Initial Environmental Examination

May 2017

NEP: Regional Urban Development Project
Drainage and Road Construction and Improvement Works at Nepalgunj Sub-metropolitan City

CURRENCY EQUIVALENTS

as of 28 January 2017

Currency unit	–	Nepalese Rupee (NRS)
NRe1.00	=	$ 0.0092
$1.00	=	NRs108.67

ABBREVIATIONS

3R	reduce, reuse, and recycle
AAPA	Aquatic Animals Protection Act
ADB	Asian Development Bank
CBS	Central Bureau of Statistics
CFUG	Community Forest Users Group
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
DADO	District Agriculture Development Office
DDC	District Development Committee
DEECCU	District Energy, Environment and Climate Change Unit
DFO	District Forest Office
DIZ	Direct Impact Zone
DMC	Developing Member Country
DSC	Design and Supervision Consultants
DUDBC	Department of Urban Development and Building Construction
DWEC	Daily WAGE Execution Committee
EARF	Environmental Assessment and Review Framework
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMAP	Environmental Management Action Plan
EMEP	Environmental Mitigation Execution Plan
EMP	Environmental Management Plan
EPA	Environment Protection Act
EPM	Environmental Protection Measures
EPR	Environment Protection Rules
FGD	Focused Group Discussion
FWR	Far Western Region
FWRN	Far Western Region of Nepal
GDP	gross domestic product
GFP	Grievance Focal Points
GHG	greenhouse gas
GRC	Grievance Redress Committee
GRC	Grievance Redress Cell
HDPE	High Density Polyethylene Pipe
IEC	information, education, and communication
IEE	Initial Environmental Examination
IIZ	Indirect Impact Zone
INGO	International Governmental Organizations
ISWM	Integrated Solid Waste Management
IUCN	International Union for Conservation Nature
IUDP	Integrated Urban Development Project
IWPS	Integrated Waste Processing Sites

LGCDP	Local Governance and Community Development Programme
MFALD	Ministry of Federal Affairs and Local Development
MOFSC	Ministry of Forest and Soil Conservation
MOPE	Ministry of Population and Environment
MOUD	Ministry of Urban Development
MPMC	Municipal Project Management Committee
MSW	Municipal Solid Waste
NEA	Nepal Electricity Authority
NGO	nongovernment organization
NRs	Nepalese Rupees
NTFP	nontimber forest products Products
NWSC	Nepal Water Supply Corporation
OHS	Occupational Health and Safety
PAF	Project Affected Families
PCO	Project Coordination Office
PHC	Public Hearing Committee
PIU	Project Implementation Unit
PMSC	Project Management and Supervision Consultants
PPE	Personal Protective Equipment
PPTA	Project Preparatory Technical Assistance
REA	Rapid Environmental Assessment
RUDP	Regional Urban Development Project
SEA	Strategic Environmental Assessment
SHS	Solar Home System
SPM	Suspended Particulate Matter
SPS	Safeguard Policy Statement
SWMTSC	Solid Waste Management and Technical Support Centre
TLO	Tole Level Organization
TOR	Terms of Reference
TSP	Total Suspended Particles
VDCs	Village Development Committees
WUA	Water Users Association

NOTES

(i) The fiscal year (FY) of the Government of Nepal ends on 15 July. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2017 ends on 15 July 2017.
(ii) In this report, "$" refers to US dollars.

CONTENTS

EXECUTIVE SUMMARY

1. The proposed Regional Urban Development Project includes subprojects in Nepalgunj sub-metropolitan city (NSMC). The project is funded by the Asian Development Bank (ADB) under loan number 47252, the Government of Nepal, and municipal contribution. The Department of Urban Development and Building Construction (DUDBC) under the Ministry of Urban Development (MOUD) is the Executing Agency and is responsible for technical and project management matters including engineering, safeguards, and social aspects. The project will improve the surfacing of the existing roads and add urban design features and improve existing earthen drains to stone masonry and brick masonry standard drains to improve mobility, reduce flooding and water logging, and improve overall liveability and quality of life in Nepalgunj.

2. **Subproject scope.** The NSMC drainage and road construction subproject is one of the subprojects proposed under the RUDP. The subproject includes: (i) improving/rehabilitating about 60.1 km of the existing drainage system to avoid flooding, (ii) fitting about 7.68 km of the city roads with adequate drainage to minimize traffic congestion in the city core and protect roads, and (iii) to raise the quality of the infrastructure and services, thereby improving people's quality of life.

3. **Screening and categorization.** An environmental assessment of the subproject is required per ADB's Safeguard Policy Statement (SPS, 2009). An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for drainage and road construction (Appendix 1) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus NSMC drainage and road construction subproject is classified as environmental category B as per ADB SPS and an initial environmental examination (IEE) has been prepared in accordance with ADB SPS requirements for environment category B projects.

4. This is the Initial Environmental Examination (IEE) based on the detailed design stage. The IEE will be updated/finalized[1] to incorporate any further changes as required.

5. **Implementation arrangements.** This IEE Report has been prepared for the construction and improvement works of storm water drainage and roads of NSMC. The DUDBC under the MOUD is the executing agency. The Project Implementation Unit in NSMC is the implementing agency.

6. **Purpose of the initial environmental examination.** This IEE is to examine the proposed drainage and road construction improvement works in NSMC to ensure that the environmental issues associated with the development are effectively managed and they will not damage the environment, and provide guidance for the planning, construction and operation of the proposed subproject. This IEE is based on detailed design.

7. This IEE will be included in the bid documents, 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.

[1] PCO will ensure that IEEs will be properly updated with site specific information, design and locations considered site selection criteria and guidelines, environmental measures implemented during construction and O&M phases. The updated/finalized IEE will include monitoring program to measure progress of implementation of the mitigation measures.

8. **Environmental Management Plan.** An environmental management plan (EMP) is included as part of this IEE, which includes (i) mitigation measures for environmental impacts during implementation; (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting; (iii) public consultation and information disclosure; and (iv) a grievance redress mechanism. A number of impacts and their significance were reduced through mitigation measures in the preliminary design stage. The EMP will form part of the civil works bidding and contract documents.

9. Locations and siting of the proposed infrastructure were considered to further reduce impacts. The concepts considered in design of the subproject are: (i) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (ii) taking all possible measures in design and selection of alignment to avoid resettlement impacts; (iii) avoiding where possible locations that will result in destruction/disturbance to historical and cultural places/values; (iv) avoiding tree-cutting where possible; (v) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection.

10. During the construction phase, impacts mainly arise from (i) disturbances to residents, businesses, and traffic; (ii) need to manage excess construction materials and spoils; and (iii) community and worker health and safety. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation measures minimizing inconvenience by choice of construction method. Traffic management will be necessary during excavation works on busy roads. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

11. Mitigation measures have been developed to reduce all negative impacts to acceptable levels and will be assured through a program of environmental monitoring. The monitoring program will include observations on and off-site, document checks, and interviews with workers and beneficiaries. The PCO will submit semi-annual monitoring reports to ADB, which will include a detailed review of EMP implementation, including corrective actions taken.

12. The IEE includes design considerations for mitigation, especially design material, method of construction should be taken appropriate to make the subproject climate-proof and disaster resilient.

13. **Consultation, disclosure and grievance redress.** The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the municipality and will be disclosed to a wider audience via the ADB and MoUD project websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and can participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

14. **Monitoring and reporting**. The PCO and PIUs through their Design and Supervision Consultants will be responsible for safeguard monitoring. The PIU will submit monthly monitoring reports to PCO, and the PCO will send semi-annual monitoring reports to ADB. ADB will post the semi-annual environmental monitoring reports on its website as part of its disclosure requirements.

15. **Conclusions and recommendations**. The IEE study of the drainage and road construction and improvement works project reveals that the benefits from the implementation

of proposed drainage and road construction and improvement works project are more significant and long term in nature against the adverse impacts most of which could be mitigated or avoided. Therefore, this IEE is sufficient for approval of proposed subproject. This subproject is implemented with incorporation of mitigation measures and environmental monitoring plan.

I. INTRODUCTION

1. The Regional Urban Development Project (RUDP) will improve resilient and sustainable urban infrastructure in 8 municipalities located in the southern Terai region of Nepal bordering India. The project will also support regional and urban planning, municipal infrastructure investments, and institutional strengthening to foster regional competitiveness and regional cooperation. The project will also strengthen government capacity for preparation of transformational projects with high readiness for cities in Nepal through a project bank facility.

