about 29 kilometers from Lahan, the major junction of the East-West Highway. Since, this place is totally routed by Mahendra Highway which is directly linked from the capital city, Kathmandu by Tata Sumo or Hiace (following the KTM-Bardibas road 6-7 hours) while following Chitwan, it will take 10-11 hours or by domestic flight to either Janakpur (65 km west of Mirchaiya) or Biratnagar (145 km east of Mirchaiya) and continuation by local bus. The nearest airport is the Janakpur airport, where daily flights from Kathmandu provide their services.

5.3.7.7 Communication and Electricity

155. There is provision of regular services of landline phone and mobile service within the project area. All kinds of modern telecommunication services are available at the reasonable price. Major national daily newspapers as well as local newspapers are available within the project town.
156. The project area is well connected to the national electricity grid provided by National Electricity Authority (NEA) and hence, 24 hours supply of electricity is available in this project town.

5.3.8 Archeological Areas/Sites

157. There are local temples at various locations within the project areas as would be expected in a typical Nepali urban centre but there are no such culturally important places.

5.3.9 Local Institutions

5.3.9.1 Water Supply and Sanitation User's Association

158. Previously, WUSC for the Mirchaiya Water Supply & Sanitation project named Ramnagar Mirchaiya Water Supply and Sanitation Committee has been formed. This consisted of eleven members representing from various clusters within the service area. The executive committee consisted of 8 male and 3 female members, however, any of these 3 female members were

positioned in the key executive post of WUSC. The name of these WUSC members and their designation are presented in the tabular form:

Table 5-XXIII: Members of Ramnagar Mirchaiya WUSC

S.N.	Name	Position
1	Mr. Ram Lochan Sah	Chairperson
2	Mr. Ram Prakash Mahaseth	Vice Chairperson
3	Mr. Kesheshor Sah	Secretary
4	Mr. Rameshwar Sah	Treasurer
5	Mr. Suresh Neupane	Member
6	Mr. Sadhu Paswan	Member
7	Mr. Hira Kant Jha	Member
8	Mr. Md. Hanan	Member
9	Ms. Renu Sharma	Member
10	Ms. Rinku Devi Sah	Member
11	Ms. Ram Raji Mandal	Member

Source: Mirchaiya WSSP IEE Report, 2017

159. But, presently, this Ramnagar Mirchaiya WUSC has been dismissed and new WUSC named Mirchaiya Water Supply & Sanitation Project has been formed. The name list of these new WUSC members and their designation are presented in the tabular form:

Table 5-XXIV: Members of Mirchaiya WSSP WUSC

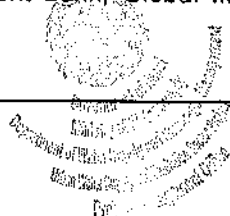
S.N.	Name	Position
1	Mr. Dharendra Kumar Sah	Chairperson
2	Mr. Dev Krishna Sah	Vice Chairperson
3	Mrs. Chanda Bhawari Mahara	Treasurer
4	Mr. Ram Kumar Yadav	Secretary
5	Mr. Ram Jagat Yadav	Member
6	Mr. Dinesh Yadav	Member
7	Mrs. Rekha Kumari Mahato	Member
8	Mrs. Nilam Kumari Hathi	Member
9	Mr. Bijaya Kumar Sah	Member

Source: IEE Field Study, 2018/019

160. The above given table shows that one female member has been appointed in key post i.e., Treasurer. Apart of this, two other female members are appointed as General Member.
161. It is noted that this WUSC has no responsibilities in operation and maintenance activities for this storm water drainage project. This WUSC is solely for the implementation of Mirchaiya Water Supply Project. All O & M activities will be carried out by the local authority/Municipality

5.3.9.2 Governmental Organizations/NGOs/CBOs

162. There are various governmental organizations that includes Mirchaiya Nepal Telecom Branch, Nepal Electricity Authority, Mirchaiya Municipality Office, Mirchaiya Police Station, Municipality Agriculture Office, Post Office etc. are available in the project town. Various financial institutions (Banks & Cooperatives) are existing in the area and providing services to the community. The existing financial institutions include Rastriya Banijya Bank, Agricultural Development Bank, Global IME Bank Limited, NCC Bank, Sunrise Bank, BOK Mirchaiya,



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Nepal SBI Bank Limited, NIC Asia Bank Limited, Muktinath Bikas Bank Limited, Prabhu Bank, Siddhartha Bank Limited, Rajshree Savings & Credit Cooperatives, Mitra Krishi Sahakari, Trivenidham Investment Pvt. Ltd. etc. Similarly, some cooperatives are also actively involved in the project area.

5.3.9.3 Other Development Activities

163. **Industries:** There are various small scale industries like Ply Industries, Rice Mills, Poultry Farming, Furniture Industries, Dairy Industries etc. in the project town. Similarly, large scale industries like Shaurya Cement Industries Pvt. Ltd., Maruti Cements, Do exist in the project area. The survey also shows that there are various hotels & lodges available within the project area that have been boosting the economic activities of the project town.
164. **Agricultural Development:** The areas adjoining the project area even within the municipal boundary are good for agriculture. The survey report shows that around 24 % population of the project area is dependent upon the agriculture products. The area is famous for its paddy production. The major crops produced here are paddy, wheat, maize, sugarcane and seasonal vegetables. Especially, Mango orchards occupy large areas.

6. ANALYSIS OF ALTERNATIVES

6.1 With and Without Project Alternatives

166. 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 Alternatives or Do-nothing alternatives

167. "Without Project" or "Do-nothing" Alternative conducted study on the existing drainage system to analyze the existing condition of the project town in the absence of the proposed project.

168. The study shows that Storm Drainage system in the proposed town has become necessary due to flat topography and frequent flooding during rainy season. It may appear as a more serious problem to be addressed once the urbanization strides. Regarding this issue and the demand & priority of WUSC, this project has been proposed. Besides this, there are some issues regarding drainage in the project town that are briefly discussed below:

- The existing drains of the project town seem to be constructed without proper planning & design.
- There is no such development plan prepared for this project town until date.
- Being a sparsely developed settlement and relatively rural in nature, natural or manmade watercourses used for irrigation have been used as drains. Most of these watercourses discharge in fields without being connected into water bodies nearby.

169. 'Without Subproject' or 'Do-Nothing' alternative will toughen the chance of accumulation of flooding problems during monsoons. This will result in immense losses to the people residing within this project town and physical environment. This will also result in water pollution and environmental degradation of waterways. This will 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.

170. 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.

171. 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 likely impacts. 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

172. With Project Alternative was also analyzed by envisaging the likely benefits of the proposed project. The analysis shows that 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. With the Subproject 26,736 populations (2016) will be benefitted from reliable and efficient storm water drainage system. In overall, the 'with subproject alternative' will bring about improved public health and living environment that will contribute to improved quality of life in the project municipality.
173. 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.
174. Along with this, the limitation of "Without Project" Alternatives regarding high risk of flooding & soil erosion, susceptibility of anticipated pollution in agricultural fields and improperly designed existing drains leads to opt for "With Project" Alternative. The proposed sub project will be the best alternative to overcome the aforementioned threats that is likely to occur in the absence of this subproject. This "With Project" Alternative also involves analysis of alternatives to assess the most cost-effective, reliable and efficient system that can serve the design population. The alternatives regarding "With Project" Alternative is described in detail in the following section.

6.1.3 Alternatives Relative to Planning and Design

175. The system alternatives need to be developed to assess the most cost-effective, reliable and efficient system that can serve the design population. Our study shows that the proposed project is a unique system and there are no alternatives proposed in the proposed project. However, the proposed project has been divided into two phases that includes Phase1 & Phase 2. Because of the unavailability of the budget, discussion has been made with Mirchaiya Municipality and PMO to split the area of the proposed project into Phase 1 and 2. Depending upon the overland flow and risk factor, the major parts of the proposed drainage lines have been identified and included in the Phase 1 while the remaining parts have been proposed in the Phase 2. The design of both phase 1 and 2 has already been carried out. The phase 1 will be implemented under ADB fund while the Phase 2 relies either on the design-based resources available within the municipality or any other potential sources.

7. ANTICIPATED ENVIRONMENTAL IMPACTS

176. 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

177. Proper & effective management of storm drain falls under the sanitation facility that each human being seeks for better hygiene. Hence, this proposed project will be the milestone for the emerging town like Mirchaiya to proceed for further development. Some of the major beneficial impacts of the project are described below along with suggestions for achieving optimal benefits.
178. The development of sanitation facilities will have numerous beneficial impacts on individuals as well as to the entire community. Availability of effective drainage system is one of the basic human needs that falls under sanitation facilities. 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

- a) Construction Phase
- i) Employment Generation

179. The project will generate direct employment opportunities to the local people of the 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 and those who are still unemployed. The socioeconomic survey shows that out of total 2302 HHs, only 8.47% depend upon labour/daily wages and 2.17% are unemployed. Hence, this project can be beneficial to this 8.47% and 2.17%, out of total 2302 HHs.
180. It has already been mentioned in Section 2.5 c) of Chapter 2 that the approximate number of Skilled and Unskilled Labours are 51,302 and 301,120 respectively. As per socio-economic survey mentioned above, the number of labors available within the project area is very less in regard to the approximate human resource requirement for this project. However, the available human resources can be benefitted by involving in this project as the amount of money earned somehow increases their level of income thereby reducing the chances of seasonal migration of the local people depending upon daily wages works to survive.
181. The impact is direct in nature, local in extent, high in magnitude and short-term in duration.



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ii) Skill Enhancement

182. 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 construction of project components like drains, manholes 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 (8.47% of total 2302 population of 403 sampled HHs) of this proposed project area if they are made involved in the proposed construction works.
183. The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration

iii) Local Trade & Business Opportunity

184. 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 3.91% and only 0.43% of total 2302 population of 403 sampled HHs are involved in trade/business and entrepreneur sector respectively. Though the target group quantity is not so significant, the enhancement of local trade & business opportunity will be fruitful to these people. This may further boost the local trade & economy.
185. The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.

b) Operation Phase

i) Improved Health & Hygiene

186. Deteriorating water quality and unsanitary conditions are often the causes of waterborne communicable diseases. Properly managed storm drainage system will minimise the flooding problem which in turn will help to improve health & hygiene. It is because in its absence, flooding problem may arise and it will contaminate surface water bodies that could be the source of water to the concerned people. This may result in the outbreak of communicable waterborne diseases that will then affect health & hygiene of the people. As this proposed project aims to provide proper drainage system to the proposed service area of the project town, the main target group of this beneficial impact will be the overall beneficiaries or people residing in the service area of this proposed project.
187. The impact is direct in nature, local in extent, high in magnitude and long-term in duration.

ii) Improvement on Surface Water Flooding and Ponding

188. Storm Water Drains are designed to drain excess rain/storm water to the possible water bodies. Thus, the proposed storm water drainage system provides easy access to the excess storm water to the proposed outfalls. This in turn improves the surface water flooding & pondage problems that is still prevailing in the proposed town during monsoons.
189. The impact is direct in nature, local in extent, high in magnitude and long-term in duration.

iii) Increase Urban Aesthetic Value

190. Implementation of Storm Water Drainage system reduces the risks of pondage problems and street flooding problems during the monsoons. This makes the street free of litters and other floatable wastes. This makes the surroundings well organized and enhances the urban aesthetic value.
191. The impact is direct in nature, local in extent, high in magnitude and long-term in duration.

iv) Increase Land Value

192. Storm Drainage system is one of the most important infrastructures for the urban development. Hence, this proposed project will increase rural-town migration due to availability of better infrastructures. This will boost economic level of the town. The increased economic level may increase the value of the land.
193. The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.
194. Overall, the Subproject will lead to improved public health and environment, significantly improving the quality of life of Mirchaiya town residents.

Table 7-I: 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)	Significant (60)
Local Trade and Business	D	M (20)	L (20)	LT (20)	Significant (60)
Operation Phase					
Improved Health and Hygiene	D	H (60)	L (20)	LT (20)	Very Significant (100)
Improvement on Surface Water Flooding and Ponding	D	H (60)	L (20)	LT (20)	Very Significant (100)
Increased Urban Aesthetic Value	D	H (60)	L (20)	LT (20)	Very Significant (100)
Increased Land Value	ID	L (10)	L (20)	LT (20)	Significant (50)

Note: Scoring is done based on following;

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

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

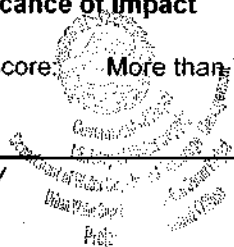
Extent, R = Regional (60), L = Local (20); and S = Site-specific (10)

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

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

Significance of Impact

Total Score: More than 75 : Very Significant



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- 50-75 : Significant
Less than 50 : Insignificant

7.2 Adverse Impacts

7.2.1 Impact on Physical Environment

a) Design Phase

i) Soil Erosion & Slope Instability

195. 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.

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

b) Construction Phase

i) Soil Erosion & Land Surface Disturbance

197. Excavation and digging works during construction of drains has the potential to cause erosion and cave in thereby causing soil erosion, silt runoff and unsettling of street surfaces. Unorganized disposal of the excavated earth can disturb the street surface and decrease the value of the area where it is disposed. The activity as such will be a discomfort to the road users and inhabitants.

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

ii) Spoil Disposal & Gully Erosion

199. Inappropriate disposal of spoils from the construction activities may result in gulying 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 private property. This will affect the people possessing those agricultural lands as well as the anticipated properties.

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

iii) Air Pollution

201. 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 concrete mixing; (vi) burning of firewoods for cooking & heating in work and labour camps and (vii) open burning of solid waste by workers.

202. 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.

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

iv) Noise Pollution

204. Noise-emitting construction activities include earthworks, 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 health care and educational facilities are situated. This will affect the construction workers, people residing in this area and the passers by.
205. The impact is direct in nature, local in extent, high in magnitude and short term in duration.

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

206. During construction phase, generation of solid waste & waste water from the construction sites and workers camp are likely to create nuisance in the surroundings. Soil runoff from the construction site may lead to off-site contamination (particularly during rainy season). Similarly, Improper disposal of construction debris may lead to off-site contamination of water resources. Unmanaged solid waste & effluent from workers camp may contaminate the surroundings. This will affect the construction workers, people residing in this area and the passers by.
207. The impact is direct in nature, local in extent, medium in magnitude and long term in duration.

vi) Accidental Leakage or Spillage of Stored Fuel/Chemicals

208. 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.
209. The impacts are direct in nature, local in extent, medium in magnitude and long-term in duration.

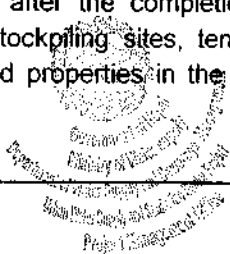
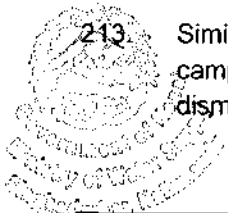
vii) Impact on Land Use Pattern

210. The construction of the proposed project components may occupy significant area of the land within the core area. Along with this, certain portion of land within the construction area is occupied for the construction of worker's camp site, stockpiling site and spoil disposal site. This may 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 in turn affects the people residing within the core area of the project.
211. The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.

viii) Haphazard Disposal of Dismantled Debris

212. The proposed project also involves dismantling activities for rehabilitation of the existing PCC roads, drainage construction and other miscellaneous works. This will result in the generation of dismantled debris.

213. 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



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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.

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

7.2.2 Impact on Biological Environment

a) Construction Phase

i) Impact on Flora & Fauna

215. The proposed drainage lines run along the E-W Highway due to which there will be no chance of interference of the project in any of the forest areas. However, there may be requirement of clearing of some bushes and shrubs along the highway. There is no requirement of cutting trees. Similarly, during drainage line construction, some of the top soil may be lost.

216. Haphazard site clearing, parking, and movement of construction vehicles and equipment, stockpiling will result in unnecessary loss of vegetation & fauna beyond Project footprints.

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

ii) Impacts on Aquatic Life

218. 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.

219. Similarly, the construction works for the proposed Outfalls may also contaminate the quality of existing & proposed sources affecting the aquatic habitat.

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

b) Operation Phase

i) Impact on Aquatic Life

221. As there is possibility of discharge of domestic wastewater and solid waste disposal from the local people into the drains, there is possibility of pollution of water flowing in the storm drain that may result in the pollution of the Outfall Rivers. This will affect the aquatic lives of those outfall rivers.

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

7.2.3 Impact on Chemical Environment

a) Design Phase

i) Impacts on Water Quality of River Outfalls

223. During operation phase, there is high chance of entry of domestic wastewater into the storm water drains for which precautions must be made during project design to restrict the entry of domestic wastewater.

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

b) Construction Phase

i) Impacts on Water Quality of the nearby rivers

225. During construction phase, there is high possibility of nearby rivers like Bataha Khola & Jiwa Khola, 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 these 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.

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

c) Operation Phase

i) Impacts on Water Quality of River used as Outfall

227. It has already been mentioned that there is high possibility of the proposed storm water drains carrying other unnecessary pollutants like domestic waste water, solid wastes, street litters etc. This may result in the pollution of the outfall rivers degrading 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.

228. 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

a) Design Phase

i) Health & Safety of Community & Workers

229. 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.

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

ii) Damage to the existing utilities

231. During construction works, there is requirement of demolition of certain portion of the highway as well as feeder roads. This type of demolition works may damage the existing road pavement. This may create discomfort to the road users and vehicles. Though this problem appears during construction phase, its mitigation measure should be considered during design phase. Hence, this impact is categorized for design phase.

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



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b) Construction Phase

i) Community health and safety hazards

233. 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.
234. The impact is indirect in nature, local in extent, medium in magnitude and short-term in duration.

ii) Workers' Health and Safety Hazards

235. 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 to the worker's camp; 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 events of flash flood each year during monsoons in this project town were recorded. If the construction works are carried out during monsoons, there is high risk of occurrence of flooding events that may pose threats to the occupational (worker's) health & safety hazards.
236. The impact is indirect in nature, local in extent, medium in magnitude and short-term in duration.

iii) Traffic Hindrance

237. The E-W Highway and Mirchaiya Katari Road may be susceptible to traffic congestion during drainage construction works that may provide discomfort to the passer-by & shopkeepers and may obstruct the daily activities of the people living in that area. This will also interrupt the smooth traffic flow.
238. The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.

iv) Public Protests

239. Due to the interruption of traffic flow along the proposed drainage lines i.e., along E/W Highway and Mirchaiya Katari, there is high chance of protests by the local people. This may interrupt the construction activities of the proposed project.
240. The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.

v) Disruption to Local Vendor's Business

241. The construction works along the proposed drainage line 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.

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

vi) Mobilization of Child Labor

243. 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.
244. The impact is indirect in nature, local in extent, medium in magnitude and long-term in duration.

vii) Impact on Sustainability of Works

245. If the construction works are carried out during monsoons, there is high risk of flooding in the proposed drainage line areas. This anticipated flooding problems may damage the storm water drains being constructed. This will unsustain the construction works of the proposed project.
246. The impact is direct in nature, local in extent, high in magnitude and short-term in duration.

viii) Damage to the Existing Utilities

247. During the construction phase, while excavating for the proposed drainage lines, the existing paved as well as unpaved road will also get damaged. This will obviously create discomfort to the people as the proposed drainage line is along the very busy E-W Highway and Mirchaiya Katari Road. This will also destroy the aesthetic view of the proposed site due to dismantling followed by construction activities.
248. The impact is direct in nature, local in extent, medium in magnitude and short-term in duration.

c) Operation Phase

i) Pollution in Newly Constructed Storm Water Drains

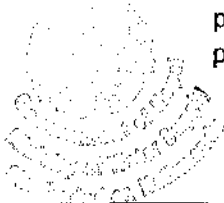
249. As there is possibility of discharge of wastewater and of solid waste disposal from the local people into the drain, there is possibility of pollution of water flowing in the storm drain that may result in the occurrence of disease vector that in turn may affect the public health.
250. The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.

ii) Blocking & Chocking of Drains

251. Due to the illegal entry of wastewater from the building as well as the possibility of disposal of waste materials by people, there is high chance of blocking & choking of drains.
252. The impact is direct in nature, local in extent, medium in magnitude and long-term in duration.

iii) Impact on Recipient Water Bodies

253. According to the detailed design, the main outlets of the drainage line proposed for this project are the existing rivers. Hence, if not properly monitored, there may be the chance of pollution in the recipient water bodies, which may worsen the surroundings.



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

iv) Non-Sustainability of Services or Completed Works

255. The events of flash flood each year during monsoons in this project town were recorded. Hence, the sustainability of the proposed system may be susceptible to risk as there is high chance of occurrence of flash flood events. These issues will be more intense with the Operator's disregard of the impacts flooding events during operation.

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

257. The summary of the impact matrix depicting evaluation of the anticipated adverse environmental impacts through impact rating in terms of nature, magnitude, extent and duration based on National EIA guidelines, 1993, field study, checklists and expert judgments are tabulated below:

Table 7-II: Summary of Impact Matrix of Adverse Issues

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 Disturbances	D	M (20)	L (20)	ST (5)	Insignificant (45)
Spoil Disposal & Gully Erosion	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)
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)

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Adverse Issues	Impact Rating				
	Nature	Magnitude	Extent	Duration	Rating
Impacts on Aquatic Life	D	M (20)	L (20)	ST (5)	Insignificant (45)
ii) Operation Phase					
Impacts on Aquatic Life	D	M (20)	L (20)	LT (20)	Significant (60)
C) Impacts on Chemical Environment					
i) Design Phase					
Impacts on Water Quality of Outfall River	ID	M (20)	R (60)	LT (20)	Very Significant (100)
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 River used as Outfall	D	M (20)	L (20)	LT (20)	Significant (60)
D) Impacts on Socio-economic Environment					
i) Design Phase					
Health & Safety of Community & Workers	ID	M (20)	L (20)	LT (20)	Significant (60)
Damage to the existing facilities	D	M (20)	L (20)	ST (5)	Insignificant (45)
ii) Construction Phase					
Community Health and Safety Hazards	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Workers' Health and Safety Hazards	ID	M (20)	L (20)	ST (5)	Insignificant (45)
Traffic Congestion	D	M (20)	L (20)	ST (5)	Insignificant (45)
Public Protests	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					
Pollution in Newly Constructed Storm Water Drains	ID	M (20)	L (20)	LT (20)	Significant (60)
Blocking/Choking of	D	M (20)	L (20)	LT (20)	Significant

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Adverse Issues	Impact Rating				
	Nature	Magnitude	Extent	Duration	Rating
Drains					(60)
Impacts on Recipient Water Bodies	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: National EIA Guidelines, 1993 & IEE Study 2018/019

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

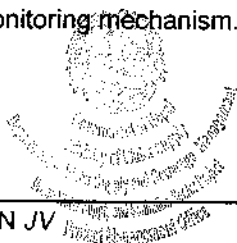
Less than 50 : Insignificant

258. The above given table shows that Air Pollution, Noise Pollution, Impacts on Water Quality of Outfall Rivers, Impacts on Water Quality of nearby rivers and Impact on Sustainability of Works are evaluated as "Very Significant". However, if the mitigation measures as described above for these impacts are properly adopted, these impacts would not be problematic for the project implementation. Apart of this, the **Table 7-II** also shows that some impacts are insignificant & some are significant. The best way to avoid these impacts is to follow the proposed mitigation measures and to implement them effectively.

7.3 Significance of Impact Rating

259. The significance of impact rating as shown in the above table is that it helps to determine the severity of each anticipated adverse impact. This will help to recommend suitable mitigation measures for each impact based on its severity. This will help to allocate budget required for the implementation of the proposed mitigation measures. As per the severity, the impact rating shall act as a means of making policy and legislations more rational, predictable and scientific. This will also help to establish close and routine monitoring requirement or criteria for mitigating impacts. This will further help to recommend the needs of adopting special checklists, if required. Moreover, this will assist to advance towards the environmental auditing during construction and operation phase, as one of the most important environmental management tools. This auditing enables to assess the actual environmental impacts, accuracy of prediction, effectiveness of environmental mitigation measures adopted and functioning of monitoring mechanism.

260. Similarly, regarding the beneficial impacts also, this impact rating enables to assess accuracy of prediction, the effectiveness of the proposed enhancement measures and functioning of monitoring mechanism.

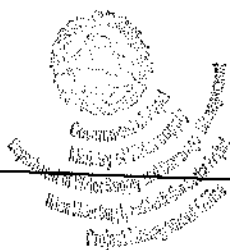


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261. Hence, the main significance of impact rating is that it reflects the authenticity of impact assessment in which the significance is interpreted in terms of acceptability of impacts that can be either in terms of legal requirements or public/stakeholders' satisfaction.



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8. MITIGATION & AUGMENTATION MEASURES

262. 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

a) Design Phase

i) Soil Erosion & Slope Instability

263. The mitigation measures for this impact include;

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

b) Construction Phase

i) Soil Erosion & land surface disturbance

264. The mitigation measures for this impact 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

ii) Spoil Disposal & Gully Erosion

265. 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 as demarcated in **Figure 2-IV** given above.
- 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.

iii) Air Pollution

266. The measures to mitigate this impact include;

- Strict Prohibition of open burning of solid waste
- Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, as necessary.

- If re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces;
- Conduct Air Quality Test for dust nuisance (PM 10 and PM 2.5) at key settlement and market area, school, hospital at least once in a month during dry working season (Jan-June).
- Use of Construction/ Transportation Vehicles complying with NVMES,2069
- Regular inspection & maintenance of construction/transportation vehicles
- Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking

iv) Noise Pollution

267. The measures to mitigate the noise pollution include:

- Restricting noisy activities to daytime and overtime work to avoid using noisy equipment;
- Prohibit the use of pressure horn by transportation vehicles
- Conduct noise level test once a year during peak construction stage at location near school, hospital and settlements especially at certain locations of Mirchaiya Core Bazaar Area like Near Health Posts, Near Schools areas and Residential Areas.
- Avoid noise generating activities like excavation works, dismantling for excavation works, loading & unloading of construction materials, noise of material transportation vehicles etc. during school time and at hospital area if any.
- Regular inspection & maintenance of construction/transportation vehicles to ensure the use of Vehicles complying with NVMES,2069 B.S.
- 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
- Regular inspection & maintenance to ensure the use of Diesel Generators complying with National Diesel Generator Emission Standard,2012

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

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

Construction Wastes:

- Adopt 3R (Reduce, Reuse & Recycle) concept
- Ensure storage areas are secure, safe & weatherproof.
- Management of reusable wastes
- Sale of Recyclable wastes to scrap dealer
- Final Disposal of Bio degradable solid wastes
- 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.



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- Management of biodegradable wastes that includes food waste, paper waste, biodegradable plastic, etc. by any suitable processes that include Composting. If these two processes are not possible then, the wastes shall be either managed by handing over these wastes to the municipality waste collectors who will finally dispose those wastes to the landfill sites of the project town or by disposing those wastes to the burial pits at suitable place.
- Non biodegradable wastes like glass, plastics & metals shall be managed by reusing them for site use or selling them to scrap dealers instead of disposing them.
- Strict Prohibition on open incineration of solid wastes & Strict Prohibition on use of plastic materials to minimize the quantity of plastic wastes as much as possible.
- 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.

vi) Accidental Leakage or Spillage of Stored Fuel/Chemicals

269. 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. 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.

vii) Impact on Land Use Pattern

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

- Avoid the acquisition of private and agricultural land for the construction of project components.
- Selection of barren/unused vacant land for the construction of worker's camp site, stockpiling site and spoil disposal site.

viii) Haphazard Disposal of Dismantled Debris

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

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

8.1.2 Impact on Biological Environment

a) Construction Phase

i) Impacts on Flora & Fauna

272. The mitigation measures for this impact include:

- Replace the excavated top soil to its original position after the completion of pipe laying works
- Re-vegetating disturbed slopes and grounds, as applicable
- Awareness programs regarding the policy related to the conservation of existing flora & fauna, to the workers prior to the construction and the community during various meetings and discussion programs;
- Regular Monitoring by DSMC & PMO

ii) Impacts on Aquatic Life

273. The mitigation measures for this impact include:

- Strict Monitoring on the daily activities of workers ;
- Provision of temporary but well equipped toilets;
- Restriction to workers from fishing;
- Adopt measures mentioned above for the solid waste management

b) Operation Phase

i) Impacts on Aquatic Life

274. The mitigation measures for this impact include:

- Direct discharge of the waste water and solid waste to the proposed drains will be discouraged through strict monitoring to the operators involved.
- Regular monitoring of the constructed drains to prevent entry of wastewater into the drains by enforcing strict regulations.

8.1.3 Impact on Chemical Environment

a) Design Phase

i) Impacts on Water Quality of the nearby rivers

275. The mitigation measures for this impact include:

- Appropriate design of the proposed drainage components with utmost care such that there is not possibility of entry of domestic wastewater into the storm water drains.

b) Construction Phase

i) Impacts on Water Quality of the nearby rivers

276. The mitigation measures includes;

- Appropriate Design of Septage Disposal through design of toilets with septic tanks
- 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 for the solid waste management

- Provision of adequate water supply and sanitation facilities at work sites.
- Strict supervision on the behavior of workers for the waste management as well as sanitation behavior and monitoring the workers to manage the wastes properly.
- Conduct water quality test of Bataha & Jiwa Khola once a year in dry season by the contractor.

c) Operation Phase

i) Impacts on Water Quality of River used as Outfall

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

- Regular Cleaning of Drains
- Strict Monitoring during operation phase to restrict the entry of domestic wastewater into the storm water drains.
- Conduct water quality test of Bataha & Jiwa Khola once a year in dry season by the O & M entity

8.1.4 Impact on Socio-economic Environment

a) Design Phase

i) Health & Safety of Community & Workers

278. The mitigation measure for this impact involves;

- Training on Community Health & Safety Hazards by DSMC by disseminating information in regard to this through training manuals, photographs & documents related to safety.
- PMO, RPMO & DSMC are the main responsible bodies to carry out the above mentioned mitigation measures.

ii) Damage to the existing facilities

279. The mitigation measures for this impact includes;

- Provide budget for restoration/replacement of damaged utilities.
- Prompt Reinstatement of paved as well as unpaved roads after completion of drainage construction works

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

b) Construction Phase

i) Community Health & Safety Hazards

281. The mitigation measures for this impact include:

- Contractor's implementation of EMP;
- Adequate lighting, temporary fence, reflecting barriers and signage at active work sites;
- Contractor's preparedness in emergency response; and
- Adequate dissemination of GRM and Contractor's observance/implementation of GRM.