MAP 1 REGIONAL URBAN DEVELOPMENT PROJECT CITIES

Source: Asian Development bank

2. **Subproject scope and location.** The NSMC drainage and road network improvement works is one of the subprojects proposed under the RUDP. The subproject includes works for improvement of storm water drainage, municipal roads and lanes. The details of the subproject are provided in Table 1.2

3. **Screening and categorization.** An environmental assessment of the subproject is required per ADB's Safeguard Policy Statement (SPS, 2009). An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for drainage and flood control (Appendix 1) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, the subproject is classified as environmental category B as per ADB SPS and an initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

4. This is the draft IEE based on the feasibility study and preliminary engineering designs prepared during project preparation. This IEE will be finalized during detailed design stage to reflect any changes and latest subproject designs.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

5. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

6. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

7. **Environmental management plan.** An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

8. **Public disclosure.** ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:

(i) Final or updated IEE upon receipt; and
(ii) environmental monitoring reports submitted by the Project Co-ordination Office (PCO) during project implementation upon receipt.

9. **Pollution Prevention and Control Technologies.** During the design, construction, and operation of the project, the PCO and PIUs will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines[2]. These standards contain performance levels and measures that are

[2] www.ifc.org/ehsguidelines

normally acceptable and applicable to projects. When government regulations differ from these levels and measures, the PCO and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PCO and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Table 1: Applicable WHO Ambient Air Quality Guidelines

Table 1.1.1: WHO Ambient Air Quality Guidelines[7,8]		
	Averaging Period	Guideline value in µg/m³
Sulfur dioxide (SO_2)	24-hour 10 minute	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter PM_{10}	1-year 24-hour	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline) 150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter $PM_{2.5}$	1-year 24-hour	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline) 75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Table 2: World Bank Group's Noise Level Guidelines

Table 1.7.1- Noise Level Guidelines[54]		
	One Hour L_{Aeq} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

B. National Laws

10. Implementation of all subprojects will be governed by the environmental acts, rules, policies, and regulations of the Government of Nepal. These regulations impose restrictions on the activities to minimize/mitigate likely impacts on the environment. Many of these are cross-sectoral and several of them are directly related to environmental issues. The most important of these are described as below:

1. Road Construction

11. As per Government of Nepal, Rule 3 of Environmental Protection Act (EPA), 1997 and Rule, 1997 (amended in 2007) as mentioned in schedule 1(D) (1) (b), the construction of the urban roads requires an Initial Environmental Examination (IEE). Thus, the IEE study of the proposal is a respect to mandatory requirement as per this provision.

2. Drainage Works

12. Environmental Protection Rules, 1997, Schedule 1, I1 (E) state that the implementation of sewerage and drainage schemes of more than NRs 5 million require an IEE study. The proposed drainage work has investment of more than 5,000,000 thus require an IEE study.

13. In addition, ADB has also classified this project as category B in accordance with the environmental requirements of ADB and environmental guidelines for the selected infrastructure development projects. Hence, IEE is to be done.

14. Rapid environmental assessment (REA) checklist has also been considered during IEE report preparation based on ADB Environmental Guidelines.

3. National Laws, Policies, Acts, Regulations, Standards and Guidelines

15. Implementation of all subprojects will be governed by the Government of Nepal's environmental acts, rules, policies, and regulations. These regulations (Table 3) impose restrictions on the activities to minimize/mitigate likely impacts on the environment. Many of these are cross-sectoral and several of them are directly related to environmental issues. The most important of these are the Environment Protection Act, 1997 (EPA, 1997), and the Environment Protection Rules (EPR, 1997).

Table 3: List of Acts, Laws, Rules, and Regulations

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
1.	Constitution of Nepal, 2072BS (2015AD)	Constitution of Nepal mandates environmental protection as state policy. The state shall give priority to the protection of the environment, and also to the prevention to its further damage due to physical development activities by increasing the awareness of the general public about environmental cleanliness, and the state shall also make arrangements for the special protection of the environment and the rare wildlife. Provision shall be made for the protection of the forest, vegetation and biodiversity, its sustainable use and for equitable distribution of the benefit derived from it.
2.	Environment Protection Act, 2053 BS (1997AD)	Any development project, before implementation, to pass through environmental assessment, which may be either IEE or an EIA depending upon the location, type and size of the projects.
3.	Forest Act, 2049 BS (1993AD)	Requires decision makers to take account of all forest values, including environmental services and biodiversity, not just the production of timber and other commodities.
4.	Environment Protection Rules, 2054 BS (1997AD) (Amendment, 1999)	Obliges the proponent to inform the public on the contents of the proposal to ensure the participation of stakeholders.
5.	Solid Waste Management Act, 2011	This Act outlines the duties of local government to take action to control haphazard waste generation, disposal or collection and has provisions for various punitive measures against those engaged in activities detrimental to the intentions of the Act. Special features of this act are as follow: • Hazardous waste, medical waste, chemical waste or industrial waste must be managed by the person/institution responsible for producing/generating it.

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
		• Local body shall only manage the processed hazardous waste/medical waste/chemical waste by levying fees. • It shall be duty of every person to reduce the production of solid waste. Further it will be the duty of person/institution to make arrangement for biodegradable waste within its boundary and discharge the remaining waste • Promotion of source separation of waste • Empowers local body the right to set collection point for systematic collection of solid waste • Transportation of solid waste: Only prescribed vehicle shall be used and only segregated waste shall be collected. • Adaptation of reduce, reuse and recycle principle. • Provision for the waste management by the private sector upon receiving of license form the local body • Provision for charging of service fee by the local body for the solid waste management services to the institution/concerned person or body. • Various punishment/penalties who violates this act
6.	Soil and Water Resource Conservation Act, 2039 BS (1939 AD)	This Act is enacted to manage the watersheds of Nepal. Section 3 empowers the government to declare any area as a protected watershed area. Section 4 provides that a watershed conservation officer has the authority to implement the following works in protected watershed areas
7.	Land Acquisition Act, 2034 BS (1978AD)	Government can acquire land at any place in any quantity by giving compensation pursuant to the act for any public purposes or for operation of any development project initiated by government institutions.
8.	Local Self Governance Act , 2055 BS (1999AD) and Rules, 2056BS (2000AD)	Empowers the local bodies for the conservation of soil, forest and other natural resources and implements environmental conservation activities.
9.	Aquatic Animals Protection Act 2018BS (1961AD) and first amendment, 1998	This act provides legislative protection of the habitats of aquatic species. Section 3 of the AAPA renders punishable any party introducing poisonous, noxious or explosive materials into a water source, or destroying any dam, bridge or water system with the intent of capturing or killing aquatic life. However, no agency has been designated the responsibility for administering and enforcing the AAPA.
10.	Water Resources Act, 1992 & Water Resources Regulation, 2000	Water Resource Act is an umbrella act governing water resource management. It declares the order of priority of water use; vests ownership of water in the state; prohibits water pollution; and provides for the formation of Water User Association and system of licensing. The Regulation sets out the procedure to register a WUA and to obtain a license and sets out the rights and obligations of WUA and license holders.
11.	Labor Act, 1991AD	It emphasizes on occupational health and safety of workers thereby providing necessary safety wares and adopting necessary precautionary measures against potentially hazardous machines/equipment. It stipulates to make arrangements 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. The provisions related to environment in labor law can be summarized as:

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
		• Spells about the provision for a healthy, safe and secure environment for workers. • Prescribes provisions for solid waste management and control noise pollution in the working areas, • Imposes mandatory provision that only Nepal citizens can be employed on permanent basis in any enterprises, permission must be sought from the Labor Department to employ non-Nepali specialists on contract basis.
12.	Child Labor (Prohibition and Regularization) Act, 2001	The Child Labor (Prohibition and Regulation) Act 2000 is the main legal expedient to prohibit engaging children in factories, mines or similar risky activities and to make necessary provisions with regards to their health, security, services and facilities while engaging them in other activities. Under the Section 3 of the Act, child having not attained the age of 14 years is strictly prohibited to be engaged in works as a laborer. Similarly, under Section 4, engagement of child in works as a laborer against his/her will by way of persuasion, misrepresentation or by subjecting his/her to any influence or fear or threat or coercion or by any other means is prohibited. Under Section 6, in case any Enterprise must engage a child in works, an approval has to be obtained from the concerned labor office or any authority or official prescribed by that office and form the father, mother or guardian of the child.
13.	Electricity Act, 1993	The clause 24 of the electricity act 1993 states about the environment which reads No Substantial Adverse Effect be made on environment further it states While carrying out electricity generation, transmission or distribution, it shall be carried out in such a manner that no substantial adverse effect be made on environment by way of soil erosion, flood, landslide, air pollution etc.
14.	Public Roads Act, 1974AD	The major provisions of the Public Roads Act, 1974 are: • Prescribes rules for planned road construction; regulating road width and boundaries, within which no houses can be built; • Maintains road environment through plantation along public roads; • GoN agencies and public needs prior approval from Department of Roads to carry out work on roads and road boundaries.
15.	Forest Rules, 2051BS (199AD)	Elaborates legal measures for the conservation of forests and wildlife.
16.	Local Self Governance Regulations, 2000	This regulation empowers the local bodies for the conservation o soil, forest and other natural resources and implements environmental conservation activities
17.	Solid Waste Management Rules, 2013	Solid Waste Management Rules has provided authority to local bodies for the segregation, transportation and disposal of solid waste as well as operation of sanitary landfill site. Local bodies may also empower the company, organization and agency, producing solid wastes, for segregating, reducing the solid wastes at its source, reuse and recycling use solid wastes and mobilize community and non-governmental organization for creating awareness for the management of the solid waste. Local bodies have also the authority to determine service charge for solid waste management.
18.	Three Years Interim Development Plan,	The Plan focuses on the need for setting up national environmental standards with strategy of internalizing environmental management into the development programs. The