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ii) Worker's Health & Safety Hazards

282. The mitigation measures for this impact include:

- Submission of Simple OHS plan for employer's approval that involves appropriate health & safety arrangement that includes minimum requirements for various activities like Excavation works, Works within the confined spaces, Use of warning signs, boards & signage, Use of PPE, Accident & Emergency Response and Monitoring & Reporting.
- Comply Labor Act,2074 (2017) of GoN
- Train all site personnel regarding environmental health and safety as like in design phase by DSMC & Contractors
- Provide Personal Protective Equipment (PPEs)to workers that includes protective clothing, helmets, goggles, boots and other equipment 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
- 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
- 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
- Implementation of Emergency Preparedness Response Plan to mitigate the impacts of flooding problems that includes i) Reporting of Incidents; ii) Investigation of incidents and iii) Prepared for availability of Stretchers, Life buoys, first aiders, first aid kits etc.

iii) Traffic Hindrance

283. The mitigation measures for this impact include:

- The excavated trench should be backfilled promptly.
- 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

iv) Public Protests

284. The mitigation measures for this impact include:

- Public Consultation should be carried out at various stages & locations as per requirement.
- Implement Grievance Redress Mechanism
- Pre-notify the public regarding the construction works that may hinder their daily activities and Coordinate with them properly

v) Disruption to Local Vendor's Business

285. The mitigation measures for this impact includes;

- Adopt "zero soil" approach through prompt backfilling right after completion of drain construction. In general, execution of excavation works is such that excavation will be done in a few meters length i.e., 50m at a time followed by pipe laying, backfilling over the pipe and removal of all surplus material from the site.
- 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

vi) Mobilization of Child Labor

286. The mitigation measures for this impact includes;

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

vii) Impacts on Sustainability of Works

287. The mitigation measures for this impact includes;

- Avoid construction works during monsoons
- After every flooding events, the contractor must conduct engineering investigation of built structures and implement the necessary corrective actions immediately as Emergency Response Preparedness.

viii) Damage to the existing facilities

288. 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.

289. 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.

290. The mitigation measures for this impact include:

- Rehabilitation & Restoration Works
- Promote greening of the length of the road where storm drainage pipe is laid to maintain the aesthetic view of the proposed site. But, for this, the approval from DoR is the must as the road carriageway is under the jurisdiction of DoR. If approval granted, it can be implemented using items not covered by BoQ.

c) Operation Phase

i) Pollution in Newly Constructed Storm Water Drains

291. The mitigation measures for this impact include;

- Regular monitoring of the constructed drains to prevent entry of wastewater into the drains by enforcing strict regulations.
- Conduct yearly dry season water quality test at U/S and D/S of storm water drainage outfalls

ii) Blocking/Chocking of Drains

292. The mitigation measures for this impact include;

- Regular monitoring of the constructed drains to prevent entry of wastewater into the drains by enforcing strict regulations.
- Conduct yearly dry season water quality test at U/S and D/S of storm water drainage outfalls
- Regular Cleansing and Desilting of the drains
- Provision of adequate human resources for regular maintenance
- Establish a functional and efficient drain monitoring and cleaning management system with sufficient annual budget allocation and assignment of human resources.

iii) Impacts on Recipient Water Bodies

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

- Regular monitoring of the constructed drains to prevent such kind of pollution.
- Conduct yearly dry season water quality test at U/S and D/S of storm water drainage outfalls

iv) Non-sustainability of Services or Completed Works

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

- Conduct engineering investigations of completed works and implement the necessary corrective actions without delay after every flash flood event
- Preparation of Emergency Response Plan and Immediate implementation of this plan after any such event
- Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs
- Regular O & M with effectiveness under the management of Mirchaiya Municipality.

8.2 Augmentation Measures

8.2.1 Impact on Socio-economic Environment

8.2.1.1 Construction Phase

a) Employment Generation

295. The augmentation measures for this beneficial impact will be as follows:

- Recommend contractor to employ local people by giving high priority to women and under privileged group as far as possible.

Sudhakar
Engineer

- Ensure equity in provision of wages to both male as well as female labors.

b) Skill Enhancement

296. The augmentation measures for this beneficial impact will 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

297. The augmentation measures for this beneficial impact will 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

298. The augmentation measures for this beneficial impact will be as follows:

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

b) Improvement on Surface Water Flooding and Ponding

299. The augmentation measures for this beneficial impact will be as follows:

- Regular supervision to avoid clogging of drains and regular cleaning of the the proposed drains.

c) Increased Urban Aesthetic Value

300. The augmentation measures for this beneficial impact will be as follows:

- Regular cleaning of the drainage components to avoid the choking problems of the proposed drains and to make the benefits intact.

d) Increased Land Value

301. The augmentation measures for this beneficial impact will be as follows:

- Ensuring regular maintenance of the drainage components
- Promoting urbanization through proper land development activities in the area.

9. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

9.1 Stakeholder Consultation & Participation

302. 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 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**.
303. 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 be either primary or secondary.

Table 9-1: 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
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

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 ¹	Stakeholders' Role or Interest	Level of Influence
5.	UWSSP, PMO, RPMO & DRTAC		✓	It is responsible in successfully implementing the proposed project activities, establishing coordination with ADB & GoN and managing day to day activities at municipality levels.	High
6.	Town Development Fund (TDF)		✓	TDF will assist the project municipality conducting financial appraisal of the proposed project and advice DWSSM on its outcomes prior to the start of detailed design process.	High
7.	Local Bodies (DCC, Municipality & Ward Offices)		✓	It is responsible for establishing coordination with the implementing agency. Here, the municipality will be also responsible for policy compliance as well as for addressing public protests if any.	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.	Households (Families & Individuals)	✓		They are the main beneficiaries and are benefitted by the provision of effective storm water drainage system.	Low
10.	Contractors, Petty Contractors		✓	It is responsible for bidding for works and involved in the construction of the proposed project.	Low
11.	Local Technicians/Plumbers	✓		This group will be benefitted through the increased work opportunities related to construction works of the proposed project.	Low
12.	Unemployed Locals	✓		This group will be benefitted through the increased work opportunities related to construction works of the proposed project.	Low
13.	Local Vendors	✓		This group will be affected by the drainage line construction along the proposed E-W highway, Mirchaiya-Katari Road and other feeder roads area.	Low
14.	Schools & Hospitals	✓		This group will be benefitted by the provision of enhanced and improved continuous water supply service.	Low

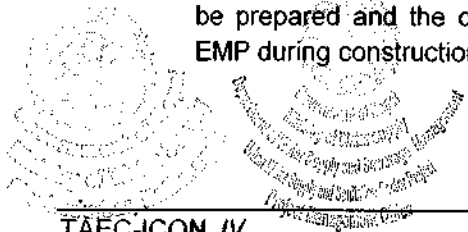
S.N.	Stakeholders	Primary ²	Secondary ³	Stakeholders Role or Interest	Level of Influence
15.	Commercial Establishments (Private Enterprises)	✓		This group is benefitted by enhancing their business by supplying items to the construction employees regarding their basic needs.	Low
16.	Scrap Vendors	✓		This group will be benefitted by purchasing the recyclable wastes generated from the construction activities as well as from workers camp.	Low
17.	Local Leaders		✓	This group will facilitate to establish strong coordination between the local people and the project authority.	High

Source: IEE Field Study 2018 and DEDR & DDR, 2019

304. 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 project. The consultations were undertaken with key stakeholders that includes Local Bodies, Beneficiaries Households, TDF, PMO, RPMO & DRTAC in line with ADB's requirements pertaining to environment and social considerations. The key concerns of the people related to the project that includes Implementation of the safeguard policy framework in field level, Delivering the information regarding safeguard activities to local level and People's participation in project implementation were discussed.

9.2 Major issues raised by the stakeholders

305. The major issues raised by the key stakeholders during stakeholder consultation are as follows:
- i. The project town is in need of efficient storm water drainage system.
 - ii. Flooding problem is severe in the project town during monsoons.
 - iii. The project should give priority to local people while hiring for the construction activities.
 - iv. The project must consider solid waste management issues during construction period.
 - v. The proposed project must address the socioeconomic problems that may be observed during the construction period at the proposed drainage line areas like Traffic Congestion, Disruption to Local Vendors, Discomfort to the passerby, Interruption to the traffic flow, Noise Pollution, Air Pollution, Damage to the existing facilities etc.
306. The assurance made by the study team regarding the issues raised by the stakeholders are as follows:
- i. The proposed project will address the problems faced by the people of Mirchaiya Municipality due to the absence of proper & effective storm water drainage system.
 - ii. The socioeconomic problems raised by the stakeholders have 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.



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- iii. 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.
 - iv. Local workers of Mirchaiya municipality will be given priority for employment to the extent possible however; it requires strong coordination with the concerned contractor.
307. 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 the municipality. PMO, ICG, Contractors, and the Municipality 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 and municipality;
 - 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 Mirchaiya Municipality 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.
308. Several public consultations held at various locations on different dates with key stakeholders as mentioned above are tabulated below:

Table 9-II: Summary of Major Public Consultations carried out by Study Team

S.N.	Meeting Date	Facilitator/ stakeholders	Venue	Participants		Topic of discussion
				Male	Female	
1	April 17, 2019	WUSC members, ERDSMC team, Local people of Mirchaiya	Bazaar Area, Sajha Chowk-5	14	6	General Discussion regarding project and its environmental issues
2	April 18, 2019	WUSC members, ERDSMC team and Local	Bazaar Area, Ward 7	12	2	General Discussion regarding project

S.N.	Meeting Date	Facilitator/ stakeholders	Venue	Participants		Topic of discussion
				Male	Female	
		people of Katahariya				
3	May 04,2019	WUSC members, ERDSMC team, Local people of Katahariya	Mirchaiya Municipality Office	36	0	Detailed Engineering Design Report
4	May 24,2019	Municipality Office, ERDSMC team, Local people of W.No 2	Mirchaiya Municipality Office	10	0	General Discussion regarding project
5	November 17, 2019	Municipality Office and Local People of Ward no. 5, 6 & 7	Katari Chowk, Mirchaiya	27	0	Discussion regarding public notice and environmental issues regarding the project

Source: DDR,2017

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

10. GRIEVANCE REDRESS MECHANISM

10.1 Purpose of the Grievance Redress Mechanism

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

10.2 Proposed Set-Up

311. The MoWS, as the Project executing agency, will establish the GRM and its support system, including setting up the Grievance Redress Committee (GRC) at the subproject level. The GRC will comprise the: (i) Chief of the WSSDO; (ii) Municipality Staffs; (iii) two representatives of affected persons, a male and a female; (iv) a member of IP community, preferably female; (v) a representative of a non-government organization or community-based organization actively involved in IP development/other backward communities in the area, if any; (vi) local government representatives, i.e., Municipality Office and DCC; (vii) DSMC social safeguard expert; and (viii) DSMC environmental safeguard expert (ESE). The environmental safeguard Assistant (ESA) of the ICG will oversee the implementation/observance of the mechanism for environmental complaints at the subproject level. He/she will be technically advised, supported and trained by DRTAC environmental specialist and the DSMC ESE. PMO's Environmental Officer will oversee the implementation/observance of the GRM in all subprojects. Representatives of affected persons (APs), civil society and eminent citizens will be invited as observers during GRC meetings. The Contractors and Municipality (as Operators) will be required to designate their respective counterpart GRM staff.
312. The GRM will accommodate both informally- and formally lodged, but Project-related, valid grievances. Informally lodged grievances are those received by the Contractors during construction or the Municipality during operation. Formally, lodged grievances are those received at the ICG office. The ICG, GRC, and PMO maintain records of all grievances, informally- and formally lodged, valid and invalid, and appealed. The ICG will immediately inform the PMO, as necessary, particularly when an AP makes an appeal in court. PMO will in turn immediately inform the ADB of the same. The observance/implementation of the GRM will be reported by the: (i) ICG ESA in the subproject's monthly progress reports, semi-annual subproject environmental monitoring report (EMR) during construction and annual subproject EMR during operation; and (ii) PMO EO in the Project's monthly progress report, semi-annual Project EMR during construction and annual Project EMR during operation.
313. Sufficient support system, including well GRM-oriented staff of Contractors and the municipality, communication/documentation/recording and reporting system, funds, and posters declaring contact details and displayed at strategic locations, among others, will be in place to sustain the effective implementation of the mechanism.

10.3 Access to the Mechanism

314. Any person who has environmental concerns/issues pertaining to the projects during detailed design, construction and operation phases will have access to the mechanism free of charge. The PMO EO and ICG ESA will ensure that:
- The public, especially the residents and regular passers-by, in the main areas of influence of the projects, are aware of their rights to access, and will have access to the GRM free of administrative and legal charges; and

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

10.4 GRM Steps and Timeframe

315. **Informal Approach:** Informally, APs can lodge complaints directly to the Contractor during construction or Operator (Municipality) during operation. The Contractor/Operator will document and screen the complaint immediately. If screening reveals the complaint as Project-related and valid, the Contractor/Operator will act on the complaint within three days from receipt of complaint. Otherwise, the Contractor/Operator will direct the AP with non-Project-related and/or invalid complaint to the ICG. The Contractor/Operator will secure a confirmation of completion of action from the AP. For at least a week after confirmation of completion, the ICG will monitor the effectiveness of the action/resolution taken. After which, ICG will secure a written confirmation of satisfaction from the AP. The Contractor/Operator shall report to the ICG all complaints received, eligible or ineligible, actions agreed on and taken and confirmation of completed action.
316. **Formal Approach:** If a complaint is eligible but is not acted on within three days from the receipt of the complaint, or if AP is not satisfied with the resolution undertaken by the Contractor/Operator, he/she can access the formal mechanism, as follows:
317. **First Level:** The access point will be the ICG. The steps are detailed below
318. **Step 1 Lodging a Complaint (Day 1)**
- AP lodges complaint with the ICG, verbally or in writing. ICG documents/registers lodged complaint, makes sure these are duly referenced and provides AP with a copy of the referenced complaint.**
- Step 2 Screening of Complaint (Day1)**
- ESA screens the complaint if it is Project-related and valid and informs the AP immediately of the screening results. An AP with complaint screened as non-Project-related and/or invalid will be advised that he/she may raise complaint to the second level of the GRM, and ICG will forward the complaint to the GRC.
- Step 3 Investigations, Discussion and Agreement (Day 1)**
- ICG, together with the Contractor/Operator and AP, will investigate and discuss the complaint at the site. Agreement on actions and measures and time involved will be made with the AP. Agreement will be properly documented and filed; ICG, AP, Contractor/Operator will have copies.
- Step 4 Implementing the Agreed Action**
- If the required action is minor, i.e. not requiring further investigation and would be quick and easy to implement, the Contractor/Operator will immediately implement the agreed action. (Day 2/Day 3)
 - If required action is major, i.e. requiring further investigation and/or procurement of supplies/parts, the Contractor/Operator will: (i) immediately provide the most suitable interim measure to reduce the magnitude of the impact (Day 2/Day 3); and (ii) start work on the major action within 5 days from discussion (or not later than Day 8 since receipt of complaint).
 - AP will be advised by the ICG that his/her complaint may be raised to the second level of the GRM, if he/she so prefers when: (i) minor action is not implemented within 2 days from discussion; (ii) interim measure prior to major

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action is not implemented within 2 days from discussion; or (iii) major action is not started within 5 days from discussion.

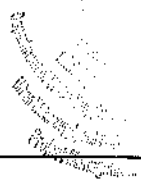
Step 5 Confirmation of Completed Action

Contractor/Operator will secure a written confirmation of completed action from the AP and furnish the ICG a copy.

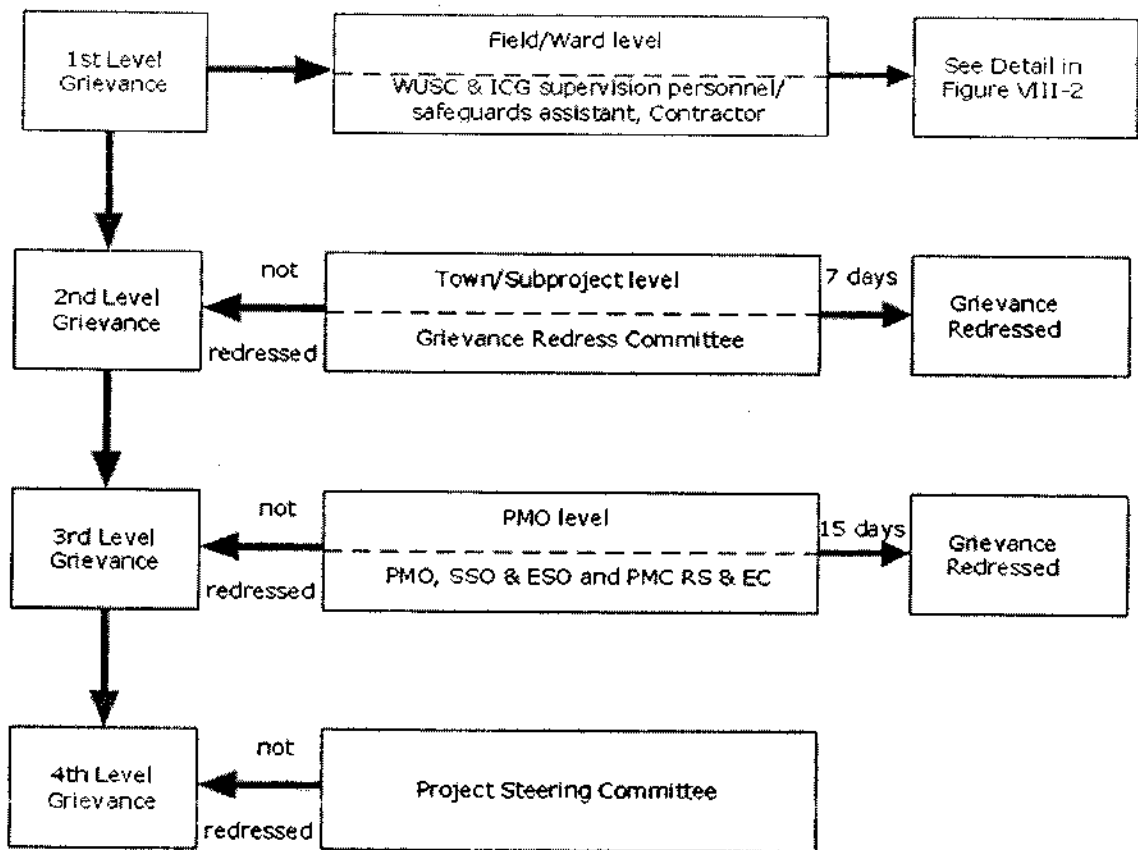
Step 6 Confirmation of Satisfaction (1 week after confirmation of completed action)

The ICG will monitor the effectiveness of the resolution for at least a week after receipt of confirmation of completed action from the Contractor/ Operator. After which, ICG will secure a written confirmation of satisfaction from the AP.

319. **Second Level:** The AP will be notified by the ICG when a complaint is forwarded to the GRC. The GRC will call for a hearing, if necessary, where AP can present his or her concerns or issues. The GRC will suggest corrective action/measure at the field level and assign clear responsibilities for implementing its decision within 7 days of receipt of complaint by GRC. If GRC decision is not acceptable to the AP, if the suggested corrective action/measure is not started within 7 days, the matter/AP will be referred to the third level.
320. **Third Level:** The ICG will refer AP and its unresolved complaint or major issues to the PMO EO who will act within 15 days.
321. **Fourth Level:** For extremely major issues that will go beyond the third level, these will be referred to the project steering committee (PSC), to be resolved within 30 days. Environmental complaints (other than those that will involve the legal system) are expected to be mainly resolved at the second level, and to a lesser extent at the third level.
322. Despite the GRM, an AP will have access to the country's legal system at any stage. Accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism (AM) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Nepal Resident Mission. The complaint can be submitted in the country's language. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the GRM.
323. **Record keeping and disclosures:** The PMO, GRC, ICG will keep records of all lodged and documented/referenced complaints, actions/resolutions taken, AP's written confirmations of completed action and satisfaction, complaints raised to higher levels and lessons learned. The number of grievances recorded and resolved and the outcomes will be displayed at the offices of WSSDO, ICG, Town LGU, PMO and Municipality. They are then reported in the monthly progress reports, semi-annual EMR during construction and annual EMR during operation, submitted to ADB.
324. **Periodic review and documentation of lessons learned:** The PMO EO will do periodic review of the effectiveness of the GRM in each town and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address complaints.
325. The following given *Figures 10-1 & 10-2* illustrates the formal approach of GRM and 1st Level Mechanism respectively.



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- ES- Environmental Specialist
- ESO- Environmental Safeguards Officer
- ICG- Implementation Core Group
- PMC- Project Management Consultant
- PMO- Project Management Office
- RS- Resettlement Specialist
- SSO- Social Safeguard Officer
- WUSC- Water Users and Sanitation Committee

Figure 10-I: Grievance Redress Mechanism (Formal Approach)



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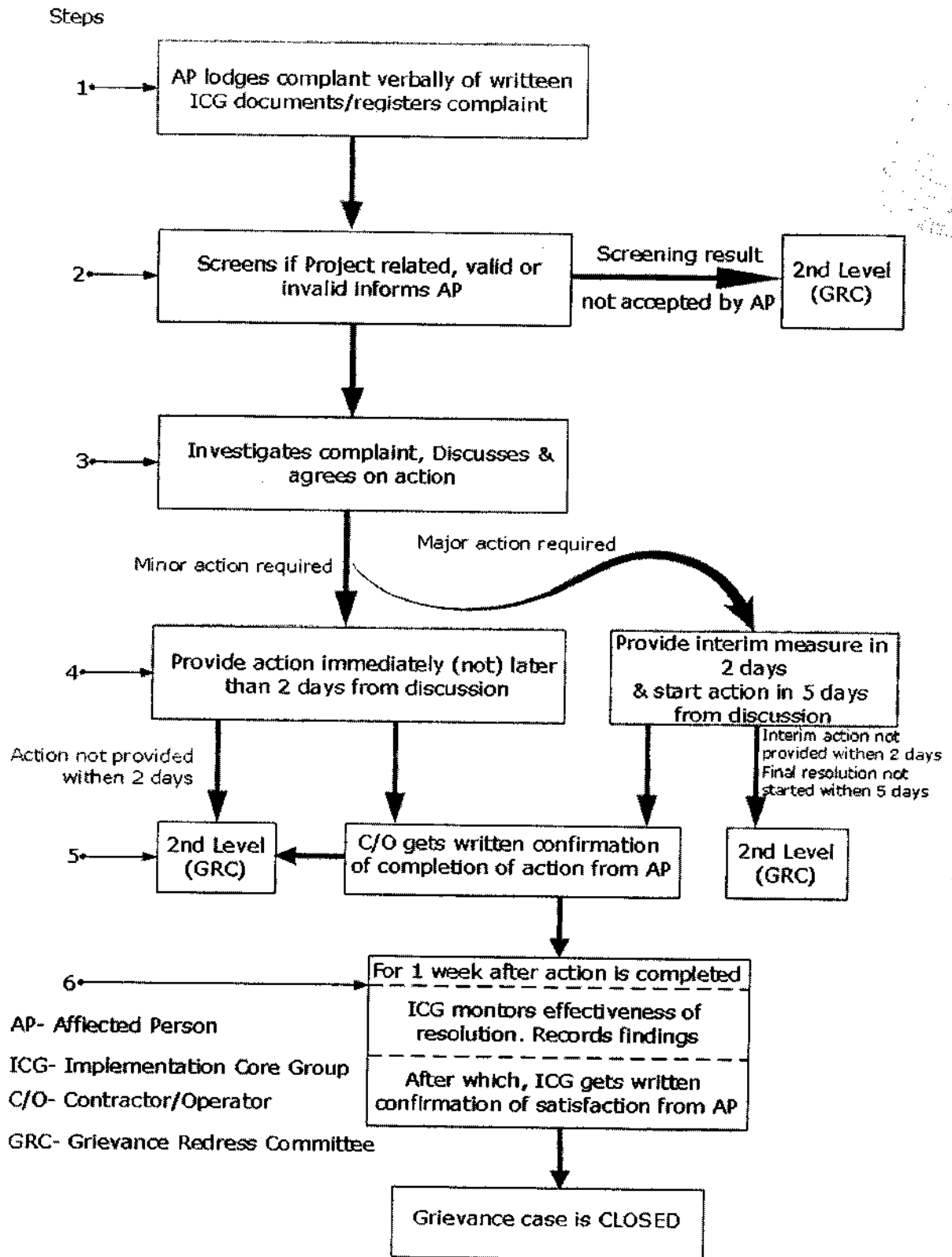


Figure 10-II: GRM First Level

11. ENVIRONMENTAL MANAGEMENT PLAN

11.1 Introduction

326. 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.
327. 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

328. 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 participating towns are the implementing agencies.
329. The key responsibilities of the executing and implementing agencies are as follows:

Prior to construction

- The MoWS will deputize a qualified staff to act as the Environmental Safeguard Officer of the Project management office (PMO).
- The 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.
- The DWSSM will review the IEE Report prepared by the Design, Supervision and Management Consultant Team's Environmental Safeguard Expert (DSMC-ESE) prior to forwarding this to MoWS.
- The DWSSM will prepare the ToRs for the Environmental Safeguard Specialist that will engage to support the PMO and for the Environmental Safeguard Specialists of the two Design, Supervision and Management Consultants that will be appointed to prepare the subprojects.

11.2.2 Safeguard Implementation Arrangement

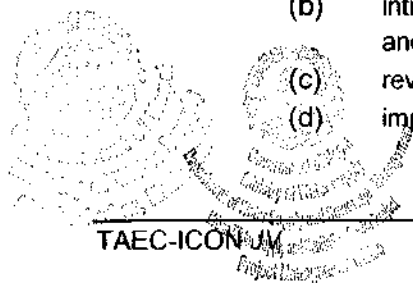
330. Project Management Office (PMO): The safeguard officers (environmental safeguard officer and social safeguard officer) of PMO will be engaged in PMO to ensure implementation of environmental safeguards. He/she will receive support from safeguards experts (environmental and social) of the Design Review and Technical Audit Consultants (DRTAC) as specified below:

- (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.

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

- (i) Prepare new IEEs/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.
332. **PMQAC:** The Project Management and Quality Assurance Consultants (PMQAC) will provide support to the PMO in the following areas:
- (i) ensure that the quality of the designs and construction of all water supply and sanitation components implemented under the project are to the required standards; and
 - (ii) assist the PMO with the overall planning, implementation and monitoring of the project during all stages of implementation including adherence to all environmental and social safeguards' requirements.
333. **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 Municipality 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.
334. **Civil Works Contracts and Contractors:** EMPs are to be included in bidding and contract documents and verified by PMO and RPMOS. The contractor shall mobilize a full-time EMP assurance and OHS staff in the project. The curriculum vitae of the staff shall be submitted for Employer's approval and appoint before mobilizing at site. The contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract. The contractor shall submit a construction EMP (CEMP) and take Employer's approval before mobilizing at site. The approved EMP shall be included in the contract. The contractor has to comply with the contract provision. 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.
335. **Capacity Building:** The DRTAC safeguards experts (environmental and social) will be responsible for training the; (a) PMO's safeguards officers (environmental and social); (b) RPMOs' engineers and social development officers. The training modules will need to cover safeguards awareness and management in accordance with both ADB and government requirements as specified below:
- (A) 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



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- (e) monitoring and reporting system. The contractors will be required to conduct environmental awareness programs and orientation to the workers prior to deployment to work sites.

(B) 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.

336. **Local Authority/Municipality:** The Municipality is the eventual operators of this Mirchaiya Storm Water Drainage Project. The key tasks and responsibilities of the local authority/municipality are, but not limited to:

Prior to construction

- Facilitate public consultation and participation, information dissemination and social preparation.
- Provide available data to the DSMC-ESS during the IEE study
- Participate in the training program.

During construction

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

During operation

- Implement the EMP.
- Prepare the environmental monitoring report as per IEE.
- Ensure observance of the grievance redress mechanism.

337. **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 O & M team of Municipality on the same.