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
	GoN, 207-2073BS (2013-2016AD)	Plan has also realized to carry out Strategic Environmental Assessment (SEA) with the long-term policy of promoting environmental governance. The Plan emphasizes on the local participation in environmental conservation, as envisaged in the Local Self Governance Act, 2055, through the local bodies, make them responsible and capable to manage local natural resources.
19.	National EIA Guidelines, 1993	The guidelines provide guidance to project proponent on integrating environmental mitigation measures, particularly on the management of quarries, borrow pits, stockpiling of materials and spoil disposal, operation of the work camps, earthworks and slope stabilization, location of stone crushing plants, etc.
20.	Environmental Guidelines published by MoPE, 2006	The guideline provides clear directions about the process of conducting EIA. This guideline makes EIA in Nepal legally mandatory and contains process for ensuring public involvement during the preparation of EIA report. It calls for information regarding identification of physical, biological, socio-economic and cultural impacts. Impacts ranking method also suggested in this guideline. It stresses the inclusion of mitigation measures to avoid, minimize and mitigate adverse impacts and maximize beneficial impacts resulting from the development project and Monitoring & environmental auditing in the EIA report. Its revision in 1997 calls for the ensuring local people's participation, collection of relevant information, identifying major issues of public concerns, evaluate them and establishing priorities for EIA study. The Environmental Guidelines published by MoPE (2006) contains the following components: • Methods for screening of the projects requiring an application of Environmental Assessment Scoping, impact identification and prediction, report review, monitoring and evaluation and impact auditing; • Methods for ensuring public participation during the preparation of the EIA report, including the need for clear documentation of the impact mitigation measures in the EIA report; • Provisions for identifying socio-economic-cultural, biological, and physical impacts and prescription of mitigation measures to avoid, eliminate and/or minimize adverse effects and to augment beneficial impacts resulting from the project implementation; and • Emphasis on the adoption of monitoring, evaluation and environmental auditing frameworks in the EIA report.
21.	Batabaraniya Nirdesika (Nepal, MLD), 2057BS (2000AD)	The directive is focused in the practical implementation of small rural infrastructures through the minimization of environmental impacts. This directive includes the simple methods of environmental management in the different phases of the project cycle. More emphasis is given to prevention rather than cure. So, the recommendations for the mitigation measures are provided only when it is necessary.

16. Environmental Protection Rules, 2054 (1997) lists in its Schedule 2, the types of projects which require an IEE. The following are relevant in the context of RUDP subprojects:

- Improvement, upgrading and reconstruction of national highways and feeder roads;
- Supply of drinking water to a population ranging from two thousand to twenty thousand;

- Waste Management activities to be undertaken with the objective of providing services to a population ranging between two thousand and ten thousand;
- Filling of land with one hundred to one thousand tons of waste a year; (landfills of more than 1000 t per year would require an EIA);
- Selecting, picking, disposing, and recycling waste through chemical, mechanical or biological techniques in an area up to two hectares;
- Activities relating to compost plants in an area ranging between one to five hectares;
- Operations of sewerage schemes;
- Clearing of national forests covering up to one hectare in the hills and five hectares in the Terai.

17. Schedule 2 also lists the projects requiring an EIA. It mentions projects to be implemented in "flood prone and other dangerous areas"; it is therefore recommended, especially in the case of larger schemes (the largest being waste disposal sites, where flood risks are an issue), to clarify this question with the competent authorities in an early stage of project preparation.

18. Environmental Guidelines (2006) published by Ministry of Population and Environment makes EIA in Nepal legally mandatory and contains process for ensuring public involvement during the preparation of EIA report. It calls for information regarding identification of physical, biological, socioeconomic and cultural impacts. Impacts ranking method is also suggested in this guideline. It stresses the inclusion of mitigation measures to avoid, minimize and mitigate adverse impacts and maximize beneficial impacts resulting from the development project and monitoring and environmental auditing in the EIA report.

19. The Environmental Guidelines (2006) contains the following components:

- Methods for screening of the projects requiring an application of Environmental Assessment Scoping, impact identification and prediction, report review, monitoring and evaluation and impact auditing;
- Methods for ensuring public participation during the preparation of the EIA report, including the need for clear documentation of the impact mitigation measures in the EIA report;
- Provisions for identifying socioeconomic, cultural, biological, and physical impacts and prescription of mitigation measures to avoid, eliminate and/or minimize adverse effects and to augment beneficial impacts resulting from the project implementation; and
- Emphasis on the adoption of monitoring, evaluation and environmental auditing frameworks in the EIA report.

20. Table 4 provides the environmental classification of RUDP subprojects. The NSMC roads and drainage subproject falls into Category B.

Table 4: Environmental Classification of Proposed Subprojects Per Government of Nepal Environmental Guidelines (2006)

Subproject	Component	Key Activities	Environment Classification per GoN	Indicative Classification per ADB SPS[3]
1. City road improvement	Road provisions (include road resurfacing, roadside footpath, roadside drains, road signs, road/pavement markings, intersection improvement, or high mast lighting)	Re-construction and extension of road (feeder road, local road)	Cat B IEE to be prepared	Cat B IEE to be prepared
2. Drainage improvement	Primary network (includes domestic connections or primary drains)	Engineering works Engineering works	Cat B IEE to be prepared	Cat B IEE to be prepared
	Secondary network (includes secondary drains)			Cat B IEE to be prepared
	Tertiary network (includes main drains and drainage outfalls)			Cat B IEE to be prepared
3. Municipal building / public building	Construction of public buildings	No similar facility	Cat B IEE to be prepared	Cat B IEE to be prepared
4. Water supply	Source augmentation (includes tube wells, surface water intake, overhead or ground reservoir, pumps and pump house, water treatment plant [WTP] or chlorination facility)	Engineering works	Cat B IEE to be prepared	Cat B IEE to be prepared
	Water transmission (includes pumping main, overhead reservoir, or pumps and pump houses)	Water, power and gas distribution line laying/ relaying/extension.	Cat B IEE to be prepared	Cat B IEE to be prepared
	Network improvements (include ring main, distribution/ carrier mains, bulk valves and flow meter, household connections or household meters)			Cat B IEE to be prepared
5. Solid waste management	Community storage bins	No similar facility	Cat B IEE to be prepared	Cat B IEE to be prepared
	Secondary transfer station			Cat B IEE to be prepared

[3] To be confirmed upon submission of the ADB REA Checklist

Subproject	Component	Key Activities	Environment Classification per GoN	Indicative Classification per ADB SPS[3]
	Waste disposal (includes sanitary landfill, composting site, or access road)	Land-filling by industrial, household and commercial wastes	Cat B IEE to be prepared Cat A if sites are considered flood prone or other dangerous area	Cat B IEE to be prepared.

C. Conventions, Treaties and Protocols

21. Nepal is party to the following international convention (Table 5) that may apply to this project, especially in selection and screening of subprojects under restricted/sensitive areas.

Table 5: International Agreements and Applicability to RUDP Subproject

Agreement	Requirements for the Project
1. Ramsar Convention on Wetlands of International Importance, 1971. The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. According to the Ramsar list of Wetlands of International Importance, there are 25 designated wetlands in Nepal which are required to be protected.	There are 10 Ramsar Sites in Nepal however they are not located within or adjacent to the any of the subproject sites. If in future any of the activities are undertaken in the proximity of Ramsar wetlands, it shall follow the guidelines of the convention (The Ramsar Convention Handbooks for the wise use of wetlands, 4th ed. (2010), (http://www.ramsar.org/cda/en/ramsar-pubshandbooks/main/ramsar/1-30-33_4000_0__)
2. Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal, 1989 To protect human health and the environment against the adverse effects of hazardous wastes. This aims at (i) reduction of hazardous waste generation, promotion of environmentally sound management (ii) restriction of transboundary movements, and (iii) a regulatory system for transboundary movements.	Municipal waste / hazardous waste; sludge /rejects generated from the municipalities may fall in hazardous waste category. They will be managed at the landfill sites and will be disposed within the country, and therefore will not attract this convention.
3. Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)	This Convention defines and provides for the conservation of the world`s heritage by listing the natural and cultural sites whose value should be preserved. Not applicable for identified subprojects. Site selection for the succeeding subprojects can refer to the existing list, if available, to avoid impacts in areas with cultural and natural heritage value.
4. Convention on International Trade in Endangered Species of Wild Fauna and Flora	This Convention provides a framework for addressing the over harvesting and exploitation