11.3 Environmental Management Plan (EMP) Matrix

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

Table 11-1: 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	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	Incorporated in final design and communicated to contractors	Before award of contract, During Detailed Design Phase
b) Construction Phase	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 	Contractor	<ul style="list-style-type: none"> Site Condition Contractor's Log Book regarding construction activities Field Photographs 	Weekly Basis During Construction Phase
Spill Management	Inappropriate disposal of spoils from the construction activities may result in gully and erosion of spoil tips especially when it is combined with unmanaged surface water runoff.	<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. 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	<ul style="list-style-type: none"> Spoil Management Plan Photographs Construction of Spoil Disposal Site 	During Phase Construction
Air Quality	Air Pollution	<ul style="list-style-type: none"> Strict Prohibition of open burning of solid 	Contractor	Written Notice/Code of Conduct	During award of contract

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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Air Quality	Air Pollution	waste		Visible Emission	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; if re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces; Conduct Air Quality Test for dust nuisance (PM 10 and PM 2.5) at key settlement and market area, school, hospital at least once in a month during dry working season (Jan-June). Use of Construction/ Transportation Vehicles complying with NVMES,2069 Regular inspection & maintenance of construction/transportation vehicles Supply of clean cooking fuel to workers instead of allowing them to use firewood for cooking. 	Contractor	<ul style="list-style-type: none"> Parameters related to monitoring of solid waste management Number of water Tank/s Capacity of Water Tank/s Daily/Weekly Frequency/Timing of water spraying Locations of water spraying Contractors Log Book of Materials to ensure the use of crushed gravel Photographs Air Quality Test Reports Photographs 	Weekly Basis During Construction
Acoustic Environment	Noise Pollution	<ul style="list-style-type: none"> Restricting noisy activities to daytime and overtime work to avoid using noisy equipment; Prohibit the use of pressure horn by transportation vehicles 	Contractor	<ul style="list-style-type: none"> Number and types of vehicles in use Certifying documents for each vehicle Contractor's/Consultant's log book of vehicle inspection & maintenance Written Notice/Code of Conduct Type of fuel supplied to camps Quantity of fuel supplied to camps Written Notice 	<ul style="list-style-type: none"> Daily Basis/ During Construction Prior to construction Weekly Basis during construction Weekly Basis during construction Prior to construction
			Contractor	<ul style="list-style-type: none"> Written Notice/Code of Conduct Number of vehicles fitted 	Daily Basis



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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		<ul style="list-style-type: none"> Conduct noise level test once a year during peak construction stage at location near school, hospital and settlements Avoid noise generating activities like excavation works, dismantling for excavation works, loading & unloading of construction materials, noise of material transportation vehicles etc. during school time and at hospital area if any. Regular inspection & maintenance of construction/transportation vehicles to ensure the use of Vehicles complying with NVMES,2009 B.S. 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 Regular inspection & maintenance to ensure the use of Diesel Generators complying with National Diesel Generator Emission Standard,2012 	Contractor	<ul style="list-style-type: none"> with pressure horns Maximum Sound Level of Pressure Horn Noise Level Test Reports Photographs Number of complaints from the sensitive receptors Contractor's Work Schedule Contractor's/Consultant's log book of vehicle inspection & maintenance Contractor's/Consultant's log book of equipment/machinery inspection & maintenance Contractor's/Consultant's log book of equipment/machinery inspection & maintenance 	Yearly Basis
		<ul style="list-style-type: none"> Adopt 3R (Reduce, Reuse & Recycle) concept Ensure storage areas are secure, safe & weatherproof. Management of reusable wastes Sale of Recyclable wastes to scrap dealer 	Contractor	<ul style="list-style-type: none"> Daily/Weekly quantity/volume of reusable/recyclable SW collected Locations of stockpiling sites Number of cases of onsite reuses Daily/Weekly quantity/volume of such wastes sold to or given to scrap vendors Frequency of sale to scrap vendors 	Daily basis
Solid Waste	Haphazard Disposal of Wastes		Contractor		Daily basis



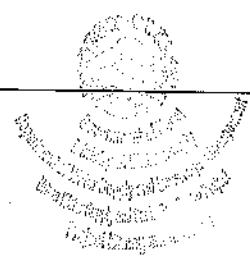
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Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Solid Waste	Haphazard Disposal of Wastes	<ul style="list-style-type: none"> Final Disposal of Bio degradable solid wastes 	Contractor	<ul style="list-style-type: none"> Number/size of burial 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
		<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. 	Contractor		Daily basis
Solid Waste	Haphazard Disposal of Wastes	<ul style="list-style-type: none"> Construct garland drains to reduce the runoff from the stockpiles. 	Contractor	<ul style="list-style-type: none"> Location of construction sites 	Daily basis
		<ul style="list-style-type: none"> Solid Wastes, Wastewater and Sewage from labour camp 	Contractor		
		<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. 	Contractor	<ul style="list-style-type: none"> Number of Colored Bins to segregate wastes into biodegradable & non-biodegradable wastes 	Daily basis during construction
Solid Waste	Haphazard Disposal of Wastes	<ul style="list-style-type: none"> Management of biodegradable wastes that includes food waste, paper waste, biodegradable plastic, etc. by any suitable processes that include Composting. If these two processes are not possible then, the wastes shall be managed either by handing over these wastes to the municipality waste collectors who will finally dispose those wastes to the landfill sites of the project town or by disposing those wastes to the burial pits at suitable place 	Contractor	<ul style="list-style-type: none"> Daily/Weekly quantity/Volume of Biodegradable waste collected Site Photographs Contractor' Log Book 	Daily basis during construction
		<ul style="list-style-type: none"> 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"> Daily/Weekly quantity/volume of such wastes sold to or given to scrap vendors Frequency of sale to 	Daily basis during construction



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Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Handling of Fuels/Chemicals	Accidental Leakage or Spillage of Stored Fuel/Chemicals	<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. 	Contractor	<ul style="list-style-type: none"> Written Notice 	Prior to Construction & During Construction
		<ul style="list-style-type: none"> Construction of the temporary latrines with temporary soak pits & septic tanks within the camp site for proper disposal of sewage. 	Contractor	<ul style="list-style-type: none"> State of well managed camp site with latrine facilities 	Daily basis
		<ul style="list-style-type: none"> Provide temporary but proper drainage system for proper outlet of waste water generated from cooking practices adopted by the workers 	Contractor	<ul style="list-style-type: none"> State of well managed camp site with drainage facilities 	Daily basis
		<ul style="list-style-type: none"> 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"> Contractor's Workers Log Book 	Prior to the 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 of 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 	Contractor	<ul style="list-style-type: none"> Frequency of use of saw dust, sand or dry soil 	Weekly Basis During Construction



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Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		<ul style="list-style-type: none"> soak up the fuel/chemical. So, availability of saw dust, sand or dry soil should be ensured in the store Regular inspection Visit to the storage site to inspect the leakage of the stored container of fuel/chemical 	DSMC & Contractor	<ul style="list-style-type: none"> State of well-maintained storage container 	Weekly Basis During Construction
Land Use Pattern	Change in land use pattern in haphazard manner	<ul style="list-style-type: none"> Avoid the acquisition of private and agricultural land for the construction of project components. Selection of barren/unused vacant land for the construction of worker's camp site, stockpiling site and spoil disposal site. Immediate Response on handling of dismantled debris 	PMO & DSMC	<ul style="list-style-type: none"> Details of land ownership and State of proposed land 	During Detailed Design Phase
Dismantled Debris	Haphazard Disposal of Dismantled Debris	<ul style="list-style-type: none"> Segregation of Dismantled Debris Adopt 3R (Reduce, Reuse & Recycle) concept Sale of Recyclable Wastes to Scrap Vendors/Dealers 	Contractor	<ul style="list-style-type: none"> State of well-maintained site condition after the completion of dismantling works Number of Colored Bins 	<ul style="list-style-type: none"> Daily Basis After Construction and Prior to Operation Daily Basis
2. Impacts on Biological Environment					
a) Construction Phase					
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; Awareness programs regarding policy related to the conservation of existing flora & fauna, to the workers prior to the construction and the community during various meetings and discussion programs Regular Monitoring 	Contractor	<ul style="list-style-type: none"> State of before and after condition of the site State of revegetated slopes & grounds Minutes & Photographs of Programs 	<ul style="list-style-type: none"> Daily Basis During Construction Weekly Basis During Construction Prior to Construction
Flora & Fauna	Loss of vegetation, Loss of habitat of faunas		PMO, DSMC & Contractor	Contractor's Log Book	Daily Basis During Construction

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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Aquatic Life	Loss of habitat of aquatic life	• Strict Monitoring on the daily activities of workers	Contractor & DSMC	State of Labor Camp Site	Construction
		• Provision of temporary but well-equipped toilets	Contractor & DSMC	Location of these temporary facilities	Weekly Basis
		• Restriction to workers from fishing	Contractor & DSMC	Written Notice	Weekly Basis
		• Adopt measures mentioned above for the solid waste management	Contractor & DSMC	• Number of Colored Bins to segregate wastes • Daily/Weekly quantity/Volume of Biodegradable solid waste collected	Daily Basis During Construction Daily Basis During Construction
b) Operation Phase					
Aquatic Life	Pollution of water bodies endangering aquatic lives	<ul style="list-style-type: none"> • Direct discharge of the waste water and solid waste to the proposed drains will be discouraged through strict monitoring to the operators involved. • Regular monitoring of the constructed drains to prevent entry of wastewater into the drains by enforcing strict regulations. 	Municipality	<ul style="list-style-type: none"> • Monitoring Reports • Photographs • Number of Complaints regarding pollution if any 	Weekly Basis
3. Impacts on Chemical Environment					
a) Design Stage					
Water Quality	Pollution on outfall rivers by poor sanitation practices of the workers	<ul style="list-style-type: none"> • Appropriate design of the proposed drainage components with utmost care such that there is not possibility of entry of domestic wastewater into the storm water drains. 	PMO & DSMC	<ul style="list-style-type: none"> • Detailed Engineering Design Report • Detailed Design Drawings 	During Design Phase prior to the approval
b) Construction Stage					

Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Water Quality	Pollution on outfall rivers by poor sanitation practices of the 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"> Photographs of Camp Site Contractor's Log Book 	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 & Photographs of Spoil Disposal Site 	During Construction
Water Quality	Pollution on outfall rivers by poor sanitation practices of the workers	<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	<ul style="list-style-type: none"> Location & 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. Strict supervision on the behavior of workers for the waste management as well as sanitation behavior and monitoring the workers to manage the wastes properly. 	Contractor	<ul style="list-style-type: none"> Photographs of camp site with required temporary facilities 	Weekly Basis
b) Operation Stage		<ul style="list-style-type: none"> Conduct water quality test of Bataha & Jiwa Khola once a year in dry season by the contractor 	Contractor	<ul style="list-style-type: none"> Water Quality Test Reports 	Yearly Basis
Water Quality	Pollution on the outfalls	<ul style="list-style-type: none"> Regular Cleaning of Drains Strict Monitoring during operation phase to restrict the entry of domestic wastewater into the storm water drains. 	O & M Team	<ul style="list-style-type: none"> Photographs of Cleaning Activities Monitoring Reports 	Monthly Basis

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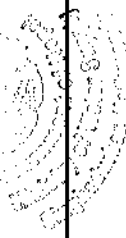


Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
4. Impact on Socio-economic Environment					
a) Design Phase					
Health & Safety of Community & Workers	Lack of provision will have impact during construction	<ul style="list-style-type: none"> Conduct water quality test of Bataha & Jiwa Khola once a year in dry season by the O & M entity Training on Community Health & Safety Hazards by DSMC by disseminating information in regard to this through training manuals, photographs & documents related to safety. Provide budget for restoration/replacement of damaged utilities. 	O & M team	Water Quality Test Reports	Yearly Basis
Existing Facilities	Demolition of existing pavement	<ul style="list-style-type: none"> PMO, RPMO & DSMC DSMC, RPMO, PMO, Contractor 	Photographs & Minutes	Approved BoQ	During detailed design phase and Prior to Construction
b) Construction Phase					
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, DSMC Contractor Contractor Contractor 	<ul style="list-style-type: none"> Review of EMP State of well managed construction site with lighting, fencing and signage facilities. Emergency Response Plan Grievance Form State of GRC 	<ul style="list-style-type: none"> During Construction Phase, Weekly Basis During Construction Phase, Monthly Basis During Weekly Basis During Monthly Basis
Workers Health & Safety	There is invariably a safety risk when construction works	<ul style="list-style-type: none"> Submission of Simple OHS plan for employer's approval that involves 	Contractor	OHS Plan Submitted	Prior to the start of the construction

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Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Workers Health & Safety	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"> appropriate health & safety arrangements that includes minimum requirements for various activities like Excavation works, Works within the confined spaces, Use of warning signs, boards & signage, Use of PPE, Accident & Emergency Response and Monitoring & Reporting Comply Labor Act (1992) of GoN Train all site personnel regarding environmental health and safety as like in design phase by DSMC & Contractors Provide Personal Protective Equipment (PPEs) to workers that includes protective clothing, helmets, goggles, boots and other equipments designed to protect the wearer's body from injury or infection and ensure their effective usage Require workers to wear high visibility clothes Exclude public from worksites 	Contractor	<ul style="list-style-type: none"> Site -Specific H&S plan Record of H&S orientation training like Photographs & Minutes Availability of personal protective equipment at construction site Environmental Site Inspection Report 	<ul style="list-style-type: none"> 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
	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 accident reports and records. Make first aid kits readily available Maintain hygienic accommodation in work camps Ensure uncontaminated water for drinking, cooking, and washing. Assure clean eating areas Make sure sanitation facilities are readily available Provide 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 Ensure moving equipment is outfitted with 	<ul style="list-style-type: none"> Contractor Contractor Contractor Contractor 	<ul style="list-style-type: none"> State of properly fenced construction site area Number of accidents as per site records Equipped first-aid stations State of well managed workers' camp Records of supply of uncontaminated water Medical Insurance Documents Contractor's Log Book of 	<ul style="list-style-type: none"> Weekly Basis during construction Weekly Basis during construction Weekly Basis during construction Monthly Basis during construction Weekly Basis during construction Prior to the construction Weekly Basis during construction

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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		<ul style="list-style-type: none"> audible backup alarms; Hearing protection equipment enforced in noisy environment Chemical and Material storage areas need to be marked clearly 	Contractor	Machinery & Equipment	construction
		<ul style="list-style-type: none"> Implementation of Emergency Preparedness Response Plan to mitigate the impacts of flooding problems that includes i) Reporting of Incidents; ii) Investigation of incidents and iii) Prepared for availability of Stretchers, Life buoys, first aiders, first aid kits etc. 	Contractor	<ul style="list-style-type: none"> Clear Signage Board for Chemical Storage and Material Storage Area Investigation Reports Emergency Preparedness Response Plan Contractor's Materials Log Book 	Monthly Basis
Traffic Congestion	Interference in the daily activities of people	<ul style="list-style-type: none"> The excavated trench should be backfilled promptly. 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"> Site Visit and Photographs of Sites Traffic Management Plan 	Daily Basis
Public Protests	Interruption of Smooth Traffic Flow along the proposed drainage line area	<ul style="list-style-type: none"> Public Consultation should be carried out at various stages & locations as per requirement. Implement Grievance Redress Mechanism Pre-notify the public regarding the construction works that may hinder their daily activities and Coordinate with them properly 	DSMC, PMO & Contractor	<ul style="list-style-type: none"> Minutes of Public Consultations. Pre notification through formal written notice or verbal (Miking) 	Prior to the Construction
Local Vendor's Business	Discomfort to the customers to get access to the shops	<ul style="list-style-type: none"> Adopt "zero soil" approach through prompt backfilling right after completion of drain construction. In general, execution of excavation works is such that excavation will be done in a few meters length i.e., 50m at 	Contractor	Field Visits and Contractor's Work Schedule	Weekly Basis

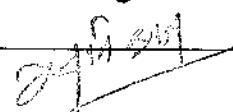
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Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		<p>a time followed by pipe laying, backfilling over the pipe and removal of all surplus material from the site.</p> <ul style="list-style-type: none"> 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 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 of 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. Avoid construction works during monsoons After every flooding events, the contractor must conduct engineering investigation of built structures and implement the necessary corrective actions immediately 	<p>Contractor</p> <p>Contractor</p> <p>Contractor & PMO</p>	<p>Photographs</p> <p>Written Notice or Miking</p> <p>Citizenship Certificate of the workers</p> <p>Contract Document</p>	<p>Weekly Basis</p> <p>Prior to the construction</p> <p>Prior to Construction</p> <p>During award of contract</p>
Deployment of Child Labor	Deprivation of Children's right to education, health, safety and moral development is deprived		Contractor & PMO		
Sustainability of Works	Damage to unsettled/unfinished/uncured and/or completed structures and affecting their structural integrity by anticipated flooding risks.		Contractor	Monthly Progress Report and Contractor's Log Book	Construction Phase
Existing Facilities	Damage to the existing road pavement creating discomfort to the people		Contractor, DSMC	Bid Document & BoQ	During Construction Phase on Daily Basis
			Contractor & PMO	<ul style="list-style-type: none"> Approval Letter from DoR Photographs Contractor's Work Schedule 	Right after the construction

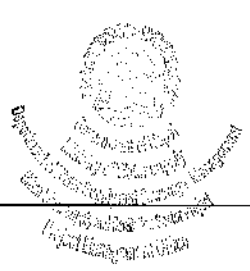


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Field	Impacts	Mitigations /Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
(c) Operation Phase					
Pollution in Newly Constructed Storm Water Drains	Possibility of Discharge of wastewater and solid waste disposal by the locals	<ul style="list-style-type: none"> Regular monitoring of the constructed drains to prevent entry of wastewater into the drains by enforcing strict regulations. Conduct yearly dry season water quality test at U/S and D/S of storm water drainage outfalls Regular monitoring of the constructed drains to prevent entry of wastewater into the drains by enforcing strict regulations Conduct yearly dry season water quality test at U/S and D/S of storm water drainage outfalls 	O & M Team of Local Authority/Mirchaiya Municipality	Site Visit <ul style="list-style-type: none"> Water Quality Test Reports Photographs Number of Complaints received if any 	Weekly Basis Yearly Basis
Blocking & Chocking of Drains	Illegal entry of wastewater from the building as well as the possibility of disposal of waste materials by people	<ul style="list-style-type: none"> Regular Cleansing and Desilting of Drains Provision of Adequate Human Resources for regular maintenance Establish a functional and efficient drain monitoring and cleaning management system with sufficient annual budget allocation and assignment of human resources. 	O & M Team of Local Authority/Mirchaiya Municipality O & M Team of Local Authority/Mirchaiya Municipality O & M Team of Local Authority/Mirchaiya Municipality	<ul style="list-style-type: none"> Water Quality Test Reports Photographs Work Schedule of O & M Team Log Book of O & M Team 	Yearly Basis Monthly Basis during operation Monthly Basis during operation
Impact on Recipient Water Bodies	Chance of pollution in the Recipient Water Bodies	<ul style="list-style-type: none"> Regular monitoring of the constructed drains to prevent such kind of pollution Conduct yearly dry season water quality test at U/S and D/S of storm water drainage outfalls 	O & M Team of Local Authority/Mirchaiya Municipality O & M Team of Local Authority/Mirchaiya Municipality	Drain Monitoring Plan with estimated budget Monitoring Reports <ul style="list-style-type: none"> Water Quality Test Reports Photographs 	Prior to the start of the operation stage Monthly Basis Yearly Basis
Non-Sustainability of Services or	Disruption in water supply service by sudden seismic events or climate change	<ul style="list-style-type: none"> O & M Team should conduct engineering investigations of completed works and implement the necessary corrective actions 	O & M Team of Local Authority/Mirchaiya Municipality	<ul style="list-style-type: none"> Investigation Report Emergency Preparedness & 	<ul style="list-style-type: none"> Immediate after any flash flood events


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Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
Completed Works	droughts	without delay if any such events occur. 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"> Strengthening Institutional Capacity and Policy Compliance through various project related capacity building programs Regular O & M with effectiveness under the management of Municipality 	O & M Team of Local Authority/Mirchaitiya Municipality	Response Plan <ul style="list-style-type: none"> Photographs of capacity building programs Minutes of such programs Monitoring Report 	Right after the completion of project construction period and During initial stage of operation phase Right after the completion of project construction 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 & Municipality	<ul style="list-style-type: none"> Contractors Log Book Number of local labors 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 & Municipality	<ul style="list-style-type: none"> Contractors Log Book Hands on training Photographs 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 	DSMC, Contractor & Municipality	<ul style="list-style-type: none"> Contractors Materials Log Book Monitoring report 	During Project Construction



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Field	Impacts	Mitigations/Enhancement Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
b) Operation Phase					
Health & Hygiene	Improved health & hygiene	<ul style="list-style-type: none"> Regular maintenance of the drainage components should be done so that the project operates smoothly and the benefits are intact 	Municipality	<ul style="list-style-type: none"> Photographs Number of complaints received, if any Monitoring reports 	During O & M
Social Comfort	Improvement on Surface Water Flooding and Ponding	<ul style="list-style-type: none"> Regular supervision to avoid clogging of drains and regular cleaning of the proposed drains 	Local Authority/Municipality	<ul style="list-style-type: none"> Photographs Number of complaints received, if any Records of flooding or pondage events, if any Monitoring Reports 	O & M phase
Aesthetic Beauty	Increased Urban Aesthetic Value	<ul style="list-style-type: none"> Regular cleaning of the drainage components to avoid the choking problems of the proposed drains and to make the benefits intact. 	Local Authority/Municipality	<ul style="list-style-type: none"> Photographs Number of complaints received, if any 	O & M phase
Economy	Increased Land Value	<ul style="list-style-type: none"> Ensuring regular maintenance of the drainage components Promoting urbanization through proper land development activities in the area 	Local Authority/Municipality	<ul style="list-style-type: none"> Monitoring Reports 	O & M phase

Source: IEE Field Study 2018/019

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11.4 Environmental Monitoring Program

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

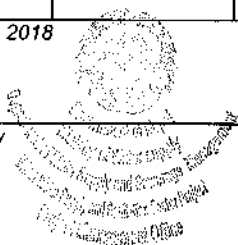
- (i) Monitoring development of project performance indicators by the PMO-ESS;
- (ii) Monitoring implementation of mitigation measures by the Contractor; and
- (iii) Overall regulatory monitoring of environmental issues by the PMO.

340. 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 11-II** presents the indicative environmental monitoring plan for the project which includes relevant environmental parameters, with a description of the sampling stations, frequency of monitoring, applicable standards, and responsible agencies.

Table 11-II: Environmental Monitoring Plan

S.No.	Field	Stage	Parameters	Location	Frequency	Standards	Responsibility
1.	Air quality	<ul style="list-style-type: none"> • Prior to construction to establish baseline • Construction phase 	PM10 SO2 NOx	<ul style="list-style-type: none"> • Work site 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 monsoon) 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 monsoon) 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 	Municipality

Source: IEE Study, 2018



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11.5 Institutional Capacity Development Program

341. Considering the limited capability of the Project's key players in environmental management, technical assistance from environmental specialists and capacity development during loan implementation will be needed. Capacity development will consist of hands-on training in implementing the responsibilities in EMP (as well as in EARF) implementation, complemented with a short-term series of lectures or seminars.
342. The DRTAC-ESS will be responsible for environmental awareness training and management by both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. Typical modules would be as follows: (i) sensitization; (ii) introduction to the environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness programs and orientation program for the workers before deployment to work sites. The proposed training program along with the frequency of sessions under which orientation program has been included is presented in *Table 11-III*.

Table 11-III: Training Program for Environmental Management

Items	Pre-construction/prior to construction	Construction	
Training Title	Orientation workshop	Orientation program/ workshop for contractors and supervisory staff	Experiences and best practices sharing
Purpose	To make the participants aware of the environmental safeguard requirements of ADB and GON and how the project will meet these requirements	To build the capacity of the staff for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and GON	To share the experiences and best practices aimed at learning lessons and improving implementation of EMP
Contents	Module 1: Orientation <ul style="list-style-type: none"> • ADB Safeguards Policy Statement • Government of Nepal Environmental Laws and Regulations Module 2: Environmental Assessment Process <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	PMO ICGs	PMO ICGs

Items	Pre-construction/prior to construction	Construction	
	(technical and environmental) involved in the project implementation	Contractors	Contractors

Source: IEE Study, 2018

11.6 Staffing Requirement and Budget

343. Staffing requirement will include the: (i) deputizing a DWSSM or PMO staff as the PMO environmental safeguards officer; (ii) deputizing WSSDO staff as RPMOS environmental engineers in each subproject town; (iii) engagement of a PMO-environmental safeguards specialist to provide technical assistance and guidance to the PMO and partly to the RPMOS and capacity development/training; and (iv) a DSMC environmental safeguards specialist to conduct the IEEs and prepare the IEE reports according to the provisions of this EARF.
344. The costs required for implementing the EMP will cover the following activities:
- (i) Updating IEE, preparing and submitting reports and public consultation and disclosure;
 - (ii) Application for environmental clearances; and
 - (iii) Implementation of EMP, environmental monitoring program and long-term surveys.
345. Environmental monitoring during construction will also be straightforward and will involve periodic site observations and interviews with workers and others, plus checks of reports and other documents. This will be conducted by PMO-ESS assisted by the PMO environmental safeguard officer. Therefore, no separate budget is required for the PMO-ESS.
346. The cost of mitigation measures and surveys during construction stage will be incorporated into the contractor's costs, which will be binding on him for implementation. The surveys will be conducted by the contractors.
347. The operation phase for mitigation measures are good operating practices to mitigate the environmental impacts of this phase & the responsibility remains to the municipality. All monitoring during the operation and maintenance phase will be conducted by the municipality.
348. The indicative costs of EMP implementation are shown in **Tables 11-IV**.

Table 11-IV: Indicative Costs of EMP Implementation

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
A.	Local Level Monitoring Measures	
a)	Air quality Monitoring	50,000.00
b)	Noise levels Monitoring	10,000.00
c)	Water Quality Monitoring	10,000.00
B.	Mitigation Measures	
a)	Impacts on Physical Environment	
I.	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	10,000.00
iii.	Air Pollution	
	Excavation Segmentation Plan	No additional cost required

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
	Watering of dry exposed surfaces and stockpiles of aggregates at least twice daily	20,000.00
	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	75,000.00
vi.	Accidental Leakage or Spillage of Stored Fuel/Chemicals	15,000.00
vii.	Impact on Land Use Pattern	No additional cost required
viii.	Haphazard Disposal of Dismantled Debris	
ix.	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	10,000.00
	Others as mentioned in Sub Section 8.1.2.1 a)	No additional cost required
ii.	Impacts on Aquatic Life	
	Strict Monitoring on the daily activities of workers	No additional cost required
	Provision of temporary but well-equipped toilets at worker's camp	35,000.00
	Restriction to workers from fishing	No additional cost required
	Solid Waste Management	No additional cost required as it has already been mentioned above in v.
II.	Operation Phase	
i.	Impacts on Aquatic Life	
	Strict monitoring to the operators involved to discourage direct discharge of waste water and solid waste to the proposed drains	No additional cost required; it will be managed by the municipality itself
	Regular monitoring of the constructed drains to prevent entry of wastewater into the drains by enforcing strict regulations.	No additional cost required; it will be managed by the municipality itself
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	25,000.00
	Shielding temporary storage areas with sandbags	No Additional Cost Required
	Solid Waste Management	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 behavior of workers for the waste management as well as sanitation behavior and monitoring the workers to manage the wastes properly	No Additional Cost Required
	Conduct water quality test of Bataha & Jiwa Khola once a year in dry season by the contractor	It is covered under local level monitoring measures
II.	Operation Phase	
i.	Impacts on Water Quality of River used as Outfall	
	Regular cleaning of drains	No Additional Cost Required; it will be managed by the municipality itself
	Regular Monitoring on the sanitation behavior of the locals.	No Additional Cost Required; it will be managed by the municipality itself
	Conduct water quality test of Bataha & Jiwa Khola once a year in dry season by the O & M entity	It is covered under local level monitoring measures

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
d)	Impacts on Socioeconomic Environment	
I.	Design Phase	
i.	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
ii.	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	10,000.00
	Contractor's preparedness in emergency response	55,000.00
	Adequate dissemination of GRM and Contractor's observance/implementation of GRM	No additional cost required
ii.	Worker's Health & Safety Hazards	
	Provision of PPE to workers	50,000.00
	Other Mitigation measures	No Additional Cost Required
iii.	Traffic Hindrance	No Additional Cost Required
iv.	Public Protests	
	Public Consultation	No Additional Cost Required
	Implementation of GRM	No Additional Cost Required
iv.	Disruption to Local Vendor's Business	
	Prompt Backfilling	No Additional Cost Required
	Provision of Planks to provide access to shops & homes	25,000.00
	Pre-notifying the vendors regarding the construction works	No Additional Cost Required
v.	Mobilization of Child Labor	No Additional Cost Required
vi.	Impact on Sustainability of Works	
	Engineering Investigations after any flash flood event, if any	50,000.00
	Emergency Preparedness Response	No additional cost required
vii.	Damage to the existing facilities	
	Rehabilitation & Restoration Works	No Additional Cost Required
	Promote greening of the length of the road	No Additional Cost Required. Its cost will be separately included using items not covered by BoQ
III.	Operation Phase	
i.	Pollution in Newly Constructed Storm Water Drains	
	Regular monitoring of the constructed drains to prevent entry of wastewater into the drains by enforcing strict regulations.	No additional cost required; it will be managed by the municipality itself
	Conduct yearly dry season water quality test at U/S and D/S of storm water drainage outfalls	No additional cost required; it is covered under local level monitoring measures
ii.	Blocking/Chocking of Drains	No additional cost required; it will be managed by the municipality itself
iii.	Impact on Recipient Water Bodies	No additional cost required; it will be managed by the municipality itself
iv.	Non-sustainability of Services or Completed works	
	Engineering Investigations after every seismic event if any	No additional cost required; it will be managed by the municipality itself
	Preparation of Emergency Response Plan and Immediate implementation of this plan after any seismic event	50,000.00
	Strengthening Institutional Capacity and Policy Compliance through various project related capacity	No additional cost required; it will be managed by the municipality itself

S. No.	Local Level Monitoring & Mitigation Measures	Mitigation & Monitoring Costs
	building programs	
	Regular O & M with effectiveness under the management of the municipality.	No additional cost required; it will be managed by the municipality itself
Total Cost of Local Level Monitoring & Mitigation Measures		500,000.00

Source: IEE Study, 2018

349. The provisional amount of NRs. 500,000.00 has been provided to execute all necessary environmental mitigation measures.

11.7 Implementation Schedule

350. Environmental management will be implemented from the detailed design phase through to procurement, construction and operation. *Table 11-V & 11-VI* presents the indicative time frame of key EMP activities in relation to project implementation schedule & Proposed topics for Capacity Building/Training respectively.

Table 11-V: Environmental Management Implementation Schedule

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

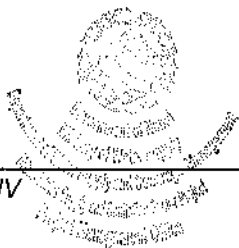
Activity	Indicative Time Frame
Quarterly, by Operator or (if applicable) by Licensed Laboratory	3 rd day of the month following the effective quarter

Source: IEE Study, 2018

Table 11-VI: Proposed Topics for Capacity Building/Training

Topic		Target Participants	Timing
1.	By Environmental Specialists		
1.1	Legal Framework	DWSSM, PMO, WSSDO, ICG,	Early stage of Output 2
	▪ Relevant national laws, regulations & standards on EA & management		
	▪ 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, WSSDO, ICG,	Early stage of Output 2
	▪ Institution arrangements & responsibilities		
	▪ Environmental quality monitoring	RMSO, WUSC,	
	▪ Emergency response	(15-18)	
1.5	EMP Implementation, part 2		
	▪ Performance monitoring & indicators		
	▪ Environmental monitoring report		
2.	By External Experts		
2.1	Other topics, such as:	MoWS, DWSSM, PMO, ICG,	During Project's
	A Good engineering and construction practices as mitigation measures		
	B Climate change adaptation (applicable to eligible activities/works under the Project)	WSSDO, RMSO, DSMC (30)	Capacity Devt. Program
	B.1 Climate change impacts on infrastructure		
	B.2 Climate-proofing of infrastructure		
	C Strategic environmental assessment of WSS sector policy, development plans, and programs		
	D Other topics that may be suggested by MoWS, DWSSM, PMO, ICG & WSSDO		

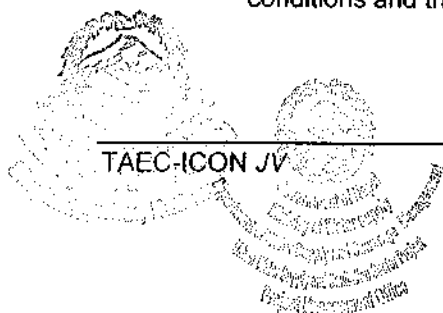
Source: IEE Study, 2018



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12. MONITORING AND REPORTING

351. RPMO is the main monitoring agency of the proposed project that will monitor and measure the progress of EMP implementation with assistance from DMSC. The monitoring activities will correspond with the project's risks and impacts, and will be identified in the IEEs for the subprojects. In addition to recording information on the work and deviation of work components from original scope, PMO, RPMOs & DSMC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. Along with this, Ministry of Water Supply (MoWS) as well as Ministry of Forests & Environment (MoFE) under Government of Nepal will also undertake monitoring process through random field visits to review the project performance.
352. RPMO will submit amonthly monitoring and implementation reports to PMO, who will take follow-up actions, if necessary. The PMO will submit semi-annual monitoring reports to ADB. The suggested monitoring report format is in *Annex 2F*. Subproject budgets will reflect the costs of monitoring and reporting requirements. For projects likely to have significant adverse environmental impacts during operation, reporting will continue on the annual basis. Monitoring reports will be posted in a location accessible to the public.
353. For subprojects likely to have significant adverse environmental impacts, the PMO will retain external experts to verify its monitoring information. PMO-ESS will document monitoring results, identify the necessary corrective actions, reflect them in a corrective action plan, and for each quarter, will study the compliance with the action plan developed in the previous quarter. Compliance with loan covenants will be screened by the PMO-ESO, with support from the PMO-ESS.
354. Strict monitoring is required during operation phase so that the domestic wastewater does not get mixed with the collected storm water. It must be noted that the proposed drain is solely for the storm water only. No entry of domestic waste water is allowed into the proposed drain.
355. ADB review the project performance against the MoWS's commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities is proportionate 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 monitor projects on an ongoing basis until a project completion report is issued. ADB 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 EAs to ensure that adverse impacts and risks are mitigated, as planned and as agreed with ADB;
 - (iv) Work with EAs to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies to re-establish compliance as appropriate; and
 - (v) Prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.