Agreement	Requirements for the Project
(Washington 1973) – also known as CITES was signed on 20 November 1981.	patterns that threaten species of flora and fauna. Under the Convention, the governments agree to restrict or regulate trade in species that are threatened by unsustainable patterns. Not applicable for subprojects. The succeeding subprojects will ensure that the same will not cause any harvesting and exploitation of wild flora and fauna during construction and operation.
5. Convention on Biological Diversity (1992)	This provides for a framework for biodiversity and requires signatories to develop a National Biodiversity Strategy and Action Plan. Not applicable for subprojects. The succeeding subprojects will refer to the applicable Biodiversity Strategy and Action Plan in selecting the project sites and that any replacement to cleared vegetation resulting from the project will be consistent with the objectives and priorities of the Action Plan.
6. United Nations Framework Convention on Climate Change (UNFCCC), 1993	The UNFCC is an international environmental treaty with the main objective to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system. Nepal signed the UNFCC on 22 April 2016 and ratified it on 5 October 2016. The project will ensure that all construction activities will not significantly increase the GHG emissions and ensure that design of all infrastructure are resilient climate change impacts

III. DESCRIPTION OF THE PROJECT

22. The project consists of the following: (i) improving/rehabilitating about 60.09 km of the existing drainage system to avoid flooding, and fitting about 7.68 km of the city roads with proper drainage to minimize traffic congestion at the city core; Nepalgunj is growing at a rapid pace. Its development is constrained, however, by a poor, inadequate drainage system that causes floods, absence of proper solid waste management, and poor city roads. Large areas of the SMC get inundated during the monsoons and a large section of the population is forced to remain inside their houses for weeks, adversely affecting their daily activities and access to food and safe drinking water. In addition, maintaining hygienic conditions in and around the inundated areas becomes a challenge. It is estimated that around 29,000 people or about 37% of the total population of Nepalgunj get affected by floods each year.

Table 6: Salient Features of Project

SN	Particular	Description
1	Project Name	RUDP, Nepalgunj, Banke
2	Loan/Grant	Loan No. 2851/Grant No. 0284
3	Sub-project	Strom Water Drainage and Urban Roads Construction and Improvement Woks
4	Location	Nepalgunj SMC, Banke, Nepal
5	Area of SMC	13.14 Sq.Km (1314 ha)
6	Total Population of SMC	72503 (acc. to census 2011)
7	Population Growth rate	1.89% (acc. to census 2011)
8	Households	15180 (acc. to census 2011)
9	Average Household Size	4.78 (acc. to census 2011)

SN	Particular	Description
10	Affected Localities	Nepalgunj SMC including all 17 wards.
11	Topography	Flat Land of Terai, altitude of 165 m, Latitudes $27^0$51'N-$28^0$20'N & Longitude $81^0$20'E-$82^0$08'E
12	Geology	Terai Plain alluvium
13	Land Use Pattern	78% barren Land followed by cultivated, orchard, barren, Built up, Water body and pond.
14	Climate	Hot Humid in midsummer up to 46^0C & 29.9^0C maximum and 17.3^0C minimum during winter, average annual rainfall (2000-2012) is 1278.84mm.
15	Major Natural Water Course	Dondra, Dundawa, Amiliya, Beha, Ratahiya Nala etc.
16	Significant Human Made Features	Dudhawa canal, Manpur Canal, Surkhet Road, Hulaki Sadak etc
Storm Water Drainage		
17	Inventory of Existing Drainage	Major drainage Network 9.175 km, tentative total Drain 50.156 km including 28 settlement areas.
18	Proposed Drain	Natural water course/Outlet Nala (2 Nos), Primary (9 Nos), secondary (31 Nos) and Tertiary Drain (16 Nos) excluding future provision
19	Type of Drain (as per section)	Type I = Earthen Trapezoidal
		Type II = Rectangular Brick section with semicircle Concrete Benching
		Type III a = Trapezoidal Concrete Section
		Type III b,c = Trapezoidal Stone pitching
		Type IV = Rectangular Brick section with Trapezoidal Concrete Benching having cover
		Type V = PCC Rectangular Section with cover
20	Tentative Catchment area	6183.53 ha
21	Primary Catchment	5Nos i.e. C-I, C-II, C-III, C-IV & C-V
22	Sub Catchment	240 Nos. i.e. C-I(4Nos), C-II(22Nos), C-III(5Nos), C-IV (155 Nos) & C-V (54 Nos) including proposed & provision for future
23	Tentative length for improvement	60.09 km excluding future provision (97.17 km including future provision & development
24	Crossing structure	Slab culverts (6 Nos.) including Double cell (3Nos.) & Triple cell (3Nos.), hume pipe & drain with cover as per site condition
25	Channel having cover slab	Provision of road width drain at Bhangusawara & Babu Gaun
26	Type of rain inlet	Collection pits with grit at major junction & grating at roadside drains @ 10m spacing
27	Drop Structure	Drops at Drain line DKDN at Kanthipur
28	Outfall structure	5 outlet structure at Dondra, 1 at Amiliya & 1 at water park Nala
29	Protection Structure	Gabion protection at Drain line DKDN at Mohanpur & Drainline RN (Ratahiya) at outlet 1
30	Diversion structure	Spilling cum overflow weir at Dondra Spilt near Joga Gaun
31	Cleaning of existing drain	Tentative length 25.06 km
32	Estimated Cost for the operational maintenance cost	NRs.43,910,937.51
33	Total Estimated cost excluding contingencies and VAT	NRs 1,463,697,917.04
34	Total Estimated cost including contingencies and VAT	NRs. 1,819,376,510.89
35	Expected project completion Date	December, 2016
Urban Road		
36	Proposed road length (by PPTA)	60.00 Km
37	Proposed Road Length (Reviewed)	36.54 Km
38	Affected area	Nepalgunj SMC
39	Type of Road	Urban Road
40	Type of Surface	Metallic
41	Pavement design	Based on TRL overseas Road Note 31 (4th edition)
42	Type of pavement	Asphalt pavement
43	Right of way (RoW)	6 to 12 m as prescribed by SMC from center line on both side
44	Formation width	Varies as per RoW
45	Bridge/culvert	Slab Culvert
46	Side drain	Rectangular Brick Section with cover slab
47	Foot path	No separate footpath except space of side drain cover applicable for it

SN	Particular	Description
48	Road furniture /median strips/parking space	Not available as per width constraints
50	Total estimated cost of the sub project excluding contingencies and VAT	NRs. 1,463,697,917.04
51	Estimated total cost including contingencies and VAT	NRs. 1,819,376,510.89
52	Expected completion Date	January, 2019

Source: Detail Design Report of proposed project

A. Description of the Subprojects

1. Drainage Improvements/Rehabilitation

23. The purpose of the proposed drainage subproject is to improve the town's drainage system and minimize the flooding that occurs every year during the monsoons. The project aims for:

(i) Elimination of cross-sewer connections;
(ii) Rehabilitation (lining, widening, etc.) and desilting of the existing drains;
(iii) Augmentation and rectifying of the missing links of existing drains;
(iv) Provision of new drains; and
(v) Dismantling of the existing culvert and construction of new wider one near Bageshwari Temple.

2. Study of the Characteristics of the Project Catchment

a. Natural Water Courses

24. There are five main natural water courses running through Nepalgunj – (i) Ameliya Nala, (ii) Dundawa Nala, (iii) Dondra Nala, (iv) Beha Nala and (v) Rataihiya Nala. Besides from the above mentioned five natural water courses, there are also two small natural water courses: Belhaniya and Gandhelli nala. Brief description of the natural water courses consisting of their originating point, length, catchment area and alignments are provided below.

b. Dondra Nala (NEA buspark to southwest of Karnalibikas bank)

25. Major natural water course for the proposed drainage outlet is Dondra nala located southwest of the project starting from Karmohana and finally flowing towards India in the south. It has a reasonable drainage surface and longer watercourse as compared to the other rivers. The western sector of the NSMC and storm water coming from Bus Park, Ganeshpur, Salyanibag, Setu B. K. Chowk, New Road, Kamal Madhesi Chowk Rani Talau, Bulbuliya, Banke Gaun, Hospital area, Bazaar line etc. can be drained out to the Dondra Nala crossing Nepalguni Surkhet road.

c. Significance of manmade features

26. During the course of urbanization, several manmade features have been established. According to the impact on the natural drainage characteristics of the catchment, there are two irrigation canals running north to south in the catchment area. The origin of the canal is at the Chatar gaun about ten (10) kilometers north of Nepalgunj airport. This canal's alignment is Chatar gaun at the starting point and meets Nepalgunj-Surkhet highway at Bhikharipur. Then it flows along the highway up to Ranjha chowk and bifurcates into two canals – (i) Dudhuwa canal on the east and (ii) Manpur canal on the west side. In between there is also one branch canal known as Khajura branch canal split from the point nearby Ganapur village to west. This canal is embanked above natural ground level, on both sides, and the embankments have the effect of forming an earth dam across any low areas which the canal traverses, preventing natural drainage of such areas in the easterly and westerly direction towards the Dondra and Dundawa nala respectively.