13. CONCLUSION

357. The IEE indicates that:

- The proposed project, its components, are not within or adjacent to environmentally sensitive areas.
- The proposed project will reduce the increased risk of flooding during monsoons due to lack of proper storm water drainage system.
- The proposed project will bring about: (i) the benefits of easy access to rivers for storm water runoff reducing risks of flooding and loss of lives & private property; (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 11**, 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 11-1** 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.
- Regular monitoring with good operation & maintenance service including prompt action on damage of the constructed drains if any; will lessen the risks of the ineffective implementation of the proposed project and will sustain the system.
- None of the anticipated environmental impacts of the proposed project 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 Mirchaiya Storm Water Drainage Project.
- The IEE study shows that project benefits outweigh the risks and these potential risks can be overcome through proper planning and management.

358. Based on the above findings, the classification of the Mirchaiya Storm Water Drainage Project as "Category B" is confirmed, no further special study or detailed EIA needs to be undertaken and people of Mirchaiya Municipality will get rid of flooding problems during monsoons that they have been experiencing for decades.

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<https://www.cbd.int/>

www.mofald.gov.np





ANNEXES

Annex-1
Approved Terms of References (ToR)



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Engineer



पत्र संख्या:- ०६६/७७
चलानी नं.:- १४०

खानेपानी मन्त्रालय



फोन नं. : ४२११६९३
फ्याक्स : २७७-१-४२११६३३
सिंहदरवार,
काठमाडौं, नेपाल ।
मिति: २०७६।०८।१६

मिति: २०७६।०८।१६

श्री आयोजना व्यवस्थापन कार्यालय,
सहरी खानेपानी तथा सरसफाइ (क्षेत्रगत)आयोजना, पानीपोखरी ।

विषय: प्रारम्भिक वातावरणीय परीक्षण (IEE) को कार्यसूची (TOR) स्वीकृति सम्बन्धमा ।

प्रस्तुत विषयमा तहो विभागबाट स्वीकृतीको लागि पेश भै आएको देहायको आयोजनाको प्रारम्भिक वातावरणीय परीक्षण (IEE) को कार्यसूची नेपाल सरकार (सचिवस्तर) को मिति २०७६/०८/१६ को निर्णयानुसार प्राप्त कार्य सूचीमा उल्लेख गरिएका Issue/Impact का अलावा प्रतिवेदन तयारीका समयमा अन्य Issue/Impact देखा परेमा सो पनि समावेश गर्नुपर्ने शर्तमा प्राप्त कार्यसूची वातावरण संरक्षण नियमावली २०५४ को नियम ५ बमोजिम स्वीकृत भएको व्यहोरा आदेशानुसार अनुरोध छ ।

आयोजना:

१ मिर्चिया सिरहा स्टर्म वाटर ड्रेनेज आयोजना, सिरहा ।

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

बोधार्थ :

श्री खानेपानी तथा ढल व्यवस्थापन विभाग,
पानीपोखरी ।



अञ्जना महर्जन
इन्जिनियर




Engineer

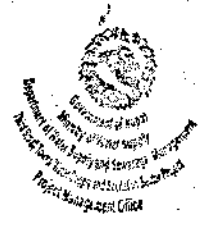


Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Supply and Sanitation (Sector) Project
PROJECT MANAGEMENT OFFICE
Panipokhari, Kathmandu

TERMS OF REFERENCE (ToR)
 for
INITIAL ENVIRONMENTAL EXAMINATION
 of
MIRCHAIYA STORM WATER DRAINAGE SUB-PROJECT
SIRAHA DISTRICT

Submitted by	Submitted to
<i>Project Management Office, Urban Water Supply and Sanitation (Sector) Project, Department of Water Supply and Sewerage Management, Panipokhari, Kathmandu</i>	<i>Ministry of Water Supply, Singhadurbar, Kathmandu</i>
Prepared by: TAEC Consult P. Ltd. – Integrated Consultants Nepal (P) Ltd. JV	

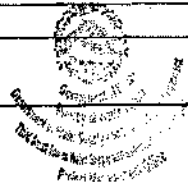
July 2019



List of Abbreviations

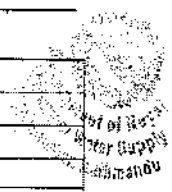
A.D.	Anno Domini
ADB	Asian Development Bank
AM	Accountability Mechanism
B.S.	Bikram Sambat
CA	Catchment Area
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CBS	Central Bureau of Statistics
CI	Cast Iron
CITES	Convention on International Trade in Endangered Species
CRO	Complaint Receiving Officer
DCC	District Coordination Committee
DEDR	Detailed Engineering Design Report
DEWATS	Decentralized Wastewater Treatment System
DRTAC	Design Review & Technical Audit Consultant
D/S	Downstream
DSMC	Design Supervision and Management Consultant
DWSSM	Department of Water Supply & Sewerage Management
EA	Executing Agency
EARF	Environmental Assessment Review Framework
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EPR	Environmental Protection Rules
etc	Et cetera
ESA	Environmental Safeguards Assistant
ESE	Environmental Safeguards Expert
E-W	East-West
FGD	Focus Group Discussion
GoN	Government of Nepal
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HH	Household
IA	Implementing Agency
IBAT	Integrated Biodiversity Assessment Tool
IEE	Initial Environmental Examination
IN	Indirect
IO	International Organization
IUCN	International Union for Conservation of Nature
KTM	Kathmandu
LT	Long Term
MoWS	Ministry of Water Supply
MS	Mild Steel

Ministry of Nepal
Water Supply
Kathmandu



ToR for IEE of Mirchaiya Storm Water Drainage Sub Project

MT	Medium Term
NCS	Nepal Conservation Strategy
NEA	Nepal Electricity Authority
NGO	Non-Governmental Organization
NRs.	Nepalese Rupees
O&M	Operation & Maintenance
ODF	Open Defecation Free
PE	Polyethylene
PMO	Project Management Office
PN	Pressure Nominal
PPP	Public Private Partnership
RCC	Reinforced Cement Concrete
RDSMC	Regional Design Supervision & Management Consultant
REA	Rapid Environmental Assessment
RPMO	Regional Project Management Office
SPS	Safeguard Policy Statement
SS	Site Specific
SSTWSSSP	Second Small Towns Water Supply and Sanitation Sector Project
ST	Short Term
STWSSSP	Small Towns' Water Supply & Sanitation Sector Project
TDF	Town Development Fund
ToR	Terms of Reference
UWSSSP	Urban Towns' Water Supply & Sanitation (Sector) Project
VDC	Village Development Committee
WN	Ward Number
WSSDO	Water Supply and Sanitation Division Office
WSSP	Water Supply & Sanitation Project
WUSC	Water Supply User's & Sanitation Committee



2/24



WEIGHTS AND MEASURES

°C	Degree Celsius/Centigrade
%	Percentage
cumec	cubic meter per second
ha	hectare
km	Kilometer
km ²	Square Kilometer
m	meter
m ³	Cubic Meter
mm	millimeter
nos	numbers



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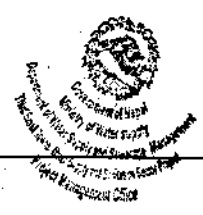


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1. INTRODUCTION

1.1 NAME AND ADDRESS OF THE PROPOENT

This Terms of Reference (ToR) has been prepared with reference to the Detailed Design Report of Mirchaiya Storm Water Drainage Sub Project, to outline the basic structure of IEE for the proposed project. TOR for the IEE study of this project is required as a reference to EPR 1997 (amendments 2007 & 2017).

Urban Water Supply and Sanitation (Sector) Project (UWSSSP) of the Government of Nepal, The Department of Water Supply and Sewerage Management (DWSSM) is the proponent (implementing agency). The Ministry of Water Supply (MoWS) is the executive agency.

Name of the Proponent:

Project Management Office

Urban Water Supply and Sanitation (Sector) Project

Department of Water Supply and Sewerage Management

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Name of the Approval Agency:

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Government of Nepal

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2. BACKGROUND AND DESCRIPTION OF THE PROJECT

2.1 Project Background

Prior to three projects (STWSSSP), (2ndSTWSSSP) & TSTWSSSP, currently, ADB and GoN are working together to provide water supply and sanitation services to selected urban municipalities of Nepal through Urban Water Supply Sanitation (Sector) Project (UWSSSP) in accordance with the updated 15-year Development Plan for Small Towns and the National Urban Development Strategy. The Project will support Nepal in expanding access to community managed water supply & sanitation facilities 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 Infrastructures in Project Municipalities and ii) Strengthened Institutional and Community Capacities.

Department of Water Supply and Sewerage Management (DWSSM) is the implementing agency whereas the Ministry of Water Supply is the executing agency. The project will assist in implementing a part of the 15-year Development Plan for Small Towns Water Supply and Sanitation Development in the country and about 20 Small Towns will be covered by this project.

In this context, the Eastern Regional Design Supervision and Management Consultants (ERDSMC), joint venture of TAEC Consult P. Ltd. and Integrated Consultants Nepal (P) Ltd. has been assigned to provide services on detailed design of seven towns namely; Birendranagar (Chitwan), Katakariya (Rautahat), Lalbandi (Sarlahi), Katari (Udaipur), Diktel (Khotang), Bhojpur Bazaar (Bhojpur) and Charikot (Dolakha) Town Projects. In addition, Ilam (Ilam), Brihat Bhanu (Tanahun), Sunkoshi Panchkhal (Kavre), Kanchanrup (Saptari), Rampurta (Okhaldhunga) and Deurali Hopse (Nawalpur) are assigned for the preparation of DEDR report.

The project has many stakeholders such as the WUSC, Project Management Office/ DWSSM, DRTAC, Town Development Fund (TDF), Regional Design Supervision and Management Consultants (RDSMCs) and Regional Project



2





Management Office (RPMO). There is a need for effective co-ordination among the various stakeholders. In this context, the consulting team especially the major members of the Consultants' Team including the Team Leader, socio-economist and design engineer responsible for detailed design has been responsible for maintaining co-ordination with all the stakeholders involved in the project.

Both the GoN and ADB policies require that the environmental implications of individual developments needs to be 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.

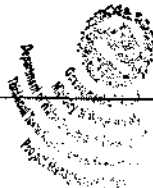
UWSSSP consists of many individual water supply town projects, storm water drainage projects and DEWATS projects which will be implemented under ADB Loan 3711-NEP. Among them, Mirchaiya Storm Water Drainage Sub Project is one of the potential projects.

2.2 Relevancy of the Project

According to 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, 2007 & 2017) and as per ADB Safeguard Policy Statement (SPS), 2009. The regulation stated in Annex 1 (H) of EPR, 1997 with amendments in 2017 shall only be applicable for this project which states that "Operation of a drinking water supply system with inclusion of sewerage drainage system with treatment system".

The proposed storm water drainage project is intended to cover the alignment along the Mahendra Highway & Mirchaiya-Katari Road that falls under wards 4, 5, 6, 7 & 8 of Mirchaiya Municipality, Siraha District. It is expected that after the implementation of this project, the users of the area will have proper drainage facility and the flooding problems during monsoons may be minimized.

The project needs to go through the IEE process as stipulated in Draft EARF prepared by MoWS (GoN) for ADB that has been prepared in accordance with ADB SPS, 2009 and GoN's EPA (1997) and EPR 1997 (Amendments 1999, 2007 & 2017). The Project does not involve the relocation and resettlement of people or





households. The project is expected to benefit a design population of about 43,161 (2035).

2.3 Objective of TOR

The main objective of the TOR is to guide the subsequent IEE study and to produce a comprehensive and coherent IEE Report. It also ensures that the resulting IEE study will fulfill the environmental assessment requirements of the project. It means that ToR shall ensure that IEE is sufficient for the proposed project.

The specific objectives of ToR include;

- Delineates the scope of IEE study
- Serves as a standard document against which the subject matter covered by the IEE report will be evaluated.
- Describes the existing environment of the proposed project town
- Delineates the specific project activities to be undertaken.
- Identifies the existing policies, plans, strategy, rules, acts and various legal frameworks related to the proposed project
- Sets out time frame, with the required human resources to carry out IEE study along with the required estimated budget
- Identifies and List out the anticipated environmental impacts that can be either adverse or beneficial
- Emphasizes the most significant aspects of the study

2.4 Objective of the IEE study

The specific objectives of the proposed IEE study include:

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



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Description of the Project

Location and Accessibility of the Project Area

The Project area of Mirchaiya Storm Water Drainage Sub Project lies in Mirchaiya Municipality, Siraha District, a terai district in the Province 2 of Nepal. The municipality lies between 26°84' to 26°86' N Latitude and 86°25' to 86°30' E Longitude. It is situated in the northern part of the District having about 3 km east-west width and about 10 km north-south length.

This **figure 1** below shows that the project area belongs to Mirchaiya Municipality of Siraha District of Province 2 of Nepal. The project town is bounded by Triyuga Municipality of Udaypur District in the north, Golbazaar Municipality in the east, Kalyanpur Municipality & Naraha Rural Municipality in the south and Karjanha Municipality in the West.



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ToR for IEE of Mirchajya Storm Water Drainage Sub Project

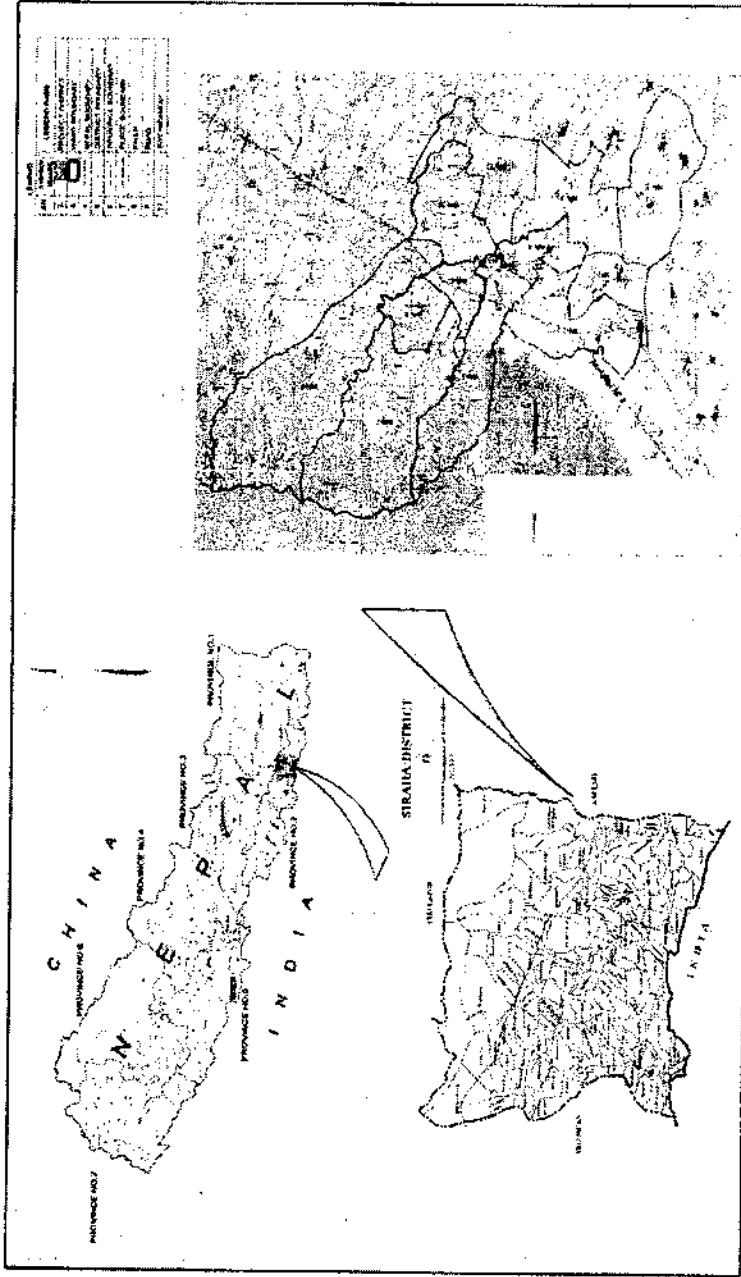


Figure 1: Project Location Map



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The project town was declared as Municipality by the Government of Nepal, Ministry of Federal Affairs and General Development from Council of Ministers on 2017 by merging the existing Mirchaiya Municipality and Sikron Rural Municipality. The municipality is divided into 12 wards covering 91.97 km². At the time of 2017 Municipality records, it has a population of approximately 50,079 people living in approximately 8,496 individual households.

Table 1: Mirchaiya Municipality Ward Profile

Former VDC/Municipality	Former Ward No.	Wards of Reformed Mirchaiya Municipality	Wards of Service Areas
Former Mirchaiya Municipality	WN 1	1	
Former Mirchaiya Municipality	WN 2	2	
Former Mirchaiya Municipality	WN 3	3	
Former Mirchaiya Municipality	WN 4	4	Partial Areas of Wards 4, 5, 6, 7 & 8
Former Mirchaiya Municipality	WN 5	5	
Former Mirchaiya Municipality	WN 6	6	
Former Mirchaiya Municipality	WN 7	7	
Former Mirchaiya Municipality	WN 8	8	
Former Mirchaiya Municipality	WN 9	9	
Former Mirchaiya Municipality	WN 10	10	
Former Mirchaiya Municipality	WN 11	11	
Sikron VDC	WN 1 to 9	12	

Source: DEDR, 2019

The above *Table 1* shows that the reformed Mirchaiya municipality has been divided into 12 wards. The wards 1 to 11 of reformed Mirchaiya Municipality belong to wards 1 to 11 of former Mirchaiya Municipality. Similarly, the ward 12 of current Mirchaiya Municipality belong to wards 1 to 9 of former Sikron VDC. Out of 12 wards of the project town, the proposed project covers only partial areas of wards 4, 5, 6, 7 & 8 along the alignment of Mahendra Highway & Mirchaiya Katari Road.

The project town is just 23 km away from the district headquarter, Siraha Municipality. Similarly, the major junction and booming market place of the project area along the Mahendra Highway, is located on all-weather black topped road that is about 29 kilometers from Lahan Municipality.

7

Ramnagar Mirchaiya Bazaar lies on the junction of the Mahendra Highway (E-W Highway) and Sagarmatha Highway. As the project area is linked with National Highway, day and night bus services are easily available. The nearest airport is the Janakpur Airport, where daily flights from Kathmandu are being operated.

The climate of the project area is sub-tropical climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of 1442mm. The maximum temperature averages 36°C and the minimum 17°C.

The project town is one of the main business markets for Katari Municipality and the southern part of Siraha district. Mirchaiya is considered as a trade and economic center of Sagarmatha zone and some parts of Udayapur district after Lahan.

The salient features of the project area are briefly included in the table given below.

Table 2: Salient Features of the Project

S.N.	Items	Description	
1	Name of Project	Mirchaiya Storm Water Drainage Project	
2	Type	Storm Drainage	
3	Study Level	Detailed Engineering Design	
4	Location Area		
	District	Siraha	
	Rural Municipality/Municipality	Mirchaiya Municipality	
	Service Area	Wards : 4, 5, 6, 7, & 8	
	Province No.	2	
5	Available Facilities		
	Road	East-West Highway	
	Water Supply System	Existence of DWSSM/WUSC, Provision of Hand pumps and Completion of Mirchaiya WSSP under TSTWSSP	
	Drainage	Few location	
	Electricity	Available	
	Communication	Available	
	Health Services	Available	
	Banking Facilities	Available	
6	Type of Structures	Phase-1	Phase-2
	Headwall (nos)	2 nos	
	Circular pipe drain (NP-3), (m)	6,611.44	2,380.84
	Rectangular drain (m)	2,573.35	8,710.69
	Total Drain length(m)	9,184.79	11091.53
	Circular Manhole (nos)	118	58
	Rainwater inlet box (no)	30	20
	Gabion outfall (nos)	3	4
7	Social Status (Based on Mirchaiya Water Supply Project)		
	Present Population (2014)	25,497	
	Base Year Population (2016)	25,736	

S.N.	Items	Description	
	Design Year Population (2035)	43,161	
	Weighted Growth Rate %	2.4	
8	Environment		
	ADB Category	B, Only IEE necessary	
	IEE finding	No significant adverse impact.	
9	Project Cost of Sanitation Component (NRs)	532,312,506.14	455,973,270.30
	GON Contribution (85 %)	462,465,630.22	387,577,279.76
	Local Authority / Users' (15 %)	79,846,875.92	68,395,990.55

Source: DEDR, Mirchaiya Storm Water Drainage Sub Project

The above table shows that the social status for the proposed project area is based on the Mirchaiya Water Supply Project because the catchment area of this drainage project is same as the service area of the Mirchaiya WSSP. According to the Detailed Engineering Design Report, the population of beneficiaries is also same as that of Mirchaiya WSSP.

2.5.2 Sub-project Components

The major sub-project components of this proposed project will be as follows:

a) Drains

Two types of drains that include Circular Drain & Rectangular Drain are proposed for this project based on the shape of the drain. The RCC Hume pipes of class NP-3 of sizes 600mm to 1600mm has been used where circular section is chosen. The pipes will be joined/ tightened with rubber gaskets. The minimum cover of the pipe will be 0.60m at black top road. Depending upon the road and site condition, the cover becomes high. Likewise, the rectangular section of 0.50 m to 1.45m width and 0.70m to 1.45m depth will be used including 0.3m free board. In rectangular drain, the depth of drain becomes higher than the design depth based on the ground topography. The rectangular drain has been covered either by RCC slab or MS grating for safety point of view and allows discharge to flow from ground surface. About 150-160m length close to outfall there is no manhole and drain cover. The drainage lines will follow both sides of road.

The proposed drain will be laid within the right of way of the road. It is considered that there will be 2-3m footpath on either side of highway. The drain will be laid parallel and joining to the footpath. The drain is covered with some gap either by cover slab or MS grating to flow all the water into drain and provide access to light traffic also.



b) Manholes

Circular brick masonry manholes with CI cover/ MS grating are proposed for this project, which will have provision of inner plastered surface to prevent the leakage and provide smooth flow. Depending upon the size of drainage, the manhole will have internal diameter of average (1.0-2.0) m and varying depth (2.5m to 8m). The spacing of manhole will be kept (30-50) m apart. Along with this, there will be provision of manholes at each road junction and drop. The top surface will correspond to the road ground level. If the footpath needs to be constructed in the future, the manhole height needs to be raised to the level of footpath and the flow inlet will be from side wall of the manhole.

The manhole cover will have either heavy duty CI or MS grating. Every alternate, MS grating will be provided to allow the overland flow. Likewise, 2 PE100, PN10 pipes of each 0.30 m diameter are will be provided at wall side to allow the access of the flood into drain.

c) Outfall

There are several possible outfalls available for the drainage of the storm water. In total, 7 outfalls are identified and proposed for this drainage project. For Phase 1, three outfalls have been proposed while for Phase 2, four outfalls have been proposed. Its brief details are given in Table 3. There will be provision of gabion wall over the proposed outfalls to secure the drainage at its position.

Table 3: Outfall Structures

Outfall Gabbions	Riverbed level	Pipe invert level	Foundation bottom level	Height of gabions	Phase of construction
Jiba Khola Outfall- 1 (CA-4), Upstream of E-W highway west	96.80	100.48	95.48	5.00	1
Jiba Khola Outfall -2 (CA-13), Downstream of E-W highway west	96.70	99.52	95.52	4.00	1
Bathaha Khola Outfall-3(CA-7) Upstream of E-W highway east	98.80	100.20	97.20	3.00	1
Bathaha Khola Outfall-4(CA-8), Downstream of E-W highway east	98.00	106.57	96.57	10.00	2
Bathaha Khola Outfall-5(CA-16), Downstream of E-W highway south	92.03	93.01	91.01	2	2
Bathaha Khola Outfall-6(CA-15 L), Downstream of E-W highway south	89.06	90.18	88.18	2	2
Bathaha Khola Outfall-7(CA-15 L), Downstream of E-W highway south	89.06	90.07	88.07	2	2

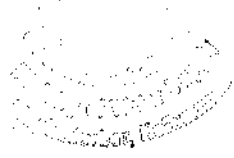
Source: DEDR, 2019



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The above given table shows that the invert level of outfall is much higher than the river bed level in the first four outfalls; this will not have backwater effect. While in last three, the outfall are about 1 m above river bed level and may have some effect or water may be back while the water level of river will rise above drain invert level. This will not have effect to the settlement due to the location of outfall. After the water level of river go down the stagnant water in the pipe/drain will flow into the river. These outfall are located at the downstream of the settlement will not affect to the public.



d) Rain Water Inlet

Brick masonry inlets are proposed which will have inside plaster to prevent the leakage. Rectangular brick masonry rain water inlet box with iron grating on top are proposed. The rainwater inlets at certain intervals will be provided for a manhole at built up areas only to allow the surface water.

2.6 Proposed Area

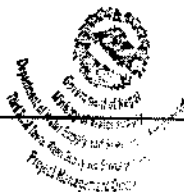
According to the detailed engineering design report, due to the availability of the budget, discussion has been made with Mirchaiya Municipality and PMO to split the area to construct the drain in phase 1 and 2. Depending upon the overland flow and risk factor, the major drain has been identified and kept in phase 1 and the remaining has been kept in phase 2. The design of both phase 1 and 2 have been carried out. The project municipality may precede for the phase 2 construction activities through the utilization of their own resources based on the design or any other possible funding sources. All designed flow of upstream of highway could not carry by phase 1 drain. Hence, the flow is diverted into another side of the road and designed the drain. Further, the flow each 1.71 cumec is diverted into CA-10 to CA16 left and right side of the road. Hence, municipality needs to give top priority to construct this drain first to overcome the problem. However, there may be some overland flow during heavy rain, if the flood comes from the upstream catchment is more than the designed flow. The wards of the project town included under both phases are given below:

Phase 1

Ward no. 4,5,6,7 & 8

Phase 2

Ward no. 4,5,6,7 & 8



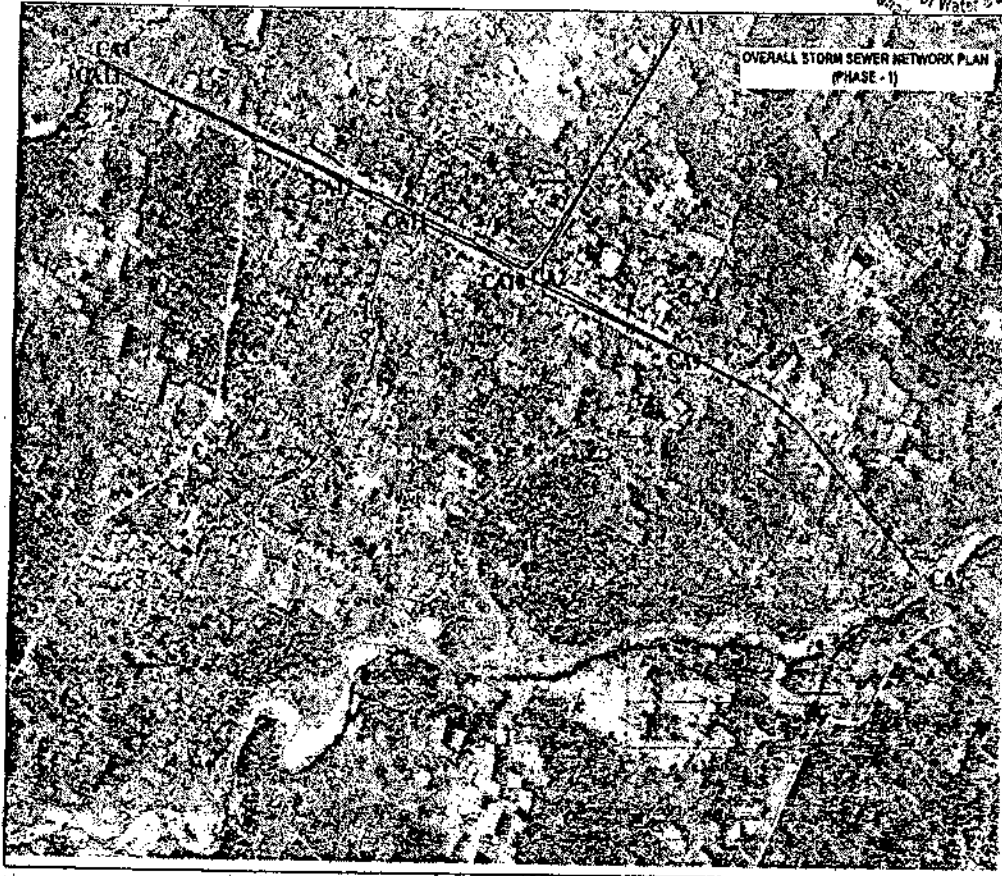


Figure 1: Overall Storm Sewer Network Plan under Phase 1





Figure 2: Overall Storm Sewer Network Plan under Phase 2

2.7 Catchment Area

The catchment area refers to the maximum area of land from which rainfall will pass into the point of consideration to determine the runoff. In this concept, the catchment has been divided into number of areas with respect to the flow consideration. Accordingly, the flow at each point has been determined to finalize the size of drain in respective stretch. Separate drainage sub system has been proposed for this project. Each sub drainage has the catchment area less than 40 ha. The catchment area for the proposed project is depicted in the figure given below:



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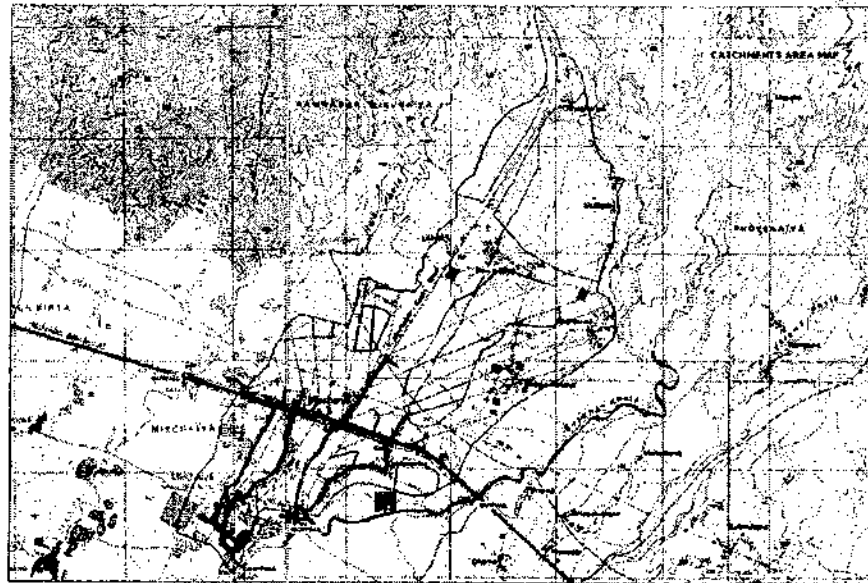


Figure 3: Catchment Area

The table given below gives brief details on the catchment areas of the proposed project.

Table 4: Catchment Area Details

Nodes	Maximum Length Travelled By Water From Farthest Point of Catchment and Converted Length, L m	Catchment area at each side pasture (Right/ Left) km ²	Catchment area at each side built up (Right/ Left) km ²
CA1-CA2			
CA1 (left/ right)	3794.19	0.88	0.58
CA1(Ch 340)(left / right)	2587.54	0.19	0.18
CA2 (left/right)	2771.38	0.12	0.19
CA2-CA7(Outfall)			
J4 at top (left/right)	2435.35	0.04	0.14
J5(Left) end bottom	202.23	0	0.03
J5(Right) end bottom	144.49	0	0
J2 at top(left and right)	2158.19	0.04	0.14
J2(Left) end bottom	219.16	0	0.04
J2(Right) end bottom	245.87	0	0.01
J1 at top(left and right)	1650.15	0.03	0.13
J1-CA6(Left) end bottom	246.74	0	0.04
J1-CA6(Right) end bottom	135.73	0	0.01
CA2-CA4(Outfall)			
J6-J7 at top(left and right)	1299.16	0.04	0.07
J6(Left) -J7 end bottom	155.74	0	0.01
J8(Right) -J7end bottom	125.99	0	0.01
J8 at top (left and right)	804.97	0.0	0.04

Government of India
 Ministry of Water Supply,
 Sanitation and Sewerage Management
 National Institute of Urban Sanitation and Sewerage Management
 Project Management Office

Nodes	Maximum Length Travelled By Water From Farthest Point of Catchment and Converted Length, L	Catchment area at each side pasture (Right/ Left)	Catchment area at each side built up (Right/ Left)
	m	km ²	km ²
J8(Left)-J9 end bottom	166.60	0	0.02
J8(Right)- J9 end bottom	124.56	0	0
J10 (left/ right)	786.42	0.03	0.05
J10(left)-J11 end bottom	180.95	0	0.01
J10(Right)-J11 end bottom	132.29	0	0
J12(left/right)	647.80	0.010	0.05
J12(Left) -CA3 end bottom	331.18	0	0.04
J12(Right) -CA3 end bottom	126.42	0	0
J13 top (left/right)	371.55	0.000	0.03
J13-J14(left) end bottom	112.91	0	0.01
J13-J14(right) end bottom		0	0
Below and at Road (Highway)			
CA9-CA13(Outfall)			
CA9-CA10(Left)	429.11	0	0.03
CA10 left	169.13	0	0.02
CA 10 - CA11 (left)	215.67	0	0.02
CA11(left)	215.67	0	0.02
CA11-CA12 left	129.86	0	0.01
CA12 left	270.24	0	0.03
CA12 - CA13 left	98.14	0	0.01
CA9-CA8(Outfall)			
CA9-CA6(Right)	275.46	0	0.02
CA6-CA8 (right)	491.28	0	0.03
CA9-CA16; CA10-CA16 (Outfall)			
CA9- CA-16right	981.53	0.04	0.11
CA9-CA16 left	1490.66	0	0.18
CA10-CA 16 right	843.95	0	0.15
CA10-CA 16 left	833.49	0.01	0.12
CA11-CA15(left Outfall)			
CA11-CA 14(Right)	1126.19	0	0.14
CA11-CA14(Left)	1000.62	0	0.1
CA14- CA15 left outfall			
CA12-CA15(right Outfall)			
CA12-CA14 left	966.30	0	0.09
CA12-CA14 right	1439.35	0	0.45
CA14- CA15 left	1039.64	0	0.23
CA14- CA15 right outfall			

Source: DEDR, 2019

2.8 Population and Demographic Characteristics

The present permanent population in the service area is 25,497. The population growth rate of the Mirchaiya Municipality of Siraha district is 2.4%.

2.9 Settlement pattern

Ramnagar Mirchaiya is part of Mirchaiya Municipality and is relatively densely populated except for some outskirts areas within ward 7 and 8, which are still growing. Most of the households in the area are pucca houses with few rural households as well. Relatively cluster settlements are found. Ramnagar Mirchaiya



is the main market place of the district, so the population pressure is naturally high.

2.10 Ethnicity and caste

The majority of caste and ethnic groups are Yadav, Teli, Sudi, Musahar, Dusadh (Paswan), Koiri, Bahun, Magar, Tamang etc in the project area. The frequently spoken language of Mirchaiya town is Maithali. However, people of this town are well educated and can speak English, Nepali, Hindi and other local language according to their ethnicity.

2.11 Education and Health

Education: There are various public and private educational institutions such as school and college, within the service area.

Health: The Health Centre exists in the municipality within the project area itself. There are private nursing homes and an Ayurvedic hospital within the Project area.

2.12 Economic Activities

The desk study shows that the project town is one of the main business market centers for Katari and the southern part of Siraha district. The main raw materials produced in this project town include Paddy, Maize and Sugarcane. Mirchaiya is also considered as a trade and economic center of Sagamatha zone and some parts of Udaypur district after Lahan. It was primarily an agrarian economy, but it has evolved as trade and industrial center. Residents of hilly and mountainous regions of Sagamatha zone are largely dependent on Mirchaiya for their supplies.

2.13 Existing Water Supply & Sanitation Situation

2.13.1 Existing Water Supply

i) Water Supply System

The existing water system is a groundwater based system with overhead tanks and intermittent supply through private household connections. There is one RCC overhead tank of 225 m³ capacity meant primarily for the market and core areas. Source of water for the existing system is groundwater boreholes, over 150 meters in depth and fitted with submersible pumps. Remaining areas are being covered by STWs, Dug wells etc.



2.13.2 Existing Sanitation Situation

i) Sanitary Facilities

The existing sanitation facilities are quite basic in the Ramnagar Mirchaiya Municipality. The literature review shows that the project town is ODF declared town. This indicates awareness on safe & hygienic sanitation behavior of the project town. However, this will be confirmed during IEE study.

ii) Drainage Facilities

There are few surface drains to drain of street run-off. The project has drainage facilities in very few areas however; they are not functioning well due to improper design, their size and its implementation. The flood flows to the settlement from Churiya hills to the service area frequently during monsoons. The E-W highway that passes perpendicularly to hill slope becomes dyke/ dam/ obstruction of overland flow. The water is collected upstream of the road. Ultimately, people are badly affected due to rain every year. They are losing their property as well as access during rain. Also, during flooding seasons, passersby and vehicle usually gets trapped for significant period.

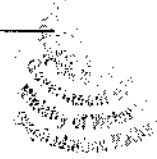
iii) Wastewater Management Practices

There is no sewerage system in the proposed service area. Almost all households in the urban areas have their own latrine with septic tanks.

iv) Solid Waste

The municipality does not have a systematic collection, conveyance, and disposal of solid waste from the town area. In fact, solid waste management is a big challenge to all established and emerging towns of Nepal. Basically, municipalities are giving preferences only for collecting the waste and dumping it. The principle of 3R (waste reduction, re-use and recycle) are not prioritized by the municipalities for effective sustainable waste management. Further, municipalities have not yet fully recognized the important stakeholders of waste management like NGOs/CBOs and private formal and informal sector, which can be involved in the planning, implementation, and monitoring for effective waste management.

Newly established Mirchaiya municipality suffers from a lack of infrastructural and technical resources to tackle the problem of waste management. CBOs, NGOs that are playing effective roles in waste reduction at source, collection, processing, and recycling should adopt public-private-partnership (PPP) model.



2.14 Description of the Environment

2.14.1 Landforms & Topography

The subproject area is located within the latitude 26°33' N to 26°55' N and longitude 86°06' E to 86°26' E. Topographically, the project area Ramnagar Mirchaiya municipality lies in the Terai region and Province 2 of Nepal and is generally flat with an average elevation is 110 to 120 m above the mean sea level.

2.14.2 Geology & Soils

The Project area consists of main sediments of the Gangetic Plain. Basically, sand, silt, and clay are the main sediments of the soils of this zone. This zone is composed of finer sediments. The sediments become finer and also show a change of faces. The Churia Hills are of unstable sandstone and conglomerates of great geological antiquity. The area immediately at the foot of the Churia Hills is called the Bhabar. It is characterized by porous soils, with boulders and gravel and a low water table. The eastern Terai is nearly level, except for hilly portions of the base of the Churia Hills; it is recent alluvial and the soils are loamy and deep.

2.14.3 Climate

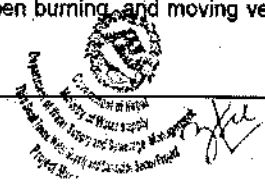
The Siraha district has a subtropical climate and is heavily influenced by the monsoon (June-September) with an average annual rainfall of 1442 mm. The maximum temperature averages 36° C and the minimum 17° C. The Subproject area lies in Sub-Tropical Climatic Zone. The temperature of this area varies from 17° C in winter to 36° C in summer. This region is heavily influenced by the monsoon (June-September) with an average annual rainfall of 1442 mm.

2.14.4 Water Resources

Bataha Khola and Jiwa Khola is the boundary of the project area on eastern and western side respectively. Both streams flood heavily during the monsoon and both go dry during the dry season.

2.14.5 Air Quality

There are few industries in project town. Air pollution is caused by fugitive dust from vehicle movements, particularly over unpaved roads and other unpaved grounds, construction activities, and wind action on unpaved exposed surfaces. Gas emissions come from household cooking, open burning, and moving vehicles.





Emissions from these sources are scattered/spread apart, both in terms of locations and timing.

2.14.6 Acoustic Environment

The sources of noise in the project town are the construction activities and vehicle movement. The anthropogenic noise is confined in few clustered settlements and in market places.

2.14.7 Flora & Fauna

Flora

The Project area is located along East-West Highway. The Churia hill situated at the northern side of the project area is covered with a highly degraded deciduous forest. The major floral species found in this proposed project areas are Sal (*Shorea robusta*) and the predominated associated species including Khair (*Acacia catechu*), Indian laurel (*Ficus microcarpa*), Karma (*Adina cordifolia*), Jaamun (*Syzygium cumini*), Sisam (*Dalbergia sisoo*), seto siris (*Albizzia procera*), bakaino (*Melia azedarach*), Teak (*Tectona grandis*), Bel (*Aegle marmelos*), Bot Dhyaro (*Lagerstroemia parviflora*) and several bamboo species and genera.

Fauna

The literature review shows that the mammals that are found in the project town include Rhesus Monkey (*Macaca mulatta*), Jungle Rat, Jackal (*Canis aureus*), Common Mongoose, Squirrel, Bat, Fox etc.

Similarly, the desk study shows that various local & migratory birds are found in the project town that includes Cuckoo, Duck, Kalij Pheasants, Crow, Dove etc.

It is also found that the project area provides habitats for a variety of butterflies, reptiles & amphibians, and during the walkover surveys, various types of these species were observed. The commonly found fishes in the project town include Rawa, Rohu, Bam, Garahi etc. The details on the existing flora & fauna will be given in IEE report.



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2.14.8 Community Forests

There are altogether eight community forests which fall under the project area as shown in the table below. The impact due to project implementation will be minimal on forest resources.

Table 5: Community forests of Ramnagar Mirchaiya

S. No.	Community Forest	Ward No.	HH	Population	Total Forest Area
1	Hattimuda Community Forest	Ramnagar Mirchaiya-7,8	386	1272	634.44
2	Ramnagar Khoriya Community Forest	Ramnagar Mirchaiya-6	93	403	154
3	Hariyo Danda Community Forest	Ramnagar Mirchaiya-7	205	1188	228.2
4	Chure Danda Community Forest	Ramnagar Mirchaiya-7	193	1137	212.26
5	Ram Krishna Community Forest	Ramnagar Mirchaiya-8	106	612	227.4
6	Laxmi Community Forest	Ramnagar Mirchaiya-7	73	299	118.8
7	Jiwa Thakur Community Forest	Ramnagar Mirchaiya-5, 6.	83	476	131.7
8	Jay Bajarangbali Community Forest	Ramnagar Mirchaiya-5, 7.	147	788	104.5

Source: DEDR, 2019

2.14.9 Protected Areas & Physical Cultural Resources

The Subproject will not encroach into, or be in close proximity to, any protected area or any physical cultural resources.

2.14.10 Infrastructure facilities

i) Transportation, Electricity, Communication and Health

The Project area is located on all-weather blacktopped road, some 29 km from Lahan, the major junction of on the Mahendra Highway. The nearest airport is the Janakpur airport, where daily flights from Kathmandu provide their services.

Since, this place is totally routed by From Mahendra Highway is directly linked from capital, Kathmandu by Tata Sumo or Hiace (following the KTM-Bardibas road 6-7 hours) following Chitwan it will take 10-11 hours or by domestic flight to either Janakpur (65 km west of Mirchaiya) or Biratnagar (145 km east of Mirchaiya) and continuation by local bus. The mode of transportation mostly used include: bus, car, bike, bicycle, rickshaw, tempo, and mini bus.





There is a regular service of the landline phone and mobile phone service in the project area. The Nepal Electricity Authority (NEA) has provided electricity for household consumption through its national grid.

There are two existing canal irrigation projects in the project area, out of which one is functional and another one is filled with sand and not in operation

ii) Educational Institutions

Mirchaiya Municipality has well managed education facilities. There are various various public and private educational institutions for Pre-primary, Primary, Lower Secondary, Secondary, Higher Secondary and College Studies.

iii) Other Institutions

There are several government and non-government offices including private institutions, community-based organizations, NGOs, banks and financial institutions within the service area., some cooperatives are also in operation in the area.

Similarly, various industries exists in the area. There are some hotels, restaurants and cafes available in the service area.

iv) Quality of Life Values

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

v) Cultural and religious sites

This project town is famous for popular temple Vishnu Mandir which is one of the popular religious sites of Nepal. However, the project activities will not encroach into this religious site. Apart of this, there are no other cultural and religious sites near the project area.

2.15 Resettlement, Relocation and Compensation Issues

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





2.16 Project Impact Area Delineation

The project impact area delineation meant to the identification of the area affected by the project activities. The impact area has been delineated on the basis of proximity of the construction site to the nearby surrounding areas. This area is divided into 'Core Area' and 'Surrounding Area' on the basis of vicinity and magnitude of the impacts due to construction and operation of the proposed project.

Here, the *Core Area* refers to the area required permanently as well as temporarily for the proposed project activities. This area includes service area of the project town which comprises of partial areas of wards 4,5,6,7 & 8. This area covers the area of the Mahendra Highway and Mirchaiya Katari Road along which the proposed drain structures will be constructed and the outfall areas.

The *Surrounding Area* refers to the area within the immediate surroundings of the proposed project. It includes the area of the project town which is not covered under the service area of the proposed project.

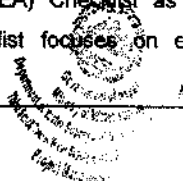




3. PROCEDURES TO BE ADOPTED FOR THE STUDY

This ToR will explain various approaches, methodologies and procedures adopted to prepare a comprehensive IEE report which should follow the provisions of the EPA & EPR and related national and sectorial guidelines. The IEE study should focus on impact identification, prediction and finally evaluating the extent and weight of the impact. The Consultant should follow the following methodology for preparation of the report:

- i) Carry out literature review through the collection of secondary data from published and unpublished reports, maps, aerial photographs, newspaper articles, etc. biological, social, chemical, physical, and cultural environments were collected from various sources and reviewed to get information on the coverage of the studies and fulfill the data gaps.
- ii) Prepare questionnaires/checklists/matrices for the collection of primary data for both the biophysical and socio-economic assessments during field study.
- iii) Describe relevant parts of the town project, using maps with appropriate scale and photographs and aerial photographs, where necessary, including the following information: location, alignment, alternatives, design, standards, pre-construction, construction and post-construction activities, work schedule, staffing and support facilities and services.
- iv) Publication of a public notice of 15 days about the project in a national daily newspaper and Pasting Copies of this Public Notice at the municipality office, DCC, public places and market areas within the service area. The main aim of the notice was to seek written opinions from the concerned people and institution, on possible impacts from the implementation of the proposed project.
- v) Carry out Public consultation program regarding public notice in the premises of the concerned authority office. During this program, opinions and suggestions from the participants will be highly praised. Recommendation letters from the concerned local stakeholders has been collected after the 15 days of public notice and public consultation.
- vi) Carry out Rapid Environmental Assessment through completion of the Rapid Environmental Assessment (REA) Checklist as per SPS (2009) for the proposed project. This checklist focuses on environmental issues and



concerns. It should cover all the baseline information required to identify the anticipated impacts that may arise during and after the project construction

vii) Carry out Environmental Assessment in detail through field studies which has been briefly discussed below:

3.1 Literature Review/Desk Study

Available primary and secondary literature in the form, of reports and maps; topographic maps, land use maps, aerial photographs, cadastral survey maps, etc. will be collected and reviewed. Feasibility Study Report and Detailed Engineering Design Report of the proposed project will be the key documents to determine the nature and scope of activities of the project that influences the environmental conditions of the proposal area. Rainfall & Other Meteorological data of the project town will be collected from the concerned authority. Similarly, published and unpublished reports about environmental policies, laws, rules, standards, Acts, Regulation and other legal provisions will be 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. will be collected from various sources and reviewed to get information on the coverage of the studies and fulfill the data gaps.

3.2 Field Study

Field studies will be carried out in the project site 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 will be collected through simple checklist method and Survey Questionnaire method. During field study, Rapid Environmental Assessment (REA) Checklist (Refer Annex I) as recommended by ADB as per SPS, 2009 will be duly followed and filled up. This checklist should include the data regarding physico-chemical, biological, socio-economic & cultural environment. Various approaches and methodological tools that should be used for the data collection of various environmental aspects during this field study are described below:



3.2.1 Physico-Chemical Environment

An extensive physical & chemical environment survey will be carried out by delineating the project impact area to collect the baseline information. Topographic and geomorphological features that include Landforms, Geology & Soil, Land use pattern, Landslide susceptibility etc. will be observed and documented. The data regarding Climate & Rainfall of the project town will be collected from the concerned authority. Similarly, information on air quality and noise quality condition will be collected through field observation and expert's judgment. Information on rivers and aquatic ecology will also be collected to assess the existing condition. Various consultations programs with the local communities and Interviews with few government officials, schools & representatives of the local bodies will be also conducted.



3.2.2 Biological Environment

The baseline information regarding biological environment will be collected through walkthrough survey throughout the core & surrounding areas of the project area by adopting simple checklist method (*Refer Annex II*), through professional judgment and local interaction. Under this baseline information in regard to the biological environment, types of vegetation and forests will be identified based on the species composition. 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 will be enumerated based on consultation with the local people and the expert judgment.

Information on rivers of the project area and aquatic ecology will be also collected through the interaction with the locals, the expert judgment and field observation.

The data on the existing wildlife/mammals, birds, herpetofauna (Reptiles/Amphibians) will be collected through field observation and interaction with the locals. The checklists as given in *Annex II* will be filled up accordingly. The status of each of these species will be identified as either threatened or near threatened or endangered species or least concern as per IUCN Red Book, IBAT Report of ADB, CITES Appendices and GoN list species. This will be affirmed by the expert review.





3.2.3 Socio-Economic & Cultural Environment

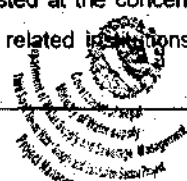
Household surveys will be conducted through interviews by simple questionnaire method to obtain information on the socio-economic & cultural environment that primarily includes demography, ethnicity, education, health & sanitation, drinking water condition of the project area, irrigation facility, local traditions, 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 will also be collected. Information on the people residing within the core area of the proposed project town will be collected through socio-economic survey. The sample of Household Survey Questionnaire that should be filled up during household survey has been included in **Annex II**.

Focused Group discussions (FGD) will be conducted to obtain suggestions and comments from all the potential stakeholders. Direct observation (Transect Walk Method) will be conducted to ascertain the existence of the cultural sites, and public institutions such as temples, cremation grounds, historical & archaeological sites, schools, and health posts within the project core areas and to determine the effect on their existence due to project construction activities. The Consultations with the village elites, Meetings and Group discussions shall be done to assess the current situation of the project area community.

3.3 Public Notice

As the *Sub Rule 2 under Rule 7 of Chapter 1* of *EPR/1997 with Amendments. 2017* states that "*Whilst preparing the report, the proponent shall, in the cases of initial environmental examination affix a notice in the concerned Village Development Committee or Municipality, Office of the District Development committee school, hospital, and health post requesting the Village Development committee or Municipality and District Development Committee or concerned individuals or institution to offer their written opinion and suggestions within Fifteen days with regard to the possible impact of the implementation of the proposal on the environment where the proposal is to be implemented and prepare a deed. The said Fifteen days' notice shall also be published in a national level daily newspaper. After the publication of such notice the opinions and suggestions so received in relation to the same shall also be included in the report.*"

Hence, here 15 days public notice should be pasted at the concerned authorities that include Municipality Office, DCC and other related institutions like Schools,





Health Posts, and Hospitals etc. Accordingly, this 15 days public notice will be published in a national daily newspaper. 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.

3.4 Public Hearing/Consultation

The **Sub Rule 2 under Rule 7 of Chapter 1** of EPR 1997 with Amendments 2017 also states that *"The proponent shall organize a public hearing about the proposal at the area of Village Development Committee or Municipality where the proposal is to be implemented and collect opinions and suggestions"*. Hence, the public consultation program will be conducted to collect reviews from the concerned stakeholders after the completion of 15 days of public notice. This public consultation program should include Public Hearing Programs, FGD, Meetings and Various Discussion Programs.

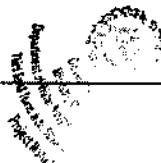
3.5 Collection of Muchulkas (Deed of Inquiry) & Recommendation Letters

The deed of inquiry (Muchulka) from each concerned authority where 15 days public notice shall be pasted should be included in IEE report. Recommendation letters from the concerned local stakeholders will be also collected after the 15 days of public notice followed by public consultation.

3.6 Impact Identification, Prediction & Evaluation Methods

The information regarding Physico-chemical, Biological and Socio-economic & Cultural aspects as mentioned above will be collected to identify the susceptibility of these aspects to be affected by the proposed project activities. This will help to identify the anticipated environmental impacts of the proposed project. For this, Simple Checklist method shall be adopted for the impact identification. This will be carried out by using Rapid Environmental Assessment (REA) Checklist prepared by ADB (*Refer Annex I*) and by using simple household survey questionnaire (*Refer Annex II*) prepared during the desk study. These checklists will explain the environmental features or factors that need to be addressed when identifying the impacts of projects and activities.

Once all the important impacts will be identified, their potential characteristic will be predicted. The baseline data on physico-chemical, biological, socio-economic and



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cultural aspects will be used to estimate the likely characteristics and parameters of impacts that includes Nature, Magnitude, Extent and Duration.

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

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

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

The scoring of Impacts as per *National EIA Guidelines 1993* is tabulated below:

Table 3: 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 Specific (SS)	10
4.	Duration	Long Term (LT)	20
		Medium Term (MT)	10
		Short Term (ST)	5

Source: *National EIA Guidelines 1993*



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

Table 7: 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

This evaluation will be done as per the professional judgment by the key expert team involved in the IEE study.

3.7 Report Preparation

An IEE report shall be prepared in two different formats that include ADB Format & GoN Format (as per EPR 1997 & 2017). The outline of the report is given in Chapter 9 of this TOR. The draft report shall be presented to MoWS & ADB. Following to this, a final report will be prepared and submitted as soon as comments & suggestions on this draft report are received.



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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, municipality 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:

- Constitution of Nepal
 - a) Plan, Policies & Strategies
 - ADB's "Safeguard Policy Statement (SPS)", 2066 B.S. (2009 A.D.)
 - Climate Change Policy, 2067 (2011)
 - Forest Sector Strategy (2016 A.D – 2025 A.D)
 - Fourteen Three Years Plan 2073/74- 2075/76
 - Land Acquisition, Rehabilitation and Resettlement Policy, 2015
 - Land Use Policy, 2015
 - National Biodiversity Strategy and Action Plan (2014-2020)
 - National Conservation Strategy, 2071 (2014)
 - National Forest Policy, 2075 B.S. (2019 A.D.)
 - National Urban Water Supply & Sanitation Sector Policy, 2065 B.S. (2009 A.D.)
 - National Urban Policy, 2063 B.S. (2007 A.D.)
 - National Water Plan, 2058 (2002- 2007 AD)
 - National Water Supply & Sanitation Policy (Draft), 2071 B.S. (2014 A.D.)
 - National Environmental Policy and Action Plan (NEPAP), 2050 B.S. (1993 A.D.)
 - Urban Water Supply & Sanitation Policy 2066 B.S. (2009 A.D.)
 - Updated 15-Yr Development Plan for Small Towns Water Supply and Sanitation Sector, 2066 B.S. (2009 A.D.)
 - Water Resources Strategy, 2059 B.S. (2002 A.D.)





b) Law & Acts

- Aquatic Animal Protection Act, 2017 B.S. (1961 A.D.) with Amendments (2055 B.S. (1997 A.D.))
- Child Labour Prohibition and Regulation Act, 2056 B.S. (2001 A.D.)
- Environmental Protection Act 2053 B.S. (1997 A.D.) with latest amendments (2007 A.D. & 2017 A.D.)
- Forest Act, 2049 B.S. (1993 A.D.)
- Labour Act 2048 B.S. (1992 A.D.)
- Land Acquisition Act, 2049 B.S. (1993 A.D.)
- Local Government Operation Act, 2074 B.S. (2017 A.D.)
- Soil and Water Conservation Act, 2052 B.S. (1995 A.D.)
- Solid Waste Management Act, 2068 B.S. (2011 A.D.)
- Town Development Act 2045 B.S. (1988 A.D.)
- Water Resources Act 2049 B.S. (1992 A.D.)

c) 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 Amendments
- Labor Rules, 2075 B.S.
- Solid Waste Management Rules, 2070 B.S. (2013 A.D.)

d) Guidelines & Manuals

- National EIA Guideline 2049 B.S. (1993 A.D.)
- WHO Air Quality Guidelines, Global Update, 2061 B.S. (2005 A.D.)
- National Noise Standard Guidelines, 2068 B.S. (2012 A.D.)
- Guidelines for Community Noise by WHO, 2055 B.S. (1999 A.D.)

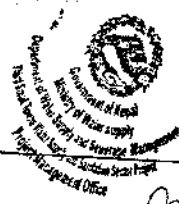
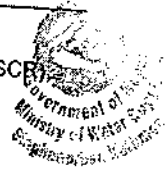
e) International Conventions

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:

- Convention on Biological Diversity (CBD), 1992
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973



- International Covenant on Economic, Social and Cultural Rights (ICESCR) 1976
- Worst Forms of Child Labour Convention, 1999
- f) Environmental Standards
 - National Ambient Air Quality Standards, for Nepal (NAAQS), 2003 A.D. & Updated in 2012 A.D.
 - National Diesel Generator Emission Standard, 2069 B.S. (2012 A.D.)
 - Nepal Vehicle Mass Emission Standard, (NVMES), 2069 B.S. (2012 A.D.)





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

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

5.1 Time Schedule

Considering the time limitations, the study has to be completed within about 9 weeks. The work schedule is presented in *Table 8*.

Table 8: Proposed Work Schedule

Activity / Work	Weeks								
	1	2	3	4	5	6	7	8	9
Literature Review/Desk Study	█								
Preparation and Approval of TOR		█							
Field Study			█	█					
Public Notice					█	█			
Public Consultation & Collection of Deed of Inquiry & Recommendation Letters							█		
Impact Identification through Data Evaluation /Preparation of Draft IEE Report					█	█	█		
Submission of Final IEE Report									█

5.2 Estimated Budget

The total estimated budget for conducting IEE study for the proposed project would be approximately NRs. 500,000.00. This cost is not included in detailed engineering design report as it is a separate study.

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:





- a) Team Leader
- b) Environmental Specialist
- c) Water Supply and Sanitation Engineer
- d) Sociologist
- e) Geo-hydrologist
- f) 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.



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6. ANTICIPATED IMPACTS OF THE PROPOSED PROJECT ON ENVIRONMENT

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.

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. These anticipated impacts are stated below but not necessarily limited to:

6.1 Beneficial Impacts

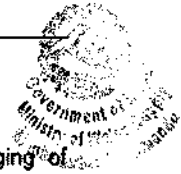
6.1.1 Impact on Socioeconomic Environment

- a) **Construction Phase**
 - i) Employment Generation
 - ii) Skill Enhancement
 - iii) Local Trade & Business Opportunity
- b) **Operation Phase**
 - i) Improved Health & Hygiene
 - ii) Increased Economic Opportunity
 - iii) Social Empowerment

6.2 Adverse Impacts

6.2.1 Impact on Physical Environment

- a) **Design Phase**
 - i) Soil Erosion and Slope Instability due to incorporation of sloped areas in project design



b) Construction Phase

- (i) Soil Erosion and Land Surface Disturbance due to excavation & digging of trenches and Stockpiling
- (ii) Gully Erosion
- (iii) Air Pollution
- (iv) Noise Pollution
- (v) Generation of Solid Waste & Waste Water from construction sites and worker's camp
- (vi) Impact on Land Use Pattern

6.2.2 Impact on Biological Environment

a) Construction Phase

- i) Impact on Flora & Fauna
- ii) Impact on Aquatic Life
- iii) Haphazard of Disposal of Debris from dismantling of temporary facilities

6.2.3 Impact on Chemical Environment

a) Construction Phase

- i) Impact on Water Quality of River used as Outfall

6.2.4 Impact on Socio-economic Environment

a) Design Phase

- i) Health & Safety of Community & Workers
- ii) Damage to the existing utilities
- iii) Disruption of Local Vendor's Business
- iv) Public Protests
- v) Interference to smooth traffic flow

b) Construction Phase

- i) Community Health & Safety Hazards
- ii) Workers' Health & Safety Hazards
- iii) Traffic Congestion
- iv) Mobilization of Child Labor
- v) Impacts on Sustainability of Works





Damage to the existing facilities

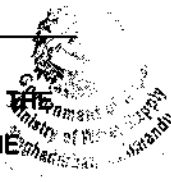
Operation Phase

- i) Pollution in newly constructed storm drain
- ii) Blocking/Choking of Drains
- iii) Impact on Recipient Water Bodies at the outfall
- iv) Non-sustainability of Services or Completed Works



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7. MATTERS CONCERNING THE PREVENTION & AUGMENTATION OF THE IMPACTS OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT



To sustain the project, it is necessary to deal with the anticipated impacts properly. Hence, there is requirement of proposal of effective measures to cope with these impacts. Here, the proposed measures shall include a) Mitigation Measures to reduce or eliminate or avoid the adverse impacts and b) Augmentation Measures to maximize the beneficial impacts.

These Mitigation & Augmentation measures will be proposed for each anticipated impacts. These measures shall primarily involve a) Mitigation Measures like Slope Protection Measures, Air Quality Monitoring, Noise Quality Monitoring, Waste Management, Prompt Backfilling, Awareness regarding Workers & Community Health & Safety Hazards etc. and b) Augmentation Measures like Prioritizing Local Labors, Provision of regular hands on training to the workers during the project construction period, Prioritizing Local Products, Prioritizing underprivileged group of people especially women and poor people in various capacity building programs and project related community meetings. These all will be discussed in detail in IEE Report.