27. Other major manmade features are two large roads namely Nepalgunj-Surkhet highway and Hulaki Sadak from bus park to Guleriya. These roads are generally built above the prevailing ground levels. Hence, its formation and cross drainage structures act as physical barriers to the natural drainage of storm water across their alignment.

28. Other features which impact the catchment are locally established small size drains (Nalla) within the city core area. After a careful consideration of the constraints mentioned above, due to the low gradients, natural and man-made barriers, and the tendency to encounter shallow flood retention prone areas, Nepalgunj is indeed a challenging location for the development of storm water drainage network system.

d. Flooding Area

29. The topography of Nepalgunj is virtually flat with a little slope in the north–south direction. There is limited slope towards the east and west from the centre of the city. The municipal drainage system is an incomplete system with many lines constructed without a proper outlet. Most of the NSMC gets flooded every year. In many parts, the drains have inadequate capacity. The stagnant water in those drains allows mosquitoes to breed resulting in environmental risks to the municipal population. The southern and northwestern parts of the NSMC are still without drains. During the annual monsoon these areas become flooded taking 2 or 3 days to drain. Other areas badly affected by flooding are Phultekra in ward No-6, Salyani Bangla and Ganeshpur in ward No- 2 and 5, and New Road and Bageshowri in ward No-4.

e. Inventory of Existing Drainage System

30. Nepalgunj SMC has a very complicated and haphazard storm drainage system. A field inventory survey was carried out by the DSC to find out the details of the existing drainage network system in the SMC's area. During the Inventory Survey the drainage networks all over the urban municipal area were taken into consideration. During the survey works the type of drains, physical condition, location of the discharge points and its existence either on one side or on both side of the road was recorded. The earthen drains on the side of blacktopped road or along the gravel road within the municipal urban area were not measured during the inventory survey. Details of the drainage networks are tabulated below as major drains and minor drains.

Table 7: Details of Existing Major Drainage Networks

S. N.	Name of Drain	Coverage Area	Length of Drain	Area Coverage	Type of Drain	Existing Capacity	Present Condition
1	Bageshwori Drain	Gharbari tole; Salyanbhag, Gareshpur, New Road, Setu B.K.	1.85	460 ha	Earthen Open Channel	2 to 2.5 m^3/sec	Working
2	BTS Drain (Bheri Technical School)	Kamal Madhasi Chowk, Rani Talau, Bulbiliya, partly Banke Gaon	2.55	330 ha	Lined Open Channel with trapezoidal	4 to 4.5 m^3/sec	In working condition
3	Bhrikuti Drain	Hospital Area and Banke Gaon	1.05	123 ha	Lined Drain with partly cover and partly open	0.5 to 1 m^3/sec	Not working well
4	Nepalgunj - Surkhet Road Drain	Area enclosed by Karkandu area, PL Chowk - Industrial Estate Compound alongside the Surkhet Road	3.1	150 ha	Drain with cover		Partially not working but under improvement through ongoing project
5	DSP Chowk, Drain	Area enclosed from DSP Chowk - Rani Talau	0.625	30 ha.	Lined drain with cover		Mostly blocked with solid waste
Total		**9.175 Km**					

Source: Detail Design Report of proposed project

From the technical inventory survey, there are total 9.175 Km. length of major drains responsible for storm water drainage system of Nepalgunj SMC whereas overall length of the drainage system is about 50,156 Km. within 28 (twenty eight) settlement area. Most of the drains are made of open brick masonry except few with cover. Locations of the drains are on both sides of the respective roads. Major problem of the drains are deposition of debris, siltation, solid waste deposition and contamination of industrial effluents and household sewer. Proper functioning of the drains requires systematic cleaning, repair and maintenance and some need improvement works. Brief descriptions are tabulated below.

Table 8: Details of Existing Drainage Network

Drain	Drain code	Length (m)	Drain Size	Material Type	Drain Type	Flow Direction	Existing Condition	Recommendation
Adarsha Road	D1 to D13	1241.13	Varies	Brick Masonry	Open/Both	Varies	Earth Deposition/Moderately functioning	Cleaning
Water park road	D14 to D24	598.27	Varies	Brick Masonry	Open	Varies	Earth Deposition/Moderately functioning	Cleaning
Karkando to Bus park road	D25 to D37A	1137.19	Varies	Brick Masonry	Open	Varies	Fairly working	Cleaning
Phultekra to sikta cannel road	D37A to D48	1540.88	Varies	Brick Masonry	Open	Varies	Earth Deposition/Moderately functioning	Cleaning
Phultekra to Rapti Khola road	D49 to D59	3150	Varies	Brick Masonry	Open	Varies	Deposition/Partly working	Cleaning and improvement
Dewaphulwari Road Kha	D60 to D81		Varies	Stone masonary	with cover	North to South	Under construction by STEP	Made by STEP
New road to Saliyanibag road	D82 to D83	247.7	0.23m*0.30m	Brick Masonry	Open	Varies	Deposition/partly functioning	Cleaning
Dewaphulwari road to Setu BK Road	D84 to D86	263.85	Varies	Brick Masonry	Open	North to South	Partly working	Cleaning, New Construction
Charbahini to Nagar bhawan	D87 to D91	530.91	Varies	Brick Masonry	Open	Varies	Debris Deposition/Moderately functioning	Cleaning
Nagarbhawan to Tribeni Road	D92	589.51	0.40m*0.23m	Brick Masonry	Open	East to West	Partly working	Cleaning
Stadium Road to Hospital Road	D93 to D104	497.91	Varies	Brick Masonry	Open	Varies	Earth Deposition and solid waste disposal/Hardly functioning	Cleaning
Ashok Marg	D105 to D112	375.28	Varies	Brick Masonry	Open	Varies	Partly functioning	Proposed for improvement
Landfill Access Road	D113 to D120	2622.11	Varies	Brick Masonry	Open	Varies	Partially functioning	Repair and Cleaning
Charbahini to Paraspur Dondra Nala	D121 to D122	2557.54	Varies	Brick Masonry	Open/Both	Varies	Fairly functioning	-
Peralpurwa to Rataya Culvert	D123 to D137	4181.06	Varies	Brick Masonry	Open	Varies	Partially functioning	Repair and Cleaning
INF Marg	D140 to D147	1618.62	Varies	Brick Masonry	Open/Both	Varies	Partially functioning	Cleaning
Shankerthapa to New Road	D148 to D155	453.41	Varies	Brick Masonry	Open/Both	Varies	Partially functioning	Improvement and Cleaning
Samsanghat to Ranitalau		1131.3						
Udaypur Road to Ward Office - 18	D156	205.66	0.70m*1.20m	Brick Masonry	Open	South to North	Deposition	Cleaning and improvement

Drain	Drain code	Length (m)	Drain Size	Material Type	Drain Type	Flow Direction	Existing Condition	Recommendation
Surkhet Road to medical college to Dondra Nala	D157 to D200	205.66	Varies	Brick Masonry	Open/Both	Varies	Earth and solid waste disposal/Partly Working	Improvement and Cleaning inside of drains
Bheri Hospital to Ramlila Maidan	D201 to D205	479.15	Varies	Brick Masonry	Open	Varies	Partially Working	Proposed for improvement
Surkhet Road to Bheri Technical road	D212 to D220	1061.02	Varies	Brick Masonry	Open/Both	Varies	Siltation, solid waste deposition/Partial Functioning	Cleaning
Gharbari tole to Tribeni chowk	D243 to D247	1014.8	Varies	Brick Masonry	Open	Varies	Siltation, solid waste deposition/Partial Functioning	Proposed For Improvement
Ranitalau to Trivhuban Chowk to BP Chowk	D248 to D252	747.73	Varies	Brick Masonry	Open	Varies	Deposition and Partial Functioning	Repair and Cleaning
East South of Pravat school to Samudaek bikash kendra to west paraspur chowk	D253 to D256	1537	Varies	Brick Masonry	Open	Varies	Partial Functioning	Improvement and Cleaning
Royalhotel to Bus park road to Bikasanagar	D257 to D268	7763.69	Varies	Brick Masonry	Open	Varies	Partial Functioning	Improvement and Cleaning
Total Length of drainage system		**40.00 Km.**						