These Mitigation & Augmentation 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 UWSSSP, DWSSM, WUSC and local agencies, local administration, police officers shall be consulted during the implementation of mitigation measures. The proponent will be required to prepare the Environmental Management Plan (EMP), and these measures shall be outlined in EMP to implement the proposed measures during project implementation.



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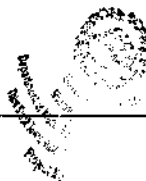
8. ALTERNATIVE ANALYSIS

The 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 in terms of environmental point of view. Alternative analysis will aim to attain suitable & feasible option of the proposed project, 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:

- **Without-Project or Do-Nothing Alternative:** This will help to analyze the condition of the existing environment of the project town in the absence of the proposed project.
- **With Project Alternative:** This will help to envisage the likely benefits of the proposed project in terms of environmental point of view. This will also assess the limitation of "Without Project" Alternatives. This will further analyze the alternatives to assess the most cost-effective, reliable and efficient system. This alternative will involve the following aspects:
 - Alternatives Relative to Planning & Design
 - a) Alternative Outfalls
 - b) Alternative Design
 - c) Selected Proposed Alternative

Alternatives regarding potential environmental impacts, capital & operating costs, institutional training and monitoring requirements should be described. The costs and benefits of each alternative should be quantified (wherever possible), and incorporating the estimated costs of any associated mitigation measures. The "Without project" option is always open.

This will also involve the analysis of "With No Forest" alternative if any national priority forests are observed to be located within the core area of the proposed project. However, our initial study shows that there will be no requirement of this alternative as there will be no interference of the proposed project components in any of the existing community forest areas.





8.1 Alternative System Analysis

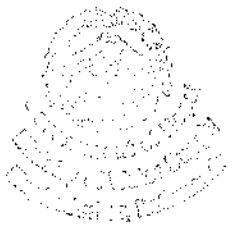
The system alternatives need to be developed to assess the most cost effective, reliable and efficient system that can serve the design population. However, in case of Mirchaiya Town Project, no such alternatives shall be proposed.

8.2 Alternative Assessment

The proposed project is a unique system and it shall not have any alternatives.



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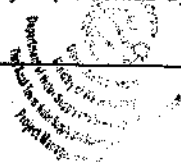
MATTERS TO BE MONITORED WHILE IMPLEMENTING THE PROPOSAL

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

9.2 Environmental Monitoring Plan

The project will develop an Environmental Monitoring Plan for the pre-construction, construction and post-construction activities of the project itself. The program will evaluate: (i) the extent and severity of the adverse environmental impacts as compared to what was predicted, (ii) how effective the mitigating measures were and compliance with the regulations and (iii) the overall effectiveness of EMP. The environmental monitoring of the project includes field supervision and reporting of project activities before and during the project construction and operation to ensure that the works are being carried out by the approved design and that the environmental mitigation measures are fully implemented by EMP. A monitoring



system will be developed involving (i) front line monitoring (ii) monitoring by the government line agencies or independent monitors. To ensure the effective implementation of environmental monitoring plan (EMP), EMP matrix must be prepared in a tabulated form which must be followed by the concerned authorities during each phase of the project. The sample of EMP Matrix is given in **Annex III**. The details in EMP matrix must be given in detail in IEE report.

The table of EMP matrix must include the following matters;

a) Types of Environmental Impacts (Adverse & Beneficial Impacts)

- This includes Impacts on either Physical Environment or Biological Environment or Chemical Environment or Socio-economic Environment.
- As for e.g. If Soil Erosion & Land Surface Disturbance is an anticipated adverse impact, this will be categorized under 'Impact on Physical Environment'

b) Project Phase

- Design Phase/Construction Phase/Operation Phase-This will be confirmed as per the nature of the anticipated impacts.

c) Field of Anticipated Environmental Impacts

- As for e.g.; If Soil Erosion & Land Surface Disturbance is an anticipated impact, the field should be "Topography/Geology".

d) Proclamation of Anticipated Environmental Impacts

- E.g. Soil Erosion & Land Surface Disturbance

e) Mitigation /Augmentation Measures for the Anticipated Environmental Impacts

- As for e.g.; If Soil Erosion & Land Surface Disturbance is an anticipated impact, the proposed mitigation measures should be as follows;
- 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

f) Statement of Authorities responsible for the implementation of the proposed mitigation measures





- As for e.g.; for the impact; Soil Erosion & Slope Instability, the responsible authority will be 'The Contractor' as this impact may be encountered during the construction phase.

g) Monitoring Indicators

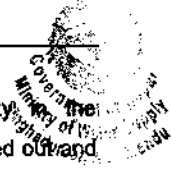
- As for e.g.; the monitoring indicators for the above mentioned impact will be Field Supervision by PMO & DSMC.

h) Frequency of Indicators

- As for e.g.; If Soil Erosion & Land Surface Disturbance is an anticipated adverse impact, the frequency of the monitoring indicator will be Weekly Field Supervision.
- As mentioned above, details of each & every impact should be given in this EMP matrix.

9.3 Information Disclosure, Public Consultation, and Participation

Public consultation is the process of exchanging information with those persons and organizations with a legitimate interest in a project and who are likely to be affected by the project (stakeholders). It is a two-way process that informs and involves the community in developing a project and informs the proponent about issues and concerns, which can then be addressed in project design. Information disclosure involves stakeholders in monitoring the development and implementation of a project and fosters openness in decision-making by presenting documents and other project materials for public scrutiny. The consultation and disclosure involve consultation with stakeholders at an early stage of project preparation, and throughout project implementation. As a minimum, the stakeholders will be consulted regarding the scope of the environmental study before the commencement of the work, and shall then be informed about the likely impacts of the project and their proposed mitigation measures. Along with this, the draft IEE report shall be under preparation. The report shall record the views of stakeholders and indicate how these have been taken into account in project development. Information shall be 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 shall normally involve 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 shall be given highest priority in implementation of mitigation measures. Public consultation shall be carried out by decision of the consultation meeting, implementation of mitigation measures should be prioritized and shall be carried out with the involvement of the local people.

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

9.4 Grievance Redress Mechanism

A project-specific grievance redress mechanism (GRM) will be established by MoWS as the project executive agency to receive, evaluate and facilitate the resolution of affected persons' concerns, complaints, and grievances related to social, environmental and other concerns on the project. GRM will aim to provide a time-bound and transparent mechanism to resolve such concerns. GRM will also have support system as Grievance Redress Committee (GRC).

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 invitee¹, 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

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



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with representatives of the APs, civil society and eminent citizens can be invited as observers in GRC meetings.

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.

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.

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).



10. REPORT

The IEE report shall be prepared as per this ToR. The IEE report, whenever applicable, shall contain location maps, graphs, photographs, tables, and matrix. The IEE report will be prepared in two different formats which is shown in detail below:

1) ADB Format (For submission to ADB)

The outline of IEE report as per this format is as follows:

List of Abbreviations

Table of Contents

Executive Summary

1. Introduction
2. Policy & Legislative Framework
3. Analysis of Alternatives
4. Description of the Proposed Project
 - 4.1 The Study Area
 - 4.2 Description of the Site and Surroundings
 - 4.3 The Proposal
5. Description of the Environment
 - 5.1 Existing Environment
 - 5.1.1 Landforms, Geology & Soils
 - 5.1.2 Climatic Condition
 - 5.1.3 Water Quality
 - 5.1.4 Air Quality
 - 5.1.5 Acoustic Environment
 - 5.1.6 Biodiversity
 - 5.1.7 Physical & Cultural Heritage
 - 5.1.8 Socio-economic Conditions
6. Anticipated Environmental Impacts & Mitigation Measures
7. Information Disclosure, Consultation and Participation
8. Grievance Redress Mechanism
9. Environmental Management Plan
10. Conclusion & Recommendations





II)

Format as per provided in EPR (1997 A.D. with latest amendments made in 2017 A.D.) - (For submission to the Ministry of Water Supply)

1. Name and address of individual or institution preparing the report:
2. Summary of the proposal: (To briefly mention the following matters in regard to the possibly impact of the implementation of the proposal on the environment):
 - (a) Objectives of the proposal
 - (b) Impact on land-use.
 - (c) Adverse impact on the environment impact on human life, and population pressure,
 - (d) Damage to be suffered by local goods or objects,
 - (e) Other necessary matters.
3. The following matters must be explicitly mentioned in respect to the proposal:
 - (a) Type of proposal; (i) Processing, (ii) Manufacturing, (iii) Installation, (iv) Service delivery, (v) Others
 - (b) If related to delivery, the nature and type of goods to be delivered.
 - (c) Proposal's; (i) Installed capacity, (ii) Number of hours to be operated per day or year,
 - (d) Materials to be used (quantity and year to be mentioned),
 - (e) Emission resulting from the implementation of the proposal (the time of operation and the consequent volume of emission to be specified);(i)Solid (ii) Liquid (iii) Air, (iv) Gas, (v) Noise (vi) Dust, (vii) Others
 - (f) Energy to be used: (i) Type, (ii) Sources (iii) Volume of consumption (per day and year)
 - (g) Human Resource requirements
 - (h) Resources required for the implementation of the proposal:
 - (i) Total (Gross) capital (ii) Working capital (iii) Land area, (iv) Building and their types, (v) Machinery and tools (vi) Others.
 - (i) Detailed particulars of the area where the project is to be implemented;
 - (i) Maps, (ii) Population and condition relating to settlements in the area as well as in the nearby areas, (iii) Particulars of any sensitive things or objects, if any, located close to the area where the proposal is to be implemented (iv) Current situation (v) Sources of water (vi) Arrangement made for disposing or processing the waste



(vii) Paths for movement in the area where the proposal is to be implemented

- (j) Manufacturing processes
- (k) Details of the technology
- (l) Other necessary matters.

4. Impact of the implementation of the proposal on the environment:

(a) Impact on the social, economic cultural spheres:

(i) Impact on human health, (ii) Degradation of cultivable land, (iii) Destruction of forests, (iv) Changes in social, cultural and religious norms and value, (v) Others.

(b) Biological Impact: (i) Population, (ii) Flora and fauna. (iii) 'Natural habitat and communities

(c) Physical Impact (i) Land, (ii) Atmosphere, (iii) Water, (iv) Noise, (v) Man-made objects, (vi) Others

5. Alternatives for the implementation of the proposal:

(a) Design (b) Project site (c) Processes, time-schedule, (d) Raw materials to be used, (e) Others

6. Alternatives to reduce or control the impact of the implementation of the proposal on the environment

7. Matters to be monitored while implementing the proposal. 8. Other necessary matters.

Note: - Data, maps, Photographs, tables, charts graphs etc. shall be enclosed, as required,



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11. OTHER NECESSARY MATTERS

Other necessary matters to be included in the IEE report will be Relevant Information, Literature Reviewed and Annexes that shall include Approved Terms of Reference, Checklists, Maps, Minutes of meetings, Tables & Charts, Questionnaires and Photographs to be used at the time of the baseline survey. The report will clearly recommend whether an Environmental Impact Assessment (EIA) is required or whether an Initial Environmental Examination (IEE) is sufficient for the proposed project.



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12. LITERATURE REVIEWED

- ADB, 2003. *Environmental Assessment Guidelines*
- Aquatic Animal Protection Act, 1961 with amendments. www.lawcommission.gov.np
- Constitution of Nepal (2015). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu
- District Development profile of Nepal 2010/11 with VDC Profile. A Socio-Economic Development
- Detailed Engineering Design Report of Mirchaiya Storm Water Drainage Sub Project, 2019
- Diesel Power Generation (2014). Inventories and Black Carbon Emissions in Kathmandu Valley, Nepal, The World Bank
- Environmental Assessment and Review Framework, (2017). Regional Urban Development Project (RUDP), Ministry of Urban Development (MoUD), Government of Nepal for ADB
- Environmental Assessment and Review Framework, Draft (2018). Urban Water Supply & Sanitation (Sector) Project, Ministry of Water Supply, Government of Nepal for ADB
- Environment Protection Act, (1997). Ministry of Science, Technology and Environment Kathmandu
- Environment Protection Rules, (1997 with latest amendments 2007 & 2017), 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
- Labor Act (1991), Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu
- Land Acquisition Act, 1977 and latest amendments. www.lawcommission.gov.np
- Local Government Operation Act, (2017). www.lawcommission.gov.np
- National Forest Policy, (2015). dof.gov.np
- National Urban Policy (2007). Ministry of Law, Justice and Parliamentary Affairs, Law Books Management Board, Kathmandu
- Proximity Report Generated by the Integrated Biodiversity Assessment Tool (Mirchaiya Town), (2018), ADB
- Shrestha K 1996. 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





ANNEXES





ANNEX I
ADB's REA Checklist & Preliminary Climate
Risk Screening Checklist



ToR for IEE of Mirchaiya Storm Water Drainage Sub Project



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.

Country/Project

NEP: Urban Water Supply and Sanitation (Sector) Project

Title: Subproject:

Mirchaiya Storm Water Drainage 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			
Buffer zone of protected area			
Special area for protecting biodiversity			
Bay			
B. Potential Environmental Impacts			
Will the Project cause...			
pollution in rivers proposed as outfall			



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ToR for IEE of Mirchaiya Storm Water Drainage Sub Project

Screening Questions	Yes	No	Remarks
Soil erosion runoff?			
Impairment of historical/cultural monuments/areas and loss/damage to these sites?			
Generation of Solid Waste & Waste Water from the construction sites and worker's camp?			
Social conflicts arising from displacement of communities?			
Impairments associated with drainage lines and access roads?			
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.			
Health and safety hazards to workers and biological and physical hazards during project construction and operation?			
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?			
Interruption on road traffic due to interference of construction activities?			
Continuing soil erosion/silt runoff from construction activities?			
Damage to the existing facilities?			
Increased sewage flow due to increased water supply			
Increased volume of sullage (wastewater from cooking and washing)			
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)?			

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ToR for IEE of Mirchaiya Storm Water Drainage Sub Project



Screening Questions	Yes	No	Remarks
Social conflicts if workers from other regions or countries are hired?			
Disruption to Local Vendor's Business			
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			



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Preliminary Climate Risk Screening Checklist for Sample Sub Project Towns

Screening Questions	Score	Remarks
Location and design of project		Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides
		Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g. sea-level, peak river flow, reliable water level, peak wind speed etc.)
Materials and maintenance		Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity, and hydro meteorological 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





Annex II
Checklists for Baseline Information
Collection & Questionnaires for Socio-
economic Survey





Simple Checklists for Baseline Information Collection

A. Physical Environment

Parameters	Description
Topography	
Geology (Rock and Soil Types)	
Erosion and Sedimentation	
Climate	
Quarry Sites (If any)	
Sites for Labor Camp	
Site for Storage and Stockpiling	
Land Use	
Air Quality	
Water Quality	
Noise Level	
Spoil disposal sites	
Drainage Network	





B. Vegetation and Wildlife
Vegetation in the project area

SN	Local Name	Botanical Name	Location	Vegetation Type	Local Status	Local Use	Protection Status			
							IUCN	CITES	GoN	IBAT

Mammals in the project area

SN	Common Name	Scientific Name	Habitat	Local Status	Crop/Livestock Raider	Local Use	Protection Status			
							IUCN	CITES	GoN	IBAT

Birds Sighted in the project area

SN	Common Name	Scientific Name	Type	Habitat	Local Status	Protection Status			
						IUCN	CITES	GoN	IBAT

Herpeto-fauna in the Project Area

S.N.	Local Name	Scientific Name	Habitat	Local Status	Protection Status			
					IUCN	CITES	GoN	IBAT

Fish in the Project Area

S.N.	Local Name	Scientific Name	Status of Occurrence	Migratory Status/Season	Observed Location



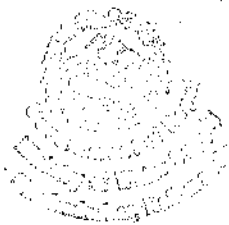
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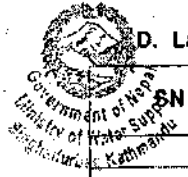
C. Socio-Economic and Cultural Environment

Parameter	Description
Demography a) Population (Male, Female) b) Caste Ethnicity c) Language d) Religion and Culture e) Literacy	
Occupation	
Migration Patten	
Public Health and Sanitation	
Drinking Water Supply	
Education Facilities	
Communication	
Fuel and Energy	
Road and Transportation	
Land Holding	
Food Sufficiency	
Irrigation	
Health Care System	
Market	
Business and Industries	
Religious and Cultural Sites	
Non governmental activities	
Development Potential	
Detail of Project Affected Structures	

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D. Landslides and Erosion Prone Areas

SN	Locations or (Left/Right)	Size of Failure	Cause of Failure	Protection Structure

E. Settlements and Population

SN	Settlement	VDC & Ward	HH	Population			Caste/Ethnicity
				Male	Female	Total	



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CHECKLISTS FOR FOCUS GROUP DISCUSSION



Date:

Project:

Venue:

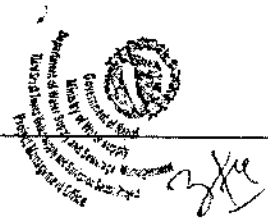
Number of Participants:

Purpose Statement:

Discussion, Responses & Outcomes:

No.	Questions/Issues by the Consultant	Responses or Findings
1		
2		
3		
4		
5		
6		

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Questionnaires for Socio-economic Survey



सुदूर पश्चिमी प्रदेश
 कैलाली जिल्ला
 चन्द्रपुरी स्वास्थ्य क्षेत्र
 (आयोजना प्रयोजकले तयार पारेको प्रयोग फारम)

नाम: _____ पता: _____
 जन्म मिति: _____ पेशा: _____
 पालना गर्ने स्थान: _____
 तालिम: _____

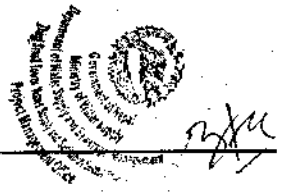
सामाजिक आर्थिक तथा अन्य विवरण

(कृपया यो जानकारी सत्य रूपमा दिनुहोस्)

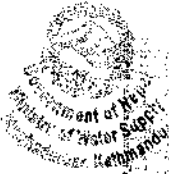
1. कुल परिवारको सदस्यको संख्या: _____
 2. परिवारको सदस्यहरूको नाम: _____
 3. परिवारको सदस्यहरूको उमेर: _____
 4. परिवारको सदस्यहरूको शिक्षा: _____
 5. परिवारको सदस्यहरूको रोजगारी: _____
 6. परिवारको सदस्यहरूको स्वास्थ्य: _____
 7. परिवारको सदस्यहरूको आर्थिक स्थिति: _____
 8. परिवारको सदस्यहरूको भू-मालिकता: _____
 9. परिवारको सदस्यहरूको भू-उपयोग: _____
 10. परिवारको सदस्यहरूको भू-उपयोगको विवरण: _____

क्र.सं.	नाम	उमेर	शिक्षा	रोजगारी	स्वास्थ्य	आर्थिक स्थिति	भू-मालिकता	भू-उपयोग	भू-उपयोगको विवरण

11. कुल परिवारको आय: _____
 12. कुल परिवारको खर्च: _____
 13. कुल परिवारको बचत: _____
 14. कुल परिवारको ऋण: _____
 15. कुल परिवारको भू-मालिकता: _____
 16. कुल परिवारको भू-उपयोग: _____
 17. कुल परिवारको भू-उपयोगको विवरण: _____
 18. कुल परिवारको भू-उपयोगको विवरण: _____
 19. कुल परिवारको भू-उपयोगको विवरण: _____
 20. कुल परिवारको भू-उपयोगको विवरण: _____



ToR for IEE of Mirchaiya Storm Water Drainage Sub Project



- 1.1.1. नदी नहर काला कोयला या अन्य पदार्थ
- 1.1.2. मिट्टी चट्टान या अन्य पदार्थ
- 1.1.3. नदी नहर काला कोयला या अन्य पदार्थ
- 1.1.4. नदी नहर काला कोयला या अन्य पदार्थ
- 1.1.5. नदी नहर काला कोयला या अन्य पदार्थ
- 1.1.6. नदी नहर काला कोयला या अन्य पदार्थ
- 1.1.7. नदी नहर काला कोयला या अन्य पदार्थ
- 1.1.8. नदी नहर काला कोयला या अन्य पदार्थ
- 1.1.9. नदी नहर काला कोयला या अन्य पदार्थ
- 1.1.10. नदी नहर काला कोयला या अन्य पदार्थ

क्र.सं.	विवरण	प्रकार	स्थिति	दिनांक	विवरण	प्रकार	स्थिति	दिनांक
1	नदी	नदी	नदी	नदी	नदी	नदी	नदी	नदी
2	नहर	नहर	नहर	नहर	नहर	नहर	नहर	नहर
3	काला	काला	काला	काला	काला	काला	काला	काला
4	कोयला	कोयला	कोयला	कोयला	कोयला	कोयला	कोयला	कोयला
5	अन्य पदार्थ	अन्य पदार्थ	अन्य पदार्थ	अन्य पदार्थ	अन्य पदार्थ	अन्य पदार्थ	अन्य पदार्थ	अन्य पदार्थ

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- के रूपमा जानकारी प्रदान गर्नुपर्ने बाहेक निम्नो जानकारीहरू बाहेक
- यस क्षेत्रको वर्तमान स्थिति तथा विकास योजनाको क्षेत्र भन्ने कति जनाको जानकारी
- यस क्षेत्रको वर्तमान स्थिति वा विकास योजनाको क्षेत्र
- यस क्षेत्रको वर्तमान स्थिति वा विकास योजनाको क्षेत्र
- यस क्षेत्रको वर्तमान स्थिति वा विकास योजनाको क्षेत्र
- यस क्षेत्रको वर्तमान स्थिति वा विकास योजनाको क्षेत्र
- यस क्षेत्रको वर्तमान स्थिति वा विकास योजनाको क्षेत्र

समाप्त जानकारी आवश्यकता अनुसार प्रदान गर्नुपर्ने जानकारीहरू

यस क्षेत्रको वर्तमान स्थिति तथा विकास योजनाको क्षेत्र भन्ने कति जनाको जानकारी

सडकको चौडाई	<input type="text"/>	वा	सडक	<input type="text"/>
सडकको गहिराई	<input type="text"/>	वा	सडक	<input type="text"/>
सडकको ढलान	<input type="text"/>	वा	सडकको ढलान	<input type="text"/>
सडकको ढलानको ढलान	<input type="text"/>	वा	सडकको ढलानको ढलान	<input type="text"/>
सडकको ढलानको ढलान	<input type="text"/>	वा	सडकको ढलानको ढलान	<input type="text"/>

यस क्षेत्रको वर्तमान स्थिति तथा विकास योजनाको क्षेत्र भन्ने कति जनाको जानकारी

1	1000 रुपैयाँ प्रति		1000 रुपैयाँ प्रति	<input type="checkbox"/>
2	2000 रुपैयाँ प्रति		2000 रुपैयाँ प्रति	<input type="checkbox"/>
3	3000 रुपैयाँ प्रति		3000 रुपैयाँ प्रति	<input type="checkbox"/>

- यस क्षेत्रको वर्तमान स्थिति तथा विकास योजनाको क्षेत्र भन्ने कति जनाको जानकारी
- यस क्षेत्रको वर्तमान स्थिति तथा विकास योजनाको क्षेत्र भन्ने कति जनाको जानकारी
- यस क्षेत्रको वर्तमान स्थिति तथा विकास योजनाको क्षेत्र भन्ने कति जनाको जानकारी

1	100 रुपैयाँ प्रति		100 रुपैयाँ प्रति	<input type="checkbox"/>
2	200 रुपैयाँ प्रति		200 रुपैयाँ प्रति	<input type="checkbox"/>
3	300 रुपैयाँ प्रति		300 रुपैयाँ प्रति	<input type="checkbox"/>
4	400 रुपैयाँ प्रति		400 रुपैयाँ प्रति	<input type="checkbox"/>
5	500 रुपैयाँ प्रति		500 रुपैयाँ प्रति	<input type="checkbox"/>
6	600 रुपैयाँ प्रति		600 रुपैयाँ प्रति	<input type="checkbox"/>
7	700 रुपैयाँ प्रति		700 रुपैयाँ प्रति	<input type="checkbox"/>
8	800 रुपैयाँ प्रति		800 रुपैयाँ प्रति	<input type="checkbox"/>
9	900 रुपैयाँ प्रति		900 रुपैयाँ प्रति	<input type="checkbox"/>
10	1000 रुपैयाँ प्रति		1000 रुपैयाँ प्रति	<input type="checkbox"/>



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- ५.४. गरीब छातेपानी विहारको प्रभावीको व्यवस्था हुँदा लगाइको परिवारबाट प्रतिव्यक्ति स्वरूप अग्रिम लाभको ५% रकम दिन तयार हुनु हुन्छ ? छ छैन
- ५.५. नयाँ सरसफाई सुविधा (सामुदायिक भौतिकालय तथा सवारी इला) निर्माणको लागि सह तयारी स्वरूप १५% स्थानीय विकास र उजभोक्ताले सहनगामी गर्न फरक हुनुहुन्छ ? छ छैन

५. लैङ्गिक दृष्टिकोणबाट महिला सहभागिता

अन्तर्गतको विभिन्न कार्यक्रम महिला सहभागिता प्रक्रिया, गैरसामान्यत विपन्न वर्गको, महिलाको अवस्था, उचित मुद्दा विस्थापित गर्न बर्बन्दा सहभागीता सम्बन्धि आवश्यक जानकारी, संकेतक भन्ने प्रत्येक खण्डकोमा विभिन्न प्रश्नहरूको उत्तर दिनुपर्नेछ।

क) महिलाहरूको उपस्थिति र सहभागिता

- ५.६. आयोजनाको कार्यमा सहभागिता गर्ने कुनै बैठक बोलाइएको थियो ?
थियो थिएन
- ५.७. आयोजनाको धनी, गन बैठकमा महिला उपस्थितगर्नाको उपस्थिति थियो ?
थियो थिएन
- ५.८. तल्लो थियो भने महिला उपभोक्ताहरूको भूमिका कस्तो थियो ?
उत्तम मात्र यन्त्रकिपात्मक निर्मात्मक
- ५.९. आयोजनाको निर्माणकार्यको विवरण पत्र को छातेपानी उपवास तथा सरसफाई विभिन्न/सबुवा राठने कार्यको बारे छ छैन/साथ छैन

ख) लैङ्गिक आधारमा कार्य विभाजन

५.१०. नयाँको मासिकतामा विद्याको कामहरूको स्तर कस्तो गर्ने गर्नुहुन्छ ? (चिन्ह लगाउनुमा)

क्र.सं.	कार्यको विवरण	पुरुष	महिला	कुल समय
१	आयोजनाको धनी, सवारी भण्डारण			
२	आयोजनाको धनी, सवारी भण्डारण			
३	सवारी भण्डारण र सवारीको सफाई			
४	सवारी भण्डारण र सवारीको सफाई			
५	आयोजनाको धनी, सवारी भण्डारण			
६	अन्य			

ग) परिवारिक कार्य, आय, खेत र अन्य विषयमा महिलाहरूको विद्यमान र पहुँच

५.११. तलको तालिकामा उल्लेखित परिवारिक विषयमा महिलाहरूको पहुँच गरीको र/वा परिवारमा महिलाको पहुँच गरीको हुनुलाई छ उपयुक्त कठिनाई (चिन्ह लगाउनुमा)

क्र.सं.	विषय वा कठिनाई	हुन्छ (V)	हुँदैन (X)
१	आय, परिवारिक खर्च		
२	सवारीको सफाई		
३	सवारीको सफाई		
४	सवारीको सफाई		
५	सवारीको सफाई		
६	सवारीको सफाई		
७	सवारीको सफाई		
८	सवारीको सफाई		
९	अन्य		



४	कम्यूनिटी फेसिलिटी				
५	केटाकटेलाइजिड पिपलाइन्स/प्राइवेट प्राइवेट प्राइवेट				
६	अन्य उपलब्ध स्रोत				

क्याइँ ७ परियोजनाको अन्य सदस्यले कहिले भएकिले महाजम्हाइर ?
 (४) पिपलाइन्सको स्थिति

१	पानी पाए				
२	नपाए				
३	असुर/पिपलाइन्स				
४	सुरक्षित पाए				
५	अन्य उपलब्ध स्रोत				

क्याइँ ८ परियोजनाको अन्य सदस्यले कहिले भएकिले महाजम्हाइर ?
 (५) पिपलाइन्सको स्थिति

१	पानी पाए				
२	नपाए				
३	असुर/पिपलाइन्स				
४	सुरक्षित पाए				
५	अन्य उपलब्ध स्रोत				

क्याइँ ९ फोहोर पानी व्यवस्थापन
 क्याइँ १० फोहोर पानी व्यवस्थापन
 १.१ फोहोर पानी व्यवस्थापनको विवरण
 १.२ फोहोर पानी व्यवस्थापनको विवरण
 १.३ फोहोर पानी व्यवस्थापनको विवरण
 १.४ फोहोर पानी व्यवस्थापनको विवरण

१	फोहोर पानी व्यवस्थापनको विवरण				
२	फोहोर पानी व्यवस्थापनको विवरण				
३	फोहोर पानी व्यवस्थापनको विवरण				
४	फोहोर पानी व्यवस्थापनको विवरण				

क्याइँ ११ फोहोर पानी व्यवस्थापनको विवरण

१	फोहोर पानी व्यवस्थापनको विवरण				
२	फोहोर पानी व्यवस्थापनको विवरण				
३	फोहोर पानी व्यवस्थापनको विवरण				



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ANNEX III
Sample of EMP Matrix





EMP Matrix

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
A. Types of Impacts					
a) Project Phase (Design/Construction/Operation)					

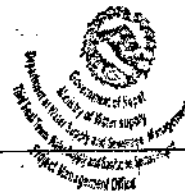


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ANNEX IV PHOTOGRAPHS







ANNEX 2: SAMPLE FORMS, FORMATS AND REPORT TEMPLATE



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Annex2A: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST FOR MIRCHAIYA PROJECT AND PRELIMINARY CLIMATE RISK SCREENING CHECKLIST FOR SAMPLE PROJECT TOWNS

Instructions:

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

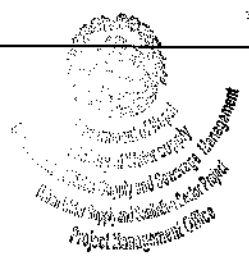
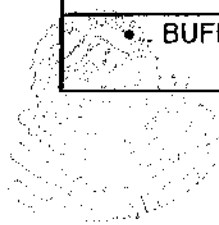
(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d)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

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

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

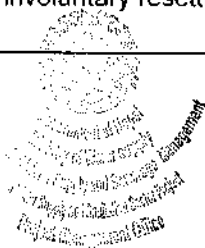
Subproject: **Mirchaiya Storm Water Drainage project**

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA			
▪ DENSELY POPULATED?		√	Mirchaiya Municipality 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		√	



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Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> SPECIAL AREA FOR PROTECTING BIODIVERSITY 		√	
<ul style="list-style-type: none"> BAY 		√	
B. POTENTIAL ENVIRONMENTAL IMPACTS			
Will the Project cause...			
<ul style="list-style-type: none"> impairment of historical/cultural monuments/areas and loss/damage to these sites? 		√	
<ul style="list-style-type: none"> Interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.? 	√		Regarding the access to buildings and roadside shops, it may interfere to some extent, but it can be avoided by providing temporary access to buildings and shops.
<ul style="list-style-type: none"> Dislocation or involuntary resettlement of people 		√	
<ul style="list-style-type: none"> Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		√	
<ul style="list-style-type: none"> Impairment of downstream water quality due to storm water discharge 		√	
<ul style="list-style-type: none"> Environmental pollution due to illegal entry of waste water in drain 	√		This can be avoided through regular monitoring.
<ul style="list-style-type: none"> social conflicts arising from displacement of communities ? 		√	
<ul style="list-style-type: none"> Risk and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation? 		√	
<ul style="list-style-type: none"> Discharge of hazardous materials to the proposed drain and danger to workers? 		√	
<ul style="list-style-type: none"> Road blocking and temporary flooding due to land excavation during the rainy season? 	√		Road blocking problem may arise but it can be mitigated through precautionary measures.
<ul style="list-style-type: none"> Noise and dust from construction activities 	√		EMP provides mitigation measures.
<ul style="list-style-type: none"> Traffic disturbances due to construction material transport and wastes 	√		EMP provides mitigation measures.
<ul style="list-style-type: none"> Temporary silt runoff due to construction 	√		
<ul style="list-style-type: none"> Hazards to public health due to illegal entry of waste water to the storm drains 	√		EMP provides mitigation measures.
<ul style="list-style-type: none"> Deterioration of water quality due to discharge of storm water to the recipient water bodies 	√		The proposed storm water drain is solely for conveying storm water, hence, there is less chance of pollution. However, EMP provides mitigation measures.
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people? 		√	



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

Preliminary Climate Risk Screening Checklist

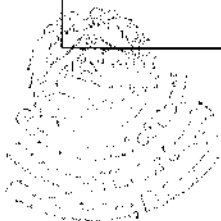
Country/Project Title: **Mirchalya Storm Water Drain Sub Project**

Sector:

Subsector:

Division/Department:

	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 proposed project will not likely be affected by climate change and extreme weather events due to the siting of project.
	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)?	2	For the project town, rainfall data of Siraha District (Ramoli Bariya) from 1991 AD to 2017 AD has been collected from DHM.
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 (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	



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Screening Questions		Score	Remarks
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	Regular operation and maintenance will not allow this effect to occur

Options for answers and corresponding score are provided 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 a 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): _____

Other

Comments: _____

Prepared by: _____



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ANNEX 2B: RELEVANT ENVIRONMENTAL QUALITY STANDARDS

1. Ambient Air Quality Standards

Parameter	Averaging Period	Nepal's Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) *	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$) **	
			Global Update 2005	Second Edition * 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.