Source: Detail Design Report of proposed project

Table 9: Details of new and Improvement of Drainage Components

S.N	Description	Drain Line Code	Drain Length (Km)	Drain line/Condition	Drain Type
A	**Natural Water Course**				
1	Dondra Nala	DN (1 - 4)	3.50	Single/Improvement	Rectangular Masonry Drain
B	**Road Side Strom Water Drain**				
1	Adarsha Road	AR(1-2)	1.241	Double/New	Brick Section
2	Water park road	WPR(1-6)	0.598	Double/New	Brick Section
3	Karkando to Bus park road	KBPR(1-7)	1.137	Double/New	Brick Section
4	Phultekra to sikta cannel road	PSCR (2-5)	1.54	Double/Improvement, Partly New	Brick Section
5	Phultekra to Rapti Khola road	PRR(1-4)	3.15	Double/New	Brick Section
6	Dewaphulwari Road Kha	WRK(3-4)		Double/ Improvement	Brick Section
7	New road to Saliyanibag road	NRSR (2-5)	0.247	Double/New	Brick Section
8	Dewaphulwari road to Setu BK Road	DRSB (2-10)	0.263	Double/ Improvement	Brick Section
9	Charbahini to Nagar bhawan	CNBR (3-12)	0.530	Double/ Improvement	Brick Section
10	Nagarbhawan to Tribeni Road	NTR (9-15)	0.589	Double/ Improvement	Brick Section
11	Stadium Road to Hospital Road	SRHR(10-11)	0.497	Single/New	Brick Section
12	Ashok Marg	AMR (1-5)	0.375	Double/ Improvement	Brick Section
14	Landfill Access Road	LAR (2-6)	2.622	Double/ Improvement	Brick Section
15	Charbahini to Paraspur Dondra Nala	CPDN (5-7)	2.55	Double/ Improvement	Brick Section

S.N	Description	Drain Line Code	Drain Length (Km)	Drain line/Condition	Drain Type
16	Peralpurwa to Rataya Culvert	PRCR (6-9)	3.18	Double/ Improvement	Brick Section
17	INF Marg	IMR (1-4)	1.618	Double/ Improvement	Brick Section
18	Shankerthapa to New Road	SNR (3-7)	0.453	Double/ Improvement	Brick Section
19	Samsanghat to Ranitalau	SRR (1-7)	1.131	Double/ Improvement	Brick Section
20	Udaypur Road to Ward Office - 18	URWO (2-9)	0.205	Double/ Improvement	Brick Section
21	Surkhet Road to medical college to Dondra Nala	SMCDN (1-7)	1.005	Double/ Improvement	Brick Section
22	Bheri Hospital to Ramlila Maidan	BHTC (2-5)	0.479	Double/ Improvement	Brick Section
23	Surkhet Road to Bheri Technical road	SRBTR (3-5)	1.061	Double/ Improvement	Brick Section
24	Gharbari tole to Tribeni chowk	GTC (4-5)	1.014	Double/ Improvement	Brick Section
25	Ranitalau to Trivhuban Chowk to BP Chowk	RTCBC (6-10)	0.747	Double/ Improvement	Brick Section
26	East South of Pravat school to Samudaek bikash kendra to west paraspur chowk	ESPS (12-15)	1.537	Double/ Improvement	Brick Section
27	Royalhotel to Bus park road to Bikasanagar	RBPR (13-15)	7.763	Double/ Improvement	Brick Section
	Total length		**40.00**		

ha =hectare, km = kilometer, m = meter.

Source: Detail Design Report of proposed project

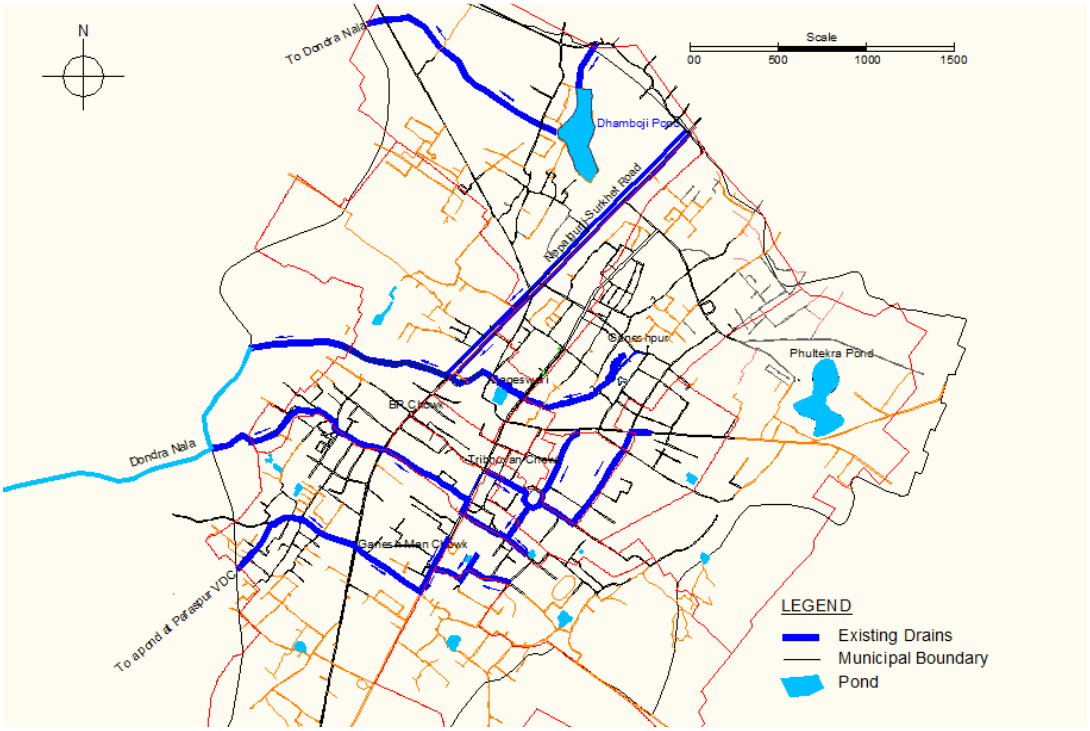


Figure 1: Existing Drainage Network

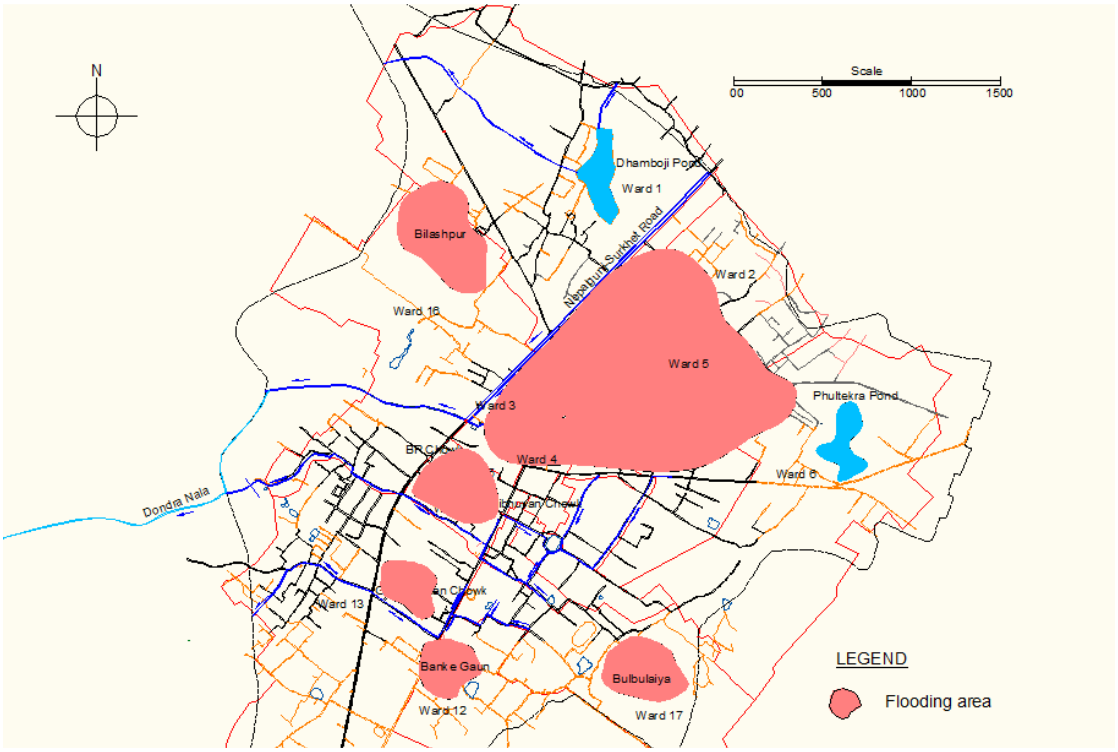


Figure 2: Flood-Affected Areas

Source: NSMC Design and Supervision Consultant. 2016. Detail design report of the proposed project.