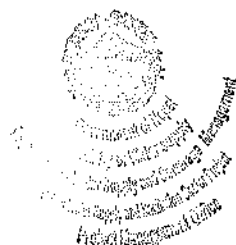
Parameter that either has no national standard value for 24-hour observation or with WHO guideline value for 24-hour observation as more stringent than that specified in the national standards.

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 _{avg} 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.



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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.



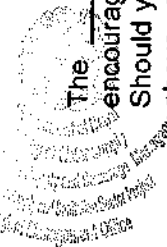
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ANNEX 2C: SAMPLE GRIEVANCE REDRESS FORM




Engineer



(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 enable 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?			

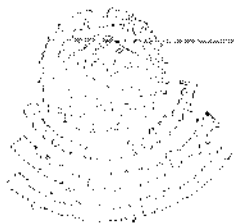
[Signature]
Engineer

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



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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;

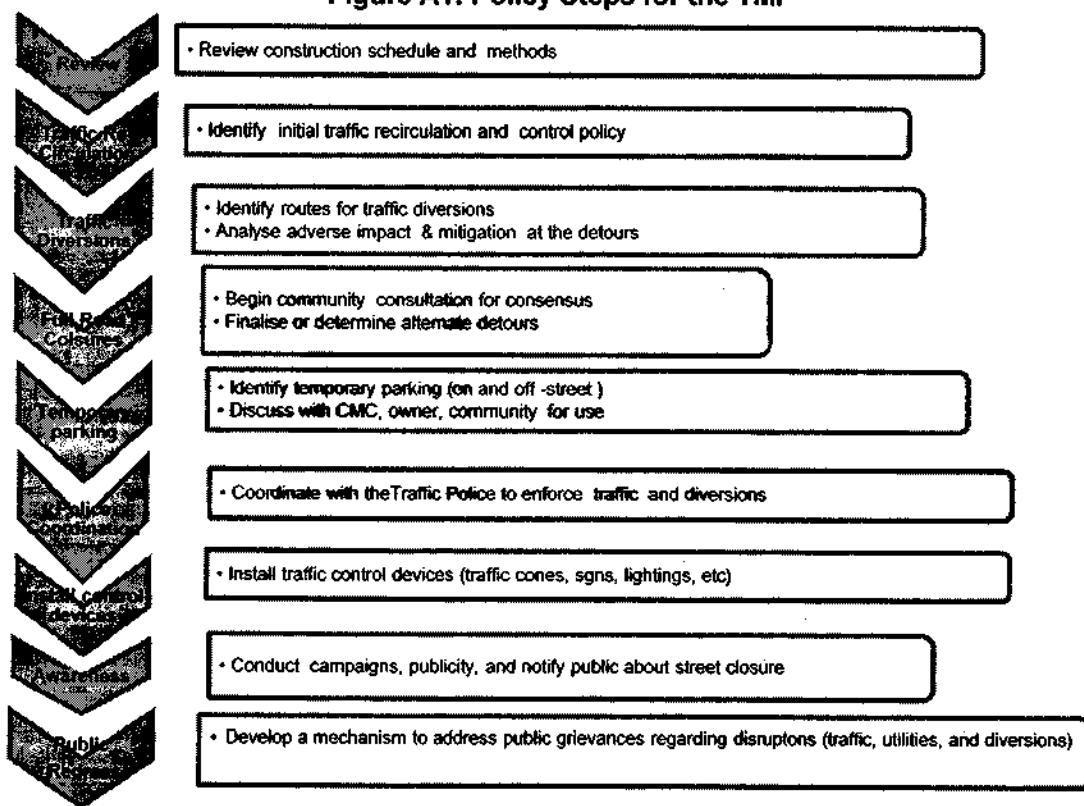


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 Engineer

- (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

Engineer

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.



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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

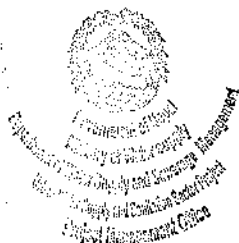
Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic 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.

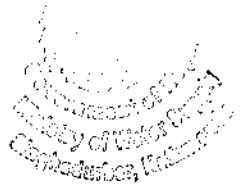
Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type)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




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ANNEX 2E:SPOIL MANAGEMENT PLAN



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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

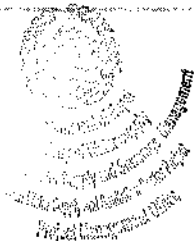
Section 8: Spoil transportation methodology

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



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Spoil volumes, Characteristics and Minimization

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

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



Adopt Spoil Reduce, Reuse Opportunities

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

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

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

Storage and stock piling

Transportation and haulage route

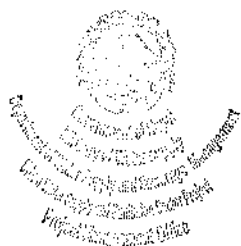
Based on the above, the contractor will prepare a SMP as an integral part of EMP and submit it to the DSMC for their review and approval.

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

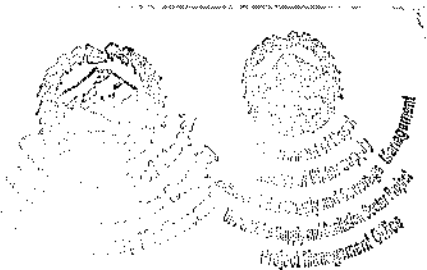
Appendixes

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



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



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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;



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- o Are their spill kits on site and if there are site procedure for handling emergencies;
- o Is there any chemical stored on site and what is the storage condition?
- o Is there any dewatering activities if yes, where is the water being discharged;
- o How are the stockpiles being managed;
- o How is solid and liquid waste being handled on site;
- o Review of the complaint management system;
- o 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

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- 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

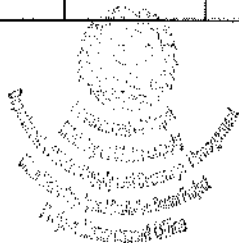
Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 ($\mu\text{g}/\text{m}^3$)	SO2 ($\mu\text{g}/\text{m}^3$)	NO2 ($\mu\text{g}/\text{m}^3$)

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 ($\mu\text{g}/\text{m}^3$)	SO2 ($\mu\text{g}/\text{m}^3$)	NO2 ($\mu\text{g}/\text{m}^3$)

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity ($\mu\text{S}/\text{cm}$)	BOD (mg/L)	TSS (mg/L)	TN (mg/L)	TP (mg/L)

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity ($\mu\text{S}/\text{cm}$)	BOD (mg/L)	TSS (mg/L)	TN (mg/L)	TP (mg/L)

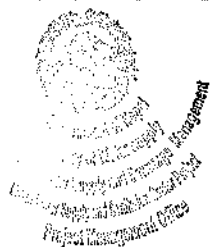


Signature
 Director

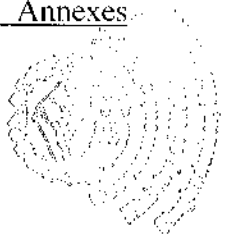
Noise Quality Results

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

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



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ANNEX 2G: SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT



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Project Name
Contract Number

NAME: _____

DATE: _____

TITLE: _____

DMA: _____

LOCATION: _____

GROUP: _____

WEATHER CONDITION: _____

INITIAL SITE CONDITION: _____

CONCLUDING SITE CONDITION:

Satisfactory _____
Resolved _____

Unsatisfactory _____
Unresolved _____

Incident _____

INCIDENT:

Nature of incident:

Intervention Steps:

Incident Issues

Resolution

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Inspection

Emissions	Waste Minimization
Air Quality	Reuse and Recycling
Noise pollution	Dust and Litter Control
Hazardous Substances	Trees and Vegetation

Site Restored to Original Condition Yes No

Signature _____

Sign off



Name
Position
Engineer
Engineer



Annex 3
Public Notice, Muchulka, Recommendation Letters & Minutes of Meeting



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PUBLIC NOTICE



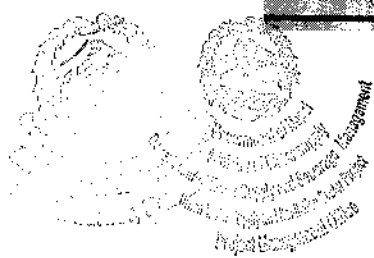
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राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६

राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६

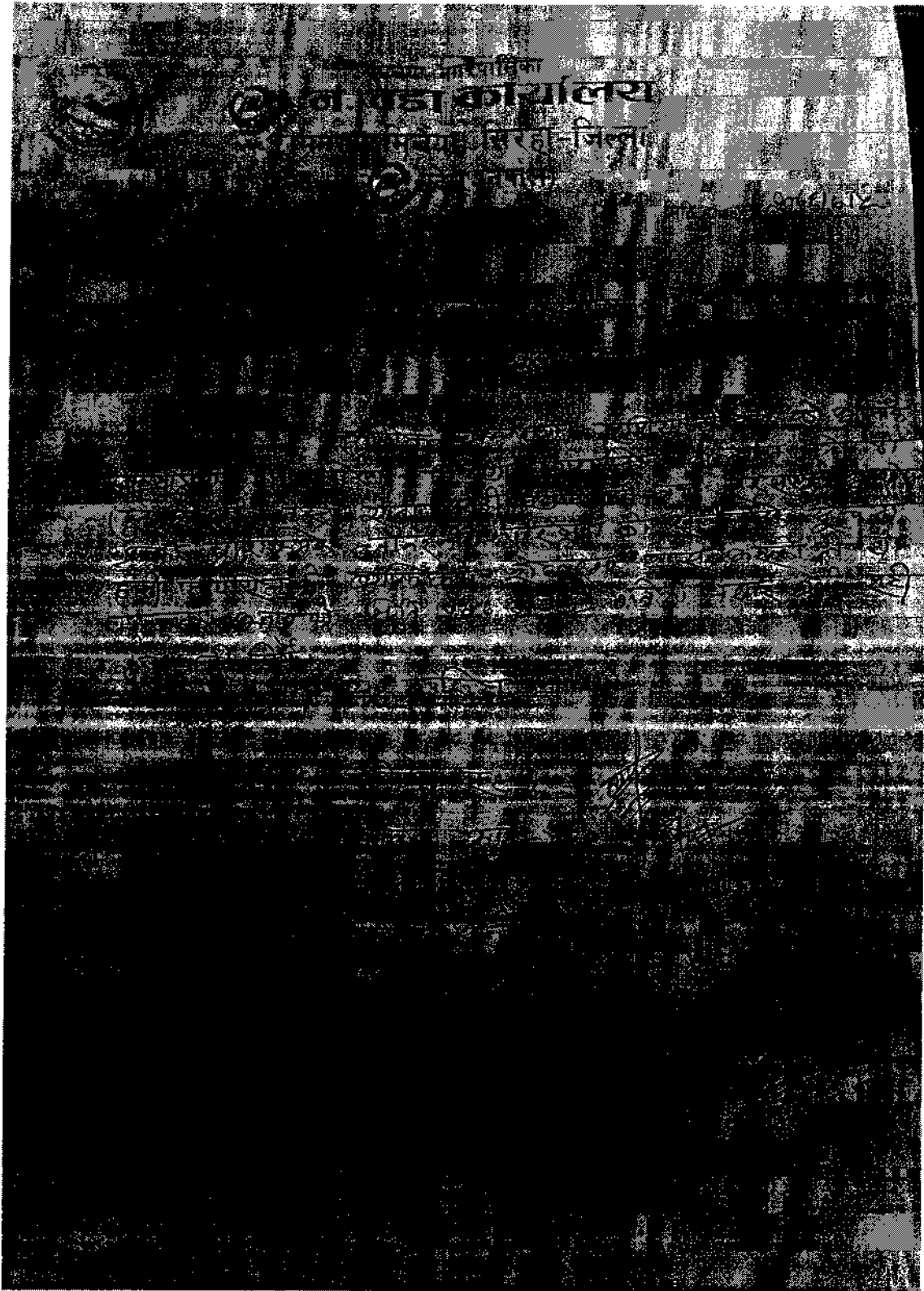
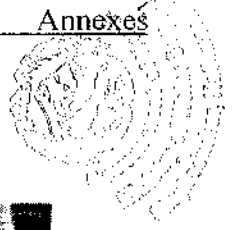
राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६

<p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p>	<p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p>	<p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p> <p>राष्ट्रिय वातावरण संरक्षण अधिनियम, १९८६</p>
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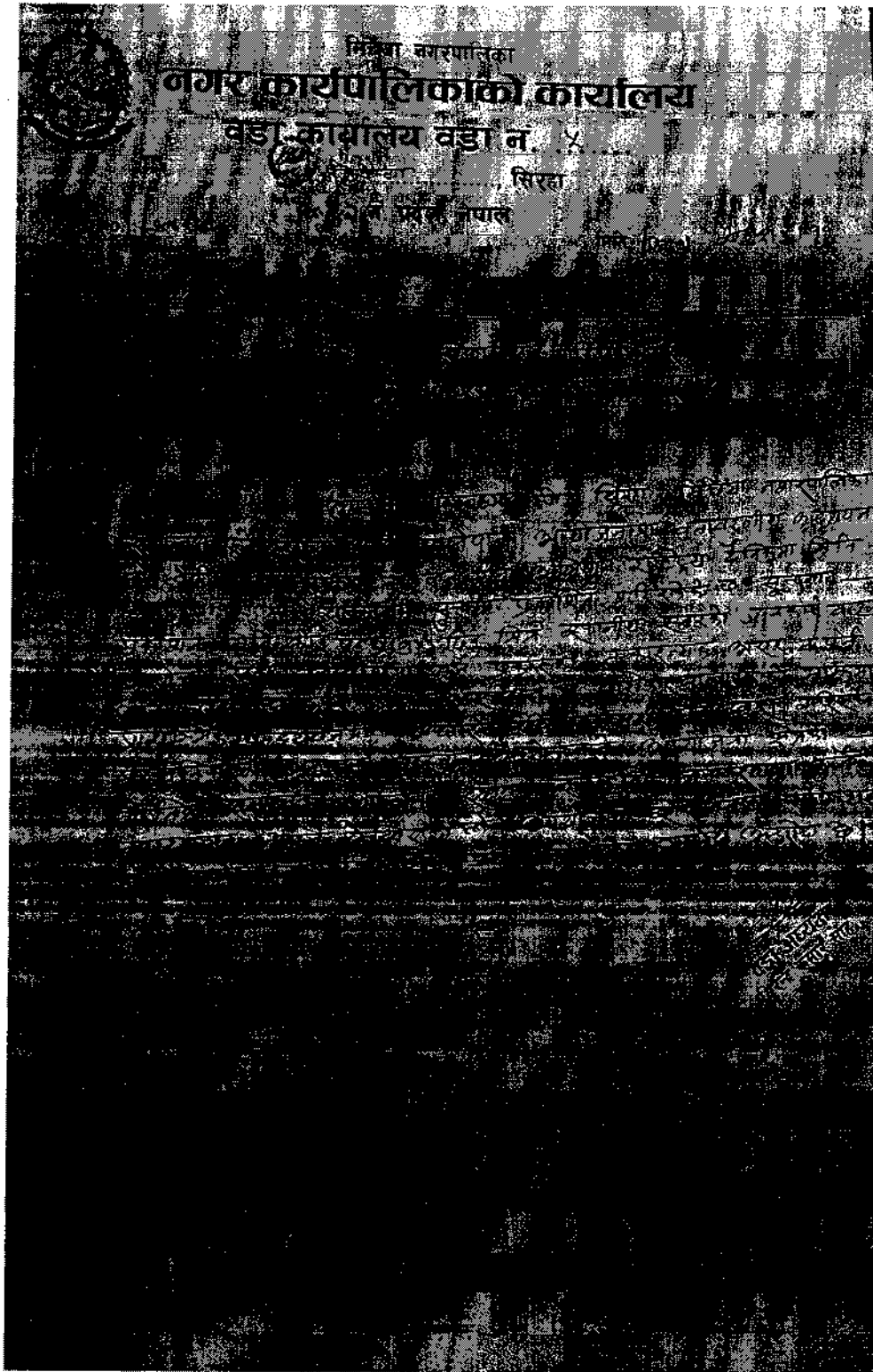
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Deed of Inquiry(Muchulka)



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RECOMMENDATION LETTER



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MINUTES OF PUBLIC CONSULTATIONS

आज मिति - 2068/2/19 गते को दिन मिर्चिया की कडासे
 जोडमा यहाँ को स्थानीय वायुदूध, मेला भइ वातावरणीय
 सम्बन्धी छलफल गरियो। मिर्चिया सगरपालिका का
 वाड नं. २, ६, ७ मा सतह छलको काम हुन याहाँको
 किसिमको वातावरणीय प्रभाव परिकेब भने सर्वसम्मती वाट
 छलफल गरि लिये गरियो।

उपस्थिति:

- | | | |
|------|------------------|--|
| (१) | गरत महा लेख | |
| (२) | प्रमोद कुमार साह | |
| (३) | महेश कुमार साह | |
| (४) | मोला साह | |
| (५) | सुभाष कुमार साह | |
| (६) | राम देव फर्पे | |
| (७) | दो खिलार गच्छ | |
| (८) | विष्णु दत्त गच्छ | |
| (९) | यमोद प्रसाद गच्छ | |
| (१०) | अशोक क. महता | |
| (११) | लाल अक्षर | |
| (१२) | सुभाष साह | |
| (१३) | सिद्ध साह | |
| (१४) | राजदत्त साह | |
| (१५) | सुभाष साह | |
| (१६) | विलय कुमार साह | |
| (१७) | शमनाथ साह | |
| (१८) | मिनोद कुमार साह | |
| (१९) | प्रदिप डाँडा | |
| (२०) | सुभाष कुमार महता | |
| (२१) | विनाय महता | |
| (२२) | महादेव महता | |
| (२३) | सुभाष कुमार साह | |
| (२४) | बिचल कुमार साह | |
| (२५) | विनाय कुमार साह | |
| (२६) | केशरी साह | |
| (२७) | सुभाष कुमार साह | |



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1. The project is being executed in accordance with the approved design and specifications. The work is progressing satisfactorily and is expected to be completed by the scheduled date.

2. The project is being executed in accordance with the approved design and specifications. The work is progressing satisfactorily and is expected to be completed by the scheduled date.

3. The project is being executed in accordance with the approved design and specifications. The work is progressing satisfactorily and is expected to be completed by the scheduled date.

4. The project is being executed in accordance with the approved design and specifications. The work is progressing satisfactorily and is expected to be completed by the scheduled date.

5. The project is being executed in accordance with the approved design and specifications. The work is progressing satisfactorily and is expected to be completed by the scheduled date.

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9. The project is being executed in accordance with the approved design and specifications. The work is progressing satisfactorily and is expected to be completed by the scheduled date.

10. The project is being executed in accordance with the approved design and specifications. The work is progressing satisfactorily and is expected to be completed by the scheduled date.

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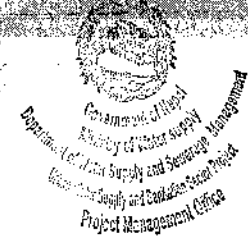
(2) दल विकास के कार्यालय में कार्य करने वाले कर्मियों को नियमित रूप से प्रशिक्षण देना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा।

(3) प्रशिक्षण के माध्यम से किसानों को आधुनिक तकनीकें प्रदान की जाएंगी। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा।

(4) प्रशिक्षण के माध्यम से किसानों को आधुनिक तकनीकें प्रदान की जाएंगी। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा।

(5) प्रशिक्षण के माध्यम से किसानों को आधुनिक तकनीकें प्रदान की जाएंगी। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा। प्रशिक्षण कार्यक्रमों को सुचारु रूप से चलाना होगा।

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Engineer

Other Consultations Programs

Mechanica Storm Drainage project Date: April 18, 2019 Location: Gazon Area Ward-7

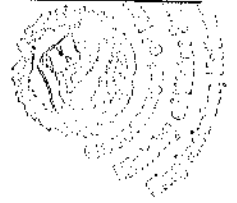
Sl. No.	Name of the participants	Address	Male	Female	Signature
1	Kamleshwar Sah, Chairman WDC	Mechanica	✓		[Signature]
2	Kalkeshwar Sah, WDC Secretary	Mechanica			[Signature]
3	Darprakash Yadav	Local Ward-7			[Signature]
4	Anita Kumar Sah	Ward-7			[Signature]
5	Jyotsna Pandey	"			[Signature]
6	Chitup Kumar	"			[Signature]
7	Kashab Narayan Das	"			[Signature]
8	Ganeshwar Das	"			[Signature]
9	Manoj Kumar	"	✓		[Signature]
10	Anjan Kumar	"	✓		[Signature]
11	Prakash Kumar Mandal	Ward-7	✓		[Signature]
12	Hemidra Kalia Social Worker	Ward-7			[Signature]
13	Shree Arjun, Teacher	Ward-7			[Signature]
14	Manoj Yadav, Local	Ward-7			[Signature]

Mechanica Storm Drainage project Date: April 19, 2019 Location: Gazon Area Chaptachowk

Sl. No.	Name of the participants	Address	Male	Female	Signature
1	Dilpa Sharma, SA Janta	Ward-7	✓		[Signature]
2	Kalkeshwar Sah, WDC Secretary	Mechanica	✓		[Signature]
3	Rishi Kumar, WDC Member	"	✓		[Signature]
4	Anita Dasi Sah	Ward-7			[Signature]
5	Surendra Yadav	Mechanica-7	✓		[Signature]
6	Shoban Kumar Mandal	"	✓		[Signature]
7	Kamleshwar Sah	Ward-7	✓		[Signature]
8	Kishor Choudhary	Ward-7	✓		[Signature]
9	Jyoti Choudhary	Ward-7		✓	[Signature]
10	Kishor Dasi Mandal	"		✓	[Signature]
11	Shree Anil Kumar	Engineer, Gazon	✓		[Signature]
12	Roshan Subedi	CE/SA - Gazon	✓		[Signature]
13	Ganesh Kumar Choudhary	CE/Mechanica	✓		[Signature]
14	Suresh Yadav	Local Ward-7	✓		[Signature]
15	Anurupa Shrestha	Engineer, Gazon	✓		[Signature]
16	Suresh & Kishor Yadav	Engineer, Gazon	✓		[Signature]
17	Rishi Kumar	Engineer, Gazon	✓		[Signature]
18	Thapana Yadav	Engineer, Gazon	✓		[Signature]
19	Prasanna Shrestha	Engineer, Gazon	✓		[Signature]
20	Fulanda, Kustaha	WDC Congress Party	✓		[Signature]



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Annex 4 SIMPLE CHECKLISTS



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Mirchajya Storm Water Drainage Project

Checklist for Physico-Chemical Environment

Parameters	Description
Topography	Latitude $26^{\circ}32'N$ to $26^{\circ}55'N$, Longitude $86^{\circ}06'$ to $86^{\circ}26'E$. Flat Topography with avg. elevation (110 to 120)m
Geology (Rock and Soil Types)	Sand, Silt & Clay
Erosion and Sedimentation	No
Floods	Flash Flood Events during monsoons
Climate	Subtropical climate Monsoon - June to September Avg. Rainfall: 2152mm
Quarry Sites (If any)	No
Land Use	Agricultural land dominates land use followed by residential & commercial areas
Air Quality	Medium
Noise Level	Medium
Drainage Network	Existing drainage system is unplanned and covers small portion of project area. Existing drains are not functioning properly due to improper design, size and improper implementation process.