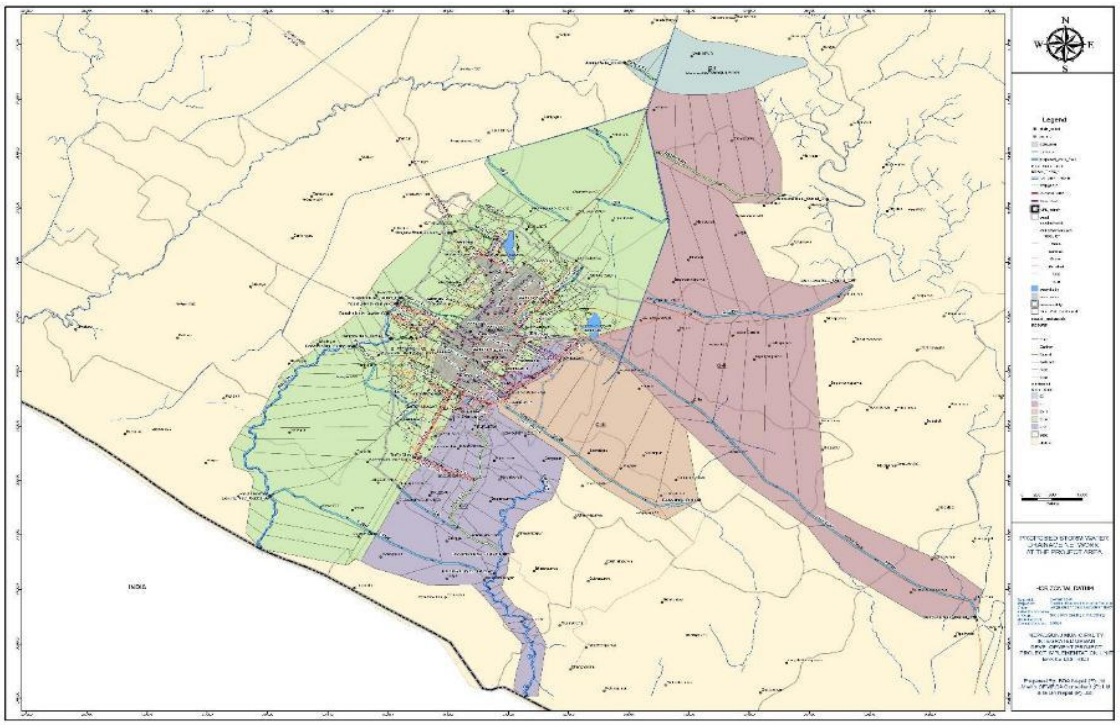


Figure 3: Proposed storm water drainage network

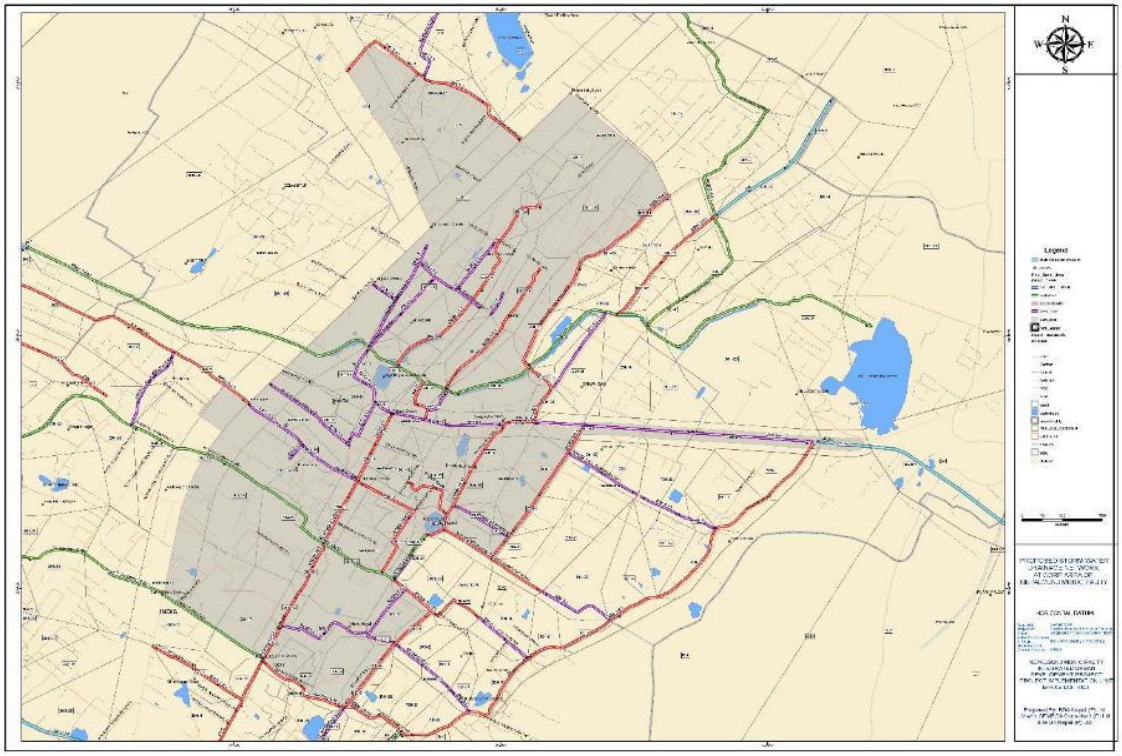


Figure 4: Proposed Storm Water Drainage network in the Core Area

Source: NSMC Design and Supervision Consultant. 2016. Detail design report of the proposed project.

B. Subprojects for City Roads Improvements/Rehabilitation

1. Background

31. Road improvements under RUDP in this SMC are a top priority of the municipality. Key objectives are to improve traffic, rehabilitation roads after construction of the drainage system, and improve access to the landfill site.

2. Existing Road Network

32. Nepalgunj SMC has good network of roads but the road surface conditions are very poor. Except for the Nepalgunj - Jamunaha Road and New Road, all other surfaces have deteriorated. As per periodic plan 2011, the total road length within the SMC is 133 km.

33. As per the Planning Section of the SMC, about 20% of the total population is served by metallic roads, 16% by gravel roads, 37% by earthen roads, 18% by brick paved or PCC roads and about 9% of the people do not have any access to a road network. The train transport at Rupaidiha in the south border in India makes linkage with different cities of India to Nepalgunj. There is an airport which provides air transport facilities in less developed western districts like Humla, Bajura, Dolpa, Bajhang, Jumla, Mugu, Jajarkot and Rukum. These transport linkages provide very effective connectivity to Nepalgunj, enhancing its overall development.

Table 10: Details of Road Network in Nepalgunj Sub Metropolitan City

Road with Metallic Surface	28.50 km (21.42% of total)
Gravelled Road	45.00 km (33.83% of total)
Earthen Road	50.00 km (37.60% of total)
Brick Paved Road	9.50 km (7.14% of total)

Source: SMC Planning Section, 2011

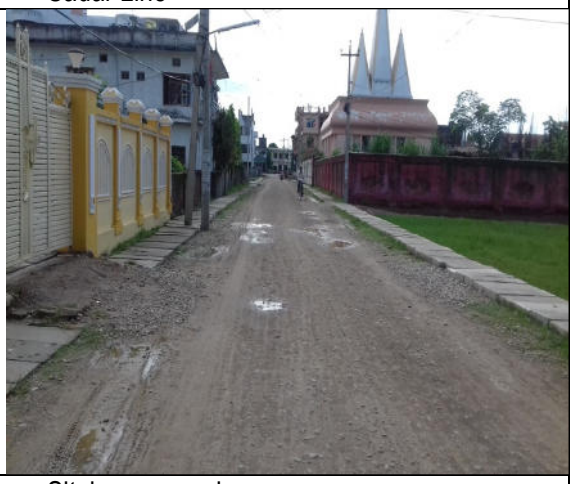
Table 11: Proposed Road

S.N	Name of Road	Length (m)	Width (PPTA) (m)	RoW	Remarks
1	BP Chowk ,Adarsh ,Water Park Road				
	Karkando-Buspark,phultakera –Sikta	4657.45	10	10	
	Phultakara –Rapti Khola	3150.00	10	12	
2	Newroad –Salyanibagh ,Dewaphuwari	511.55	10	10	
3	Charchabini ,Nagrabhawan –Tribeni mode	1120.42			
	Stadium road –Hospital Road ,Ashok Marg	873.19	10	6	
4	Landfill Access Road	2622.11			
	Samabesi Tole ,Bacchpurwa ,Devkota Chowk	3222.89	10	10	
5	UN Chowk ,Rani talau –Tribhuwan marg	1717.13	10		
	Charbhawani –ganeshmansingh –paraspur	2557.74	10	8	
6	Pillpurwa –Ratiya Culvert ,Bageshori Cinema	3669.00			
7	Shitalnagar,gharbari ,shristhi cinema hall	813.00	10	9	
8	Guruduwar ,Kasturi marg ,Koreanmarg BTS	2181.00	10	11	
9	BTS ,INF Marg ,Samshanghat ,Bheri hospital	3561.07			
10	Surkhet Road,Udaypur road -18	1266.68	8	6	
11	Surkhet Road –Medical college ,Trbini chowk	2020.63	10	6	
	Total	**38543.30**			