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B. Vegetation and Wildlife
Vegetation in the project area

SN	Local Name	Botanical Name	Location	Vegetation Type	Local Status	Local Uses	IUCN	Protection Status	
								CITES	GoN / IBAT
1.	Kol	<i>Shorea robusta</i>	Nearby forests	Trees	LC	Medicinal, Making Plates, Cupel Boards, Edible Seeds, Fuelwood	LC	LC	LC
2.	Khair	<i>Acacia catechu</i>	"	"	"	Medicinal Uses, Edible Seeds, Fuelwood, Furniture	LC	LC	LC
3.	Acan	<i>Terminalia tormentosa</i>	"	"	"	Furniture, Bending	"	"	"
4.	Korma	<i>Adina cordifolia</i>	"	"	"	Medicinal Uses, Crust, Coarse	"	"	"
5.	Jamun	<i>Syzygium cumini</i>	"	"	"	Edible Fruits, Appetiser	"	"	"
6.	Sisou	<i>Balbegeia cissao</i>	"	"	"	Agroforestry, Fops, Weaving, Furniture	"	"	"
7.	Seta Seta	<i>Albizia procera</i>	"	"	"	Edible Fruits, Agro- forestry, Medicinal, Fuelwood, Furniture	LC	LC	LC
8.	Bokand	<i>Melia azadirachta</i>	"	"	"	Edible Fruits, Agroforestry	LC	LC	LC
9.	Qajam	<i>Tectaria grandis</i>	"	"	"	Medicinal, Crust, Fuels, Fuel Wood	LC	LC	LC
10.	Bat	<i>Agave maritima</i>	"	"	"	Fuels, Agroforestry, Medicinal, Fuelwood	LC	LC	LC
11.	Bat Dajaro	<i>Lagotis arvensis parviflora</i>	"	"	"	Edible Gum, Crust, Fuel Wood	LC	LC	LC

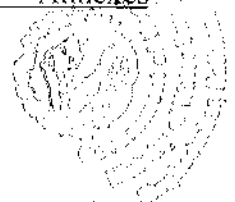


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SN	Local Name	Botanical Name	Location	Vegetation Type	Local Status	Local Uses	IUCN	Protection Status	
								CIITES	I.BAT
Non-Timber Forest Products									
1	Bans	Bambusa	Benifalada Near Lumban Mountain	Grass	LC	Grass, shrub, medicinal Agroforestry etc.	LC	LC	LC
2	Amala	Emilica officinalis	"	Trees	"	Edible, Medicinal	LC	LC	LC
3	Harro	Terminalia chepalata	"	"	"	Medicinal, dyeing, edible seeds	"	"	"
4	Barro	Terminalia bellirica	"	"	"	Medicinal, religious	"	"	"
5	Near	Aspidosperma indica	"	"	"	Medicinal, edible fruits, agroforestry	"	"	"
6	Jhis, Beti	Pithecellobium dulce	"	Shrubs	"	Food, Medicinal, Fodder, etc. etc.	"	"	"
7	Mango	Mangifera indica	"	Trees	"	Edible fruits, seeds, Medicinal etc.	"	"	"
8	Guava	Psidium guajava	"	"	"	Medicinal, agroforestry, edible fruit	"	"	"
9	Simet	Bombax ceiba	"	"	"	Medicinal, agroforestry, various other uses	"	"	"
10	Pipat	Ficus religiosa	"	Trees	"	Religious, Medicinal, Ayurved, etc.	"	"	"

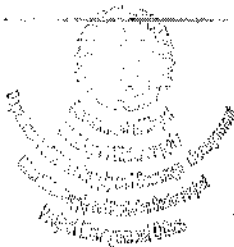


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Mammals in the project area

SN	Common Name	Scientific Name	Habitat	Local Status	Crop/Livestock Raiser	Protection Status		
						IUCN	CITES	GoN IBAT
1	Common Mongoose	<i>Haplorhina edwardsii</i>	Nearby Forests Open Field	Commonly found	No	LC	LC	LC
2	Fox	<i>Vulpes vulpes</i>	Nearby Forests	Occasionally found				
3	Golden Jackal	<i>Canis aureus</i>	"	Occasionally found				
4	Hoare	<i>Lepus sylvaticus</i>	"	Commonly found	No			
5	Jungle Cat	<i>Felis chaus</i>	"	Occasionally spotted	Livestock Raider			
6	Jungle Rat	<i>Bandicota indica</i>	Nearby Forests	Commonly found	Crop Raider			
7	Long winged Tusked Squirrel	<i>Taphozous longimanus</i>	Nearby Forests	"	No			
8	Pheasant Quail	<i>Motacilla alba</i>	"	Commonly found	Crop Raider			
9	Squirrel	<i>Funambulus sp.</i>	"	"	"			

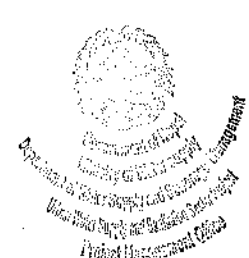
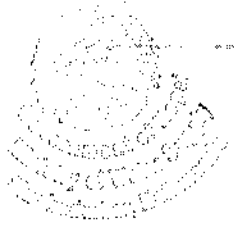


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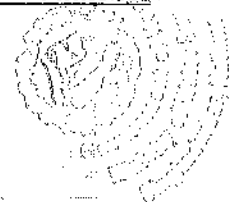
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Birds Sighted in the project area

SN	Common Name	Scientific Name	Type	Habitat	Local Status	Protection Status		
						IUCN	CITES	GoN / IBAT
1.	Busam-headed parakeet	<i>Ptilinopus roseata</i>	Forest	Nearby Forests Human habitations	LC	LC	GoN LC	LC
2.	Common May Hen	<i>Gallinula chloropus</i>	Wetlands	Nearby Forests Settlements	LC			
3.	Grey-headed Canary Flycatcher	<i>Cisticopa cerulea</i>	Forest	Nearby Forests	LC			
4.	Indian Quail	<i>Cuculus micropterus</i>	Cuckoo	Nearby Forests	LC			
5.	Red Pheasant	<i>Lophura leucomegala</i>	Pheasant		LC			
6.	Large Billed Crow	<i>Corvus macrorhynchos</i>	Jungle Crow	Nearby Forests Human Settlements	LC			
7.	Northern Pintail	<i>Anas acuta</i>	Duck	Human Settlements	LC			
8.	Red Jungle Fowl	<i>Bonasia gallus</i>	Tropical		LC			
9.	Red-whiskered bulbul	<i>Pycnonotus leucostriatus</i>	Passerine	Open areas with bushes, Gardens	LC			
10.	Rose ringed parakeet	<i>Ptilinopus roseata</i>	Bulbul	Nearby Forests Settlements	LC			
11.	Scaly-bellied woodpecker	<i>Picus squamatus</i>	Woodpecker	Nearby Forests	LC			

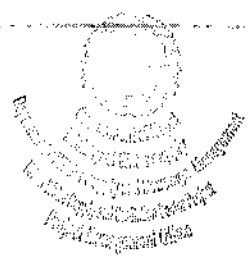


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Mammals in the project area

SN	Common Name	Scientific Name	Habitat	Local Status	Crop/Livestock Raider	Protection Status		
						IUCN	CITES	GoN
1	Common Mongoose	<i>Hesperomys pardalis</i>	Nearby forest Agricultural field	Commonly Found	No	LC	LC	LC
2	Fox	<i>Vulpes vulpes</i>	Nearby forests	Occasionally Found	Livestock Raider	"	"	"
3	Golden Jackal	<i>Canis aureus</i>	"	Occasionally Spotted	"	"	"	"
4	Have	<i>Lepus nigricollis</i>	"	Commonly Found	No	"	"	"
5	Jungle Cat	<i>Felis Chaus</i>	"	Occasionally Spotted	Livestock Raider	"	"	"
6	Jungle Rat	<i>Randolphia indica</i>	Nearby forest Field	Commonly Found	Crop Raider	"	"	"
7	Long tailed Tosh 6 Sole	<i>Taphozomys trigymnus</i>	Nearby forest	"	No	"	"	"
8	Rhesus Monkey	<i>Macaca mulatta</i>	"	Commonly Found	Crop Raider	"	"	"
9	Squirrel	<i>Surambulung</i>	"	"	"	"	"	"



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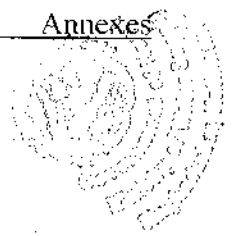
Birds Sighted in the project area

SN	Common Name	Scientific Name	Type	Habitat	Local Status	Protection Status		
						IUCN	CITES	GoN
1.	Basson headed parakeet	<i>Psaltriparus tenebrosus</i>	Parrot	Nearby Forests Hills, Near hills	LC	LC	LC	LC
2.	Common Moor Hen	<i>Gallinula chloropus</i>	Waterfowl	Nearby Human Settlements	LC	LC	LC	LC
3.	Grey Headed Canary Flycatcher	<i>Cantocopa colorata</i>	Insectivore	Nearby Forests	LC	LC	LC	LC
4.	Indian Cuckoo	<i>Cuculus micropterus</i>	Cuckoo	Nearby Forests	LC	LC	LC	LC
5.	Kollj Pheasant	<i>Lophura leucostriata</i>	Pheasant	LC	LC	LC	LC	LC
6.	Large Billed Green	<i>Corvus macrorhynchos</i>	Scrub	Nearby Forests Human Settlements	LC	LC	LC	LC
7.	Northern Pintail	<i>Anas acuta</i>	Duck	Human Settlements	LC	LC	LC	LC
8.	Red Jungle Fowl	<i>Gallus gallus</i>	Tropical	LC	LC	LC	LC	LC
9.	Red whiskered bulbul	<i>Pycnonotus melanurus</i>	Passerine	Open areas with bushes, Gardens	LC	LC	LC	LC
10.	Rose ringed parakeet	<i>Psittacula krameri</i>	Psittacidae	Nearby Forests Human Settlements	LC	LC	LC	LC
11.	Scaly-bellied Woodpecker	<i>Picus squamatus</i>	Woodpecker	Nearby Forests	LC	LC	LC	LC



Ministry of Environment, Conservation and Forestry
 Government of Nepal
 Project Management Office

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Herpeto-fauna in the Project Area

S.N.	Local Name	Scientific Name	Habitat	Local Status	Protection Status		
					IUCN	CFES	GoN IBAT
1.	Large eyed false cobra	<i>Pseudonaspion nescrops</i>	Nearby Forests and grassland in human settlement	Occasionally spotted	LC	LC	LC
2.	Common Krait	<i>Bungarus caeruleus</i>	"	"	"	"	"
3.	Common Lizard	<i>Zootoca vivipara</i>	Human Settlements	Commonly Found	"	"	"
4.	Common Toad	<i>Suhyphurus melanostictus</i>	Shrubland near stream, vicinity of sewage & fields	Commonly Found	"	"	"
5.	Ran Throated Lizard	<i>Sipora pontecorniani</i>	Nearby Forests	Occasionally Spotted	"	"	"
6.	Stream Frog	<i>Rhombophryne</i>	Nearby Streams	Commonly Found	"	"	"

Fish in the Project Area

S.N.	Local Name	Scientific Name	Status of Occurrence	Migratory Status/Season	Observed Location
2.	Garahi	<i>Channa garahus</i>	LC		"
3.	Rahu (Magal)	<i>Cirrhitus nimgala</i>	LC		"
4.	Rahu (Minesi Crabs)	<i>Lochea buda</i>	LC		"



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CHECKLISTS FOR FOCUS GROUP DISCUSSION

A. FOCUS GROUP DISCUSSION -1

Date: 18 April, 2019

Project: Mirchaiya Storm Water Drainage Project

Venue: Mirchaiya Bazaar, Ward no. 7

Number of Participants: 8

Purpose Statement: Information Dissemination to the participants regarding TSTWSSSP, Discussions regarding the proposed project and Roles & Responsibilities of various Stakeholders

Question 1: Do you know about Third Water Supply & Sanitation (Sector) Project? If yes, can you please share the information you know about this project?

Findings: All the participants are aware about the proposed project.

Question 2: How do you feel about the project proposed in your town? Do you think that this proposed project is important for your town?

Findings: According to the participants, they are in need of effective drainage system as they have facing flooding problems for decades during monsoons. Thus, they expect this proposed project to provide sanitation services through properly planned drainage system.

Question 3: How familiar are you with the term "Environment"?

Findings: The participants are also found aware about the environment.

Question 4: Are there any community forests and protected areas within this project area?

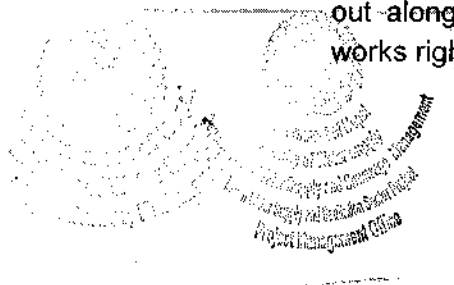
Findings: Neither protected areas nor community forests are known to be existing within the project area.

Question 5: Do you have any idea about the environmental concerns regarding the proposed project?

Findings: Their main concerns regarding the environmental aspects are Dust Emissions, Water Quality, Noise Pollution, Traffic Hindrance, 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 blockage problems during operation phase

Question 6: Do you have any objection regarding the project activities that will be carried out along the highway?

Findings: They stated "No Objection" regarding the project activities that will be carried out along the highway. However, they urged to execute prompt backfilling works right after the completion of laying works of drainage pipes.



Engineer

Question 7: As a stakeholder, how can you contribute from your side to minimize the anticipated environmental issues?

Findings: After assuring about the mitigation measures for the environmental concerns they raised, they committed to contribute to support safeguard implementation of the proposed project.

Question 8: Lastly, what would you say are the most important issues you would like to express about this project?

Findings: The most important issue they raised about the proposed project is the assurance for the provision of effective drainage system as they having facing flooding problems for decades and they always have to live in fear of loss of their livews as well as their property.

B. FOCUS GROUP DISCUSSION -2

Date: 04 May, 2019

Project: Mirchaiya Storm Water Drainage Project

Venue: Mirchaiya Municipality

Number of Participants: 8

Purpose Statement: Overall project document. Design presentation, Discussion on other project related topic Safeguard and environment.

Question 1: You must be familiar with TSTWSSSP as we had already discussed about it in our earlier discussion programs. Now, we are here for Detailed Design Report presentation and other related discussions. Do you have to say anything regarding this?

Findings: According to the participants, they are very much enthusiastic towards the proposed project. They want this proposed project to be commenced as soon as possible.

Question 2: The issue you raised regarding the initiation of the project is intrinsic as we understand the risks of flooding problems you have been going through for decades. After the approval of detailed design report, we will be heading for detailed design works. Once it gets completed, the project will go for construction and operation accordingly. During this, we need full support from the municipality as well as local people.

Findings: The participants as the representatives of local community are ready to provide full support to the consultant team to lead the proposed project towards ultimate success.

Question 3: As we have already discussed about the environmental concerns regarding the proposed project in our earlier discussion programs, we like to inform you that more or less obviously some environmental issues will be raised during construction of the project; During construction period, these anticipated environmental issues may bother the surroundings to some extent only; however, we assure you that those issues will not be either extreme or permanent.



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Findings: Like other projects, people of this project town are concerned about the environmental issues that include especially Dust Emissions, Noise Pollution, Obstruction to the vendors & passersby, Damage to the existing facilities and Construction Waste & Solid Waste Management during construction period as like in the earlier discussion programs. We assure them about the mitigation of these likely environmental impacts by adopting the proposed mitigation measures.

However, some participants queried that how the environmental impacts can be evaluated as temporary or moderate. In regard to this, we informed them about our safeguard expert team and their expertise to evaluate the significance of the impacts during design study period. Similarly, we also informed them about the mobilization of the safeguard expert team during project construction period also.

Question 4: We also want to inform you that this project is focused on the enhancement of GESI issues. We are happy to know that the WUSC has considered GESI issues during appointment of members of WUSC as here WUSC has two female general members and one as Treasurer. This kind of Gender Equity if continues this till the completion of the project through various other activities like considering GESI issues in various capacity building programs under the proposed project and other various related programs will be plus point for the successful implementation of the project.

Findings: The participants showed positive response towards GESI issues as they stated that the proposed project is for all and there will be no prejudice. Hence, they assured us to give continuity to prioritize GESI issues during the implementation of the proposed project.

Question 5: As a stakeholder, how will you contribute from your side to minimize the anticipated environmental issues?

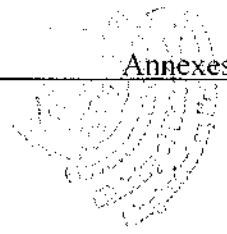
Findings: As a responsible stakeholder, they committed to contribute to support safeguard implementation of the proposed project like a) establishing coordination with the locals during construction works as some ignorant people may create hindrance to the project works due to the temporary discomfort they may suffer; b) facilitating to contact local scrap vendors for the sale of recyclable wastes generated from the construction works; c) facilitating to dispose the wastes to the approved landfill sites of the project town etc.

Question 6: Lastly, what would you like to say about this project?

Findings: Lastly, the participants articulated their desire to get sanitation service service through the successful completion & implementation of the proposed project along with the mitigated environmental impacts. They are very pleased to know that their aspiration for the proposed project has now become real & tangible.



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**Annex 5
PHOTOGRAPHS**



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1. Existing Storm Drain at D/S of E-W Highway



2. Existing Storm Water Drain at Matharwa



3. A view of E-W highway under service area



4. Outfall location Jiwa Khola



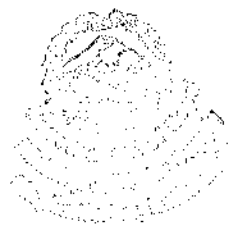
5. Outfall location after confluence of Jiwa and Bataha khola



6. Final Design Report Presentation at Mirchaiya Municipality



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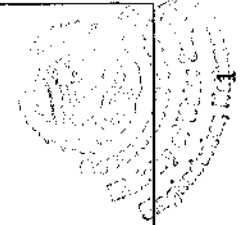


Comment and Response Matrix
Mirchaiya Storm Water Drainage Project, Siraha

S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
A. By Prem Nidhi KC, Social Development Expert				
1	Executive Summary (Nepali)	Please edit the Nepali Summary of the report	कार्यकारी सारांश -Page viii to xiv	This has been incorporated.
2	Chapters 3 & 4	Please incorporate Policy, Legal and Administrative Framework in Chapter 3 instead of Chapter 4 and Methodology in Chapter 4	Chapter 3 & 4	This has been incorporated.
3		Methodology		
a)	Chapter 3	Direct Observation and Transect Walk Method are not same method	Chapter 4, Section 4.3.3, Line 95, Page 36	This has been incorporated.
4	Chapter 5, Section 5.3	Socio-economic and Cultural Environment A) Please maintain socio-economic and cultural data presentation in the following order: a) Demographic Features -Settlement Pattern, Population Distribution, Male/Female Ratio, Age-wise distribution, Migration Pattern b) Caste/Ethnic Groups -Caste/Ethnic Groups, Religion, Language/Dialect c) Household Heads -Male/Female, Elderly Poor and Ethnic Minorities d) Economic Features -Landholding size and ownership -Economy: Occupation/Employment	Chapter 5, Section 5.3, Pages 45 to 54	This has been incorporated.



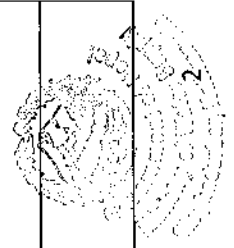

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S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
		<p>-Income and Employment</p> <p>-Local Price Information: Land, Agriculture, Forest Products, etc.</p> <p>d) Education & Skills</p> <p>-Literacy Rate, Skill Human Resource</p> <p>e) Health and Sanitation</p> <p>-Health Post, Hospitals, Prevalent Diseases, Incidence of water borne diseases and Infectious Diseases</p> <p>f) Community Infrastructure</p> <p>-Water Supply and Sanitation/Sewer Line, Irrigation, Transportation, Communication and Electricity etc.</p> <p>g) Archaeological Areas/Sites: Historic, Religious or Cultural Places etc.</p> <p>h) Local Institutions: GOs, NGOs, Cooperatives, CBOs etc.</p> <p>i) Other Development Activities: (Industries)</p>		
<p>By Mr. B.R. Manandhar (Environmental Engineer & Freelancer Expert)</p>				
1	Chapter 2, Section 2.6, Line 56, Page 14	It's not clear as to why wards comprising core area and surrounding area are exactly the same. Wards being the smallest geographical administrative units, it is important to explain why no impacts (even of low magnitude) are expected to occur in the neighboring wards.	Chapter 2, Section 2.6, Line 57, Page 16	The wards are reviewed and revised as per the expert's suggestion. It is then incorporated in the report.
2	Chapter 2, Sub Section 2.7.1 & 2.7.2, Page 16 & 17	Impact mitigating activities and environmental monitoring activities should not be included under construction activities.	Chapter 2, Sub Section 2.7.1 & 2.7.2, Page 18	This has been incorporated.
3	Chapter 3, Sub Section 3.1, Page 18	A categorical list of maps, documents, reports reviewed along with their names and dates of publication should	Chapter 4, Section 4.1, Line 83, Page 34	This has been incorporated. Key documents are listed

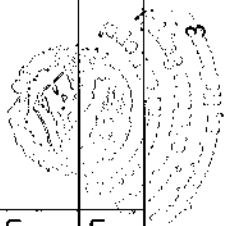
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S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
		be given.		here. Other reviewed documents are included in Chapter 14-"Literature Review"
4	Chapter 2, Section 2.6, Line 55 & 56, Page 14	Core areas is associated with high magnitude impacts whereas surrounding area is associated with medium/low magnitude impacts as spill-over effects of those that occur within the core area.	Chapter 2, Section 2.6, Line 56 & 57, Page 15 & 16	This has been incorporated.
5	Chapter 3, Section 3.3,	(Section 3.3) Secondary data collected through literature review need not be mentioned under field study.	Chapter 4, Sub Section 4.3.1, Line 90, Page 35	It has been omitted.
6	Chapter 3, Sub Section 3.3.1, Page 19	For collection of baseline information, use of Simple Interaction Matrix, which utilizes mutual interaction between activity and environmental component, instead of a Simple Checklist would be a more convenient and effective.	Chapter 4, Sub Section 4.3.1, Page 35	Simple Checklist Method has already been adopted in this method. Hence, this will be considered in other projects.
7	Chapter 3, Sub Section 3.3.1, Page 19 Chapter 3, Section 3.7, Line 98, Page 21	Methods/tools used for quantification of impacts on physical environment, if any, should have been mentioned as well under Methodology.	Chapter 4, Sub Section 4.3.1, Line 91, Page 35 Chapter 4, Section 4.7, Line 101, Page 37	This has been incorporated.
8	Chapter 5, Sub Section 5.1.3, Page 38	It'd be highly advisable to present percentage distribution of land uses existing within the core area.	Chapter 5, Sub Section 5.1.3, Line 112, Table 5-1, Page 39	No data is available regarding the percentage distribution of land within the core area. However, the data of the project district is presented.
9	Chapter 5, Sub Section 5.1.5, Page 38	Existing sources of pollution that pollute the water bodies have not been mentioned.	Chapter 5, Sub Section 5.1.5, Line 118, Page 42	This has been incorporated.
10	Chapter 7, Sub Section 7.2.1 b) -vii), Page 52	It is utterly confusing as to why impacts of water supply project on land use have been described in paragraph	Chapter 7, Sub Section 7.2.1 b) -vii), Line 210, Page 61	This has been incorporated.

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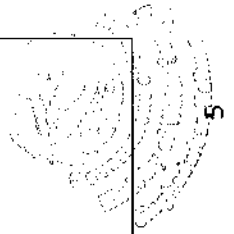


S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
		204.		incorporated.
11	Chapter 7, Sub Section 7.2.1 b) -vii), Page 52	It'd be better to quantify the impact on land use due to placement of project structures.	Chapter 7, Sub Section 7.2.1 b) -vii), Line 210, Page 61	This has been incorporated.
12	Chapter 8, Sub Section 8.1.1 a)-v), Page 62	(Para 268) Mention of incineration as a method of final disposal of bio-degradable fractions of solid waste is in contradiction with air pollution control measures, which includes among others, strict prohibition of open burning of solid waste.	Chapter 8, Sub Section 8.1.1 b)-v), Line 268, Page 71 & 72	This has been incorporated.
13	<ul style="list-style-type: none"> Chapter 8, Sub section 8.1.3 Page 63 Chapter 8, Sub section 8.1.3 b)-i), Line 246, Page 64 Chapter 12, Page 105 	Project design and operation should be undertaken with utmost care so that collected storm water does not mix with domestic wastewater.	<ul style="list-style-type: none"> Chapter 8, Sub section 8.1.3 a)-i), Line 275, Page 73 Chapter 8, Sub section 8.1.3 c)-i), Line 277, Page 74 Chapter 12, Line 354, Page 115 	This has been incorporated
Comments by MoWS				
1.	कार्यकारी सारांश, Line ३, Page viii	Better to use the word 'कार्यान्वयन रहेको समस्याको कारण' rather than the word 'अनुचित कार्यान्वयन प्रक्रिया' in introduction of executive summary.	कार्यकारी सारांश, Line ३, Page viii	This has been incorporated.
2.	कार्यकारी सारांश, Line ४, Page viii	Mention the date of EPA as 2053 instead of 2054 in executive summary.	कार्यकारी सारांश, Line ४, Page viii	This has been incorporated.
3.	कार्यकारी सारांश, Line ७ घ), Page x Executive Summary, Line 7 d), Page ii	As 'वातावरणीय सुरक्षा नियमावली, २०१७' is mentioned in Nepali executive summary and EPR, 1997 in English executive summary, correct the name of legislation.	कार्यकारी सारांश, Line ७ क), Page ix Executive Summary, Line 7 a), Page ii	This has been incorporated.
4.	Chapter 2, Section 2.3, Table 2-3, S No. 7, Pages	In table 2.3, salient features, the present population has been taken of year 2014, it is already 2020, there has	Chapter 2, Section 2.3, Table 2-III, S No. 8, Page 11	This has been incorporated.



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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
5.	Chapter 2, Section 2.3, Table 2-III, S No. 9	been difference of 6 years, so better to update the data.	Chapter 2, Section 2.3, Table 2-III, S No. 10, Page 11	This has been incorporated.
6.	Chapter 2, Section 2.3, Table 2-3, Pages 9 & 10	Better to mention about phase I and phase II in detail, also mention about the data required, impact and mitigation related to both phases.	Chapter 2, Section 2.3, Table 2-III, Pages 10 & 11	This has been incorporated. It is noted that the detailed design and IEE study has been carried out in regard to both phases.
7.	Chapter 2, Section 2.3, Table 2-3, S No. 6, Page 9	Better to mention about manhole (size, distance etc.) about width and height of drain, about the ending point of the drain and construction period in salient features table too.	Chapter 2, Section 2.3, Table 2-III, S No. 6, Pages 10 & 11	This has been incorporated.
8.		Better to mention about contribution of User's Group in project description as well.		User's Group in this project has not been assigned any of the responsibilities. All WUSC responsibilities are given to the Municipality.
9.	• Chapter 2, Section 2.5 a)-Line 43, Page 12 • Chapter 2, Section 2.5 e)-Line 50, Page 13 and f)-Line 51, Page 14	In land requirement section, page 12, 2.5 a, 11, also mention about temporary land requirement for worker's camp site, stockpiling site. Better to mention about the area, type and ownership of land for camp site, stockpiling site in 2.5. e, 18 and f 19	• Chapter 2, Section 2.5 a)-Line 44, Page 13 • Chapter 2, Section 2.5 e)-Line 51, Page 14 and f)-Line 52, Page 15	This has been incorporated.





S.N.	Chapter/ Section/ Page	Comment/Suggestions	Response from Consultant	
			In chapter/ section/ paragraph no. / page no.	Description of change Remarks
10.	Chapter 3, Section 3.4, Line 75, Page 20	In 3.4, public notice section, better to mention about the notice publication after approval of ToR.	Chapter 4, Section 4.4, Line 96, Page 36	This has been incorporated.
11.	Chapter 3, Section 3.5, Line 76, Page 20	Better to mention the number and date of public consultation.	Chapter 4, Section 4.5, Line 97, Page 36	This has been incorporated.
12.	<ul style="list-style-type: none"> Chapter 4, Sub Section 4.1.3, Table 4-I, Page 25 to 31 Chapter 4, Sub Section 4.1.2, Line 90, Page 23 	<p>In chapter 4,</p> <ul style="list-style-type: none"> Mention all Nepali legislations in Nepali date, In 4.1.2, clarify that EIA is not approved by sectoral agency, Also add a bullet about section related to IEE/EIA approval. 	<ul style="list-style-type: none"> Chapter 3, Sub Section 3.1.4, Table 3-I, Page 21 to 27 Chapter 3, Sub Section 3.1.2, Line 65, Page 19 Chapter 3, Sub Section 3.1.2, Line 66, Page 19 	This has been incorporated.
13.	<ul style="list-style-type: none"> Chapter 4, Sub Section 4.1.2, Line 90, Page 23 Chapter 4, Sub Section 4.1.3, Table 4-I, Page 27 Chapter 4, Sub Section 4.1.3, Table 4-I, S. No. 4, 1st Row, Page 30 	<ul style="list-style-type: none"> Review EPA, 2076 as well, Review National Land Policy, 2075, Correct the date of National EIA Guideline. 	<ul style="list-style-type: none"> Chapter 3, Sub Section 3.1.2, Line 65, Page 19 Chapter 3, Sub Section 3.1.1, Table 3-I, S. No. 1, 12th row, Page 23 Chapter 3, Sub Section 3.1.1, Table 3-I, S. No. 4, 1st Row, Page 26 	This has been incorporated.
14.	Chapter 5-Topic, Page 38	In chapter 5, add 'existing' in topic.	Chapter 5-Topic, Page 39	This has been incorporated.
15.	Chapter 5, Sub Section 5.1.1, Line 104, Page 38	In geology section, mention clearly that the proposed project does not lie in Chure region, if the project lies in Chure region it needs to do EIA.	Chapter 5, Sub Section 5.1.1, Line 109, Page 39	This has been incorporated.
16.	Chapter 5, Sub Section 5.1.3, Line 106, Page 38	In land use pattern, 5.1.3, mention the data from at	Chapter 5, Sub Section 5.1.3, Line 112 & Table 5-I, Page 39	This has been incorporated.

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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
		least secondary source.		
17	Chapter 5, Sub Section 5.1.3, Line 109 & Table 5-I, Page 38	As the proposed project is about storm water drainage, better to mention about rainfall in detail, give the data of rainfall in detail.	Chapter 5, Sub Section 5.1.4, Line 114, Table 5-II & 5-III, Page 39,40 & 41	This has been incorporated.
18.	Chapter 5, Sub Section 5.1.4, Page 38	Better to mention about flooding or submergence of land in detail.	Chapter 5, Sub Section 5.1.4, Line 115, Page 41	This has been incorporated.
19.	Chapter 5, Sub Section 5.1.5, Line 108, Page 38	Better to mention about water quality of river where the storm water is drained out so that it will make easy for monitoring.	Chapter 5, Sub Section 5.1.5, Line 116 & 117, Page 41 & 42	This has been incorporated.
20.	Chapter 5, Sub Section 5.3.3, Table 5-7, Page 42	Mention 'total HHs' in table 5-7.	Chapter 5, Sub Section 5.3.1.2, Table 5-X, Page 45	This has been incorporated.
21.	Chapter 5, Sub Section 5.3.1.2, Table 5-8, Page 42	What does 'EDR' stand for in table 5-8.	Chapter 5, Sub Section 5.3.1.2, Table 5-XI, Page 46	Here, EDR means Eastern Development Region. As it seems irrelevant presently, this has been omitted.
22.	Chapter 5, Sub Section 5.3.3, Line 125, Page 43	Better to not mention about Maoist movement in report.	Chapter 5, Sub Section 5.3.1.2, Line 129, Page 46	This has been incorporated.
23.	Chapter 5, Sub Section 5.3.3, Line 126, Table 5-9, Page 43	Better to remove 'eastern development region' from bullet 93.	Chapter 5, Sub Section 5.3.1.2, Page 46	It seems irrelevant at the present condition; hence, this has been omitted.
24.	Chapter 5, Sub Section 5.3.3, Line 127, Page 43	Better to mention about number of sampled HHs in bullet 94.	Chapter 5, Sub Section 5.3.4.3, Line 143, Page 49	This has been incorporated.
25.	Chapter 5, Sub Section 5.3.3, Table 5-10, Page 43	Better to mention in heading and text about 403 sampled HHs in bullet 94 and table 5-10.	Chapter 5, Sub Section 5.3.4.3, Table 5-XVIII, Page 49	This has been incorporated.



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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
26.	<ul style="list-style-type: none"> Chapter 5, Sub section 5.1.1, Line 104, Page 38 Chapter 5, Sub section 5.2.5, Table 5-6, Page 41 Chapter 5, Sub section 5.3.5, Line 131, Page 44 	In bullet 98, Ramnagar Mirchaiya Municipality has been mentioned, better to make uniformity in the name of municipality.	<ul style="list-style-type: none"> Chapter 5, Sub section 5.1.1, Line 109, Page 39 Chapter 5, Sub section 5.2.5, Table 5-IX, Page 45 Chapter 5, Sub section 5.3.7.1, Line 149, Page 51 	This has been incorporated.	
27.	Chapter 5, Sub Section 5.3.5 a), Line 98, Page 51	Clarify the word 'pucci toilet' in bullet 98.	Chapter 5, Sub Section 5.3.7.1, Line 149, Page 51	This has been incorporated.	
28.	Chapter 5, Sub Section 5.3.5 c), Line 133, Page 42	Whether waste water or sewerage from septic tank will be drained out in proposed drainage or not?? If yes need to propose specific treatment mechanism before its disposal to river.	Chapter 5, Sub Section 5.3.7.3, Line 151, Page 51	This has been incorporated.	
29.	<ul style="list-style-type: none"> Chapter 5, Sub Section 5.3.1, Line 120, Page 44 Chapter 5, Sub Section 5.3.5 b), Line 132, Page 44 	In existing environment section, mention about settlement pattern of DIA and also mention about the impact of rain water in existing condition.	<ul style="list-style-type: none"> Chapter 5, Sub Section 5.3.1.1, Line 130, Page 45 Chapter 5, Sub Section 5.3.7.2, Line 150, Page 51 	This has been incorporated.	
30	Chapter 5, Sub Section 5.1.5, Line 108, Page 38	Better to mention about the use of water in downstream rivers where the drains will outfall.	Chapter 5, Sub Section 5.1.5, Line 116, Page 41	This has been incorporated.	
31.	Chapter 7, Sub Section 7.1.1 a)-j), Line 151, Page 48	Better to mention about specific employment generation data rather than mentioning about sampled households.	Chapter 7, Sub Section 7.1.1 a)-j), Line 179 & 180, Page 57	This has been incorporated.	
32.	Chapter 7, Sub Section	Whether valve chambers, buildings, public toilets fall	Chapter 7, Sub Section	This has been	

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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
	7.1.1 a)-ii), Line 120, Page 55	under the scope of this project or not? Clarify as it has been mentioned in bullet 120.	7.1.1 a)-ii), Line 182, Page 58	This is incorporated. This is typo.
33.	Chapter 7, Sub Section 7.2.1 b)-vii), Line 149, Page 59	Though the proposed project is about storm water drainage but in bullet 149, water supply project has been mentioned, seems to be copy paste, correct it.	Chapter 7, Sub Section 7.2.1 b)-viii), Line 210, Page 61	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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