Source: Detail design report of proposed project

Proposed Subproject Locations

	
Ashok Marg	Nagarbhawan –Charbhawani
	
Masumandi Road	Phultekra to sikta cannel road
	
Ganeshpur Road	Rangshala Road

	
Salyanibagh – Bus Park	Samabesi Tole Road
	
Samshanghat -Raniltalau	Sadar Line
	
Shristhi Cinema Hall road	Sitalnagar road

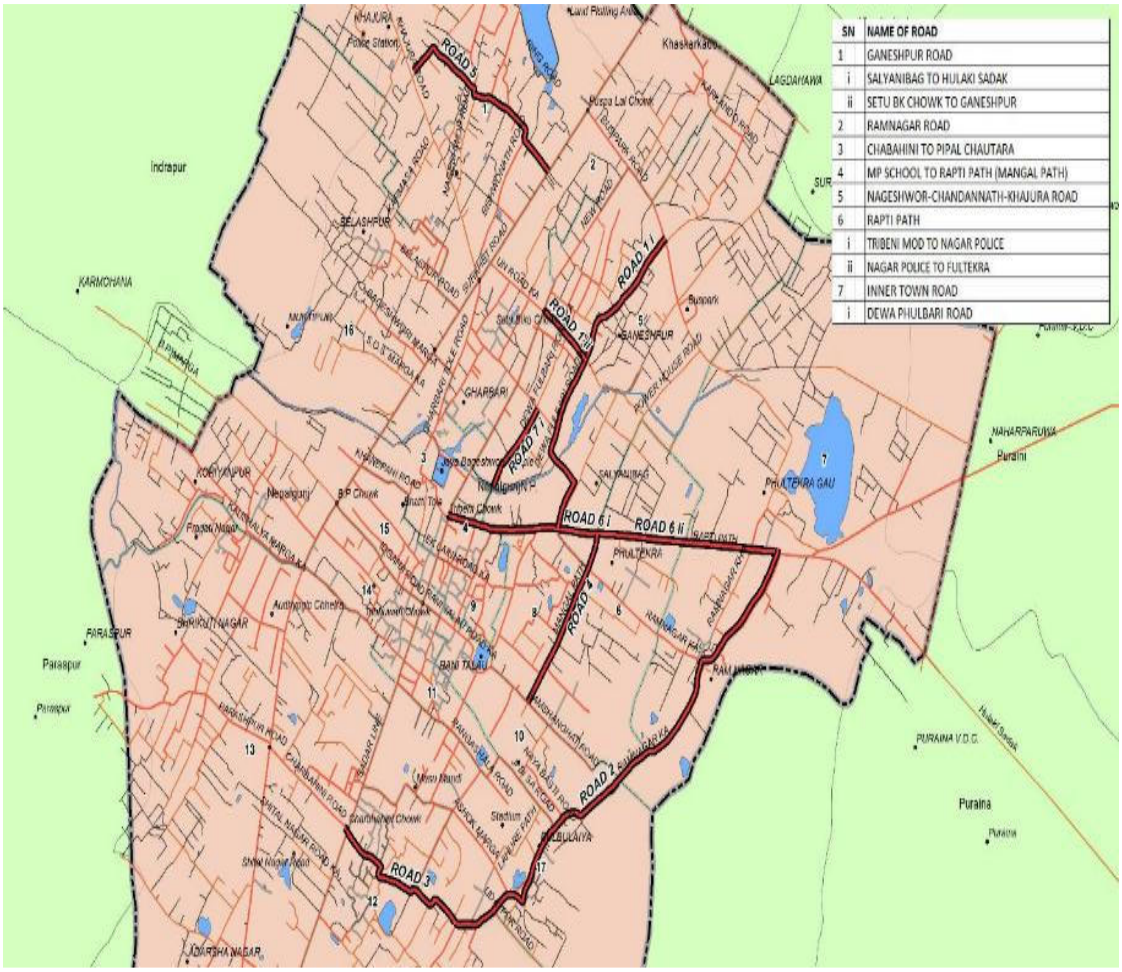


Figure 5: GIS Map of Proposed Road Network

Source: Detail design report of proposed project

C. Delineation of Project Area

34. In general as per nature, extent and magnitude of impact; the influenced area is delineated as below:

35. **Direct Impact Area/Zone** is the area which is affected directly by proposed drainage and road construction. Hence direct impact area for the roads and drainages is taken as 50 to 100 m from the road edge. Similarly, the impacts associated with the project having direct effect to the area are taken as Direct Impact area.

36. **Indirect Impact Area/Zone** is the area which is not directly influenced but indirect effects and impacts are seen due to the construction of proposed drainage and road. The project SMC i.e. Nepalgunj SMC is taken as Indirect Impact Area. While conducting IEE Study, detail study up to 100 m distance on both sides of the proposed road cross section and drain was done to find out the information of environmental parameters and issues/impacts due to construction and operation of proposed drainage and road.

D. Materials to be used

37. The main materials used for the proposed works are: sand, stone, bricks, cement, reinforcement, wood, hume pipe, aggregates, earth, and water. The quantity estimates of the materials are included in the annex

E. Emissions resulting from the implementation of the proposal

(i) *Solids:* As the project is construction and improvements of the roads and drainage at Nepalgunj Municipal area, there will be relative small amounts of material to be excavated and dumped as spoil and the materials excavated will be used for compaction of inner city roads.
(ii) Liquid: No remarkable amount of liquid materials will be emitted from the project implementation.
(iii) *Gas:* Gaseous emissions are less due to the implementation of the proposal.
(iv) *Noise:* The current noise level at the project area is not in pristine condition and due to the heavy traffic, there is noise pollution and at the time of implementation of the proposal also, due to traffic congestion and heavy traffic, the noise level will increase. During construction, the movement and operation of construction plant, equipment's and vehicle will increase noise level to some extent. During project implementation also, there will be more traffic than at present level which will obviously increase noise level.
(v) *Dust:* The dust level in the air is observed generally to be huge during movement of vehicles along the road. The construction works will also increase the dust level but at the time of operation of project, the dust level will be minimized by using sealed bituminous layer, and hence the dust pollution will be controlled much better at the time of operation of the project.

F. Energy to be used

38. Proposed works requires a substantial amount of fossil fuel e.g. kerosene for bitumen heating, gasoline (petroleum, gas etc) for vehicles etc. Work and labor force at the campsite will need kerosene, gas in absence of firewood availability for cooking their meals but firewood supply system need to be managed and controlled under transparent and respectful manner by practising standard agreement format between buyers and suppliers. Contractors fossil fuel need for their vehicles, operating machines used for the works will exert pressure on the local supplies unless a separate mechanism is amicably worked out.

G. Human Resources Requirement

39. The anticipated work force required for the project works are unskilled labor, skilled labor and technical staffs. The unskilled labor will be primarily be recruited among local communities, giving due preference to disadvantaged groups and women whenever possible. Considering the design plan and norms for rate analysis total unskilled workers required are around 135000 workers days and total skill workers including engineers, overseers, drivers, etc are around 45000 workers days.

H. Resources required for the implementation of the Proposal

40. Various resources will be required for construction and improvement of this drainage and road works. The main resources include land, human resources, tools and equipment, stones, boulders, soil, gravel and sand will be collected from Source 10 km away from the Surkhet Road and the contractor can bring the materials from within 52 km from SMC and no specific location is chosen for the collection of materials. Local transportation means like trucks will be used for this purpose.

1. Total Capital

41. The estimated cost for the improvement and development of storm water drainage and urban road including general items and civil works is recommended NRs.1,833,337,170.93 (17.13 Million Dollar) including price contingencies, physical contingencies and VAT.

42. The total cost for Improvement and Development of Storm Water Drainage is NRs 685,476,570.03 and for improvement and Development of Urban Road is NRs. 327,046,288.79, including contingencies/VAT.

2. Working Capital

43. The working capital will be decided after the final bidding procedure is done.

3. Land Area

44. The land area required for proposed work is 12309.9 Sqm. Among 12309.9 Sqm of land; 78% i.e. (9601.72 Sqm) land is barren land, 8% i.e. (984.79 Sqm) cultivated land and 14% i.e. (1723.39 Sqm) built up area.

4. Machinery and tools

45. The machinery and tools that are used at the time of construction and operation stages are as:

Labour intensive tools: Wheel Barrow, Shovel, Iron Pan, Spade, Pick etc.

Safety Tools: Helmet, Safety Jacket, Belt, Gloves, Boots, Safety rope, trolley and other equipment are

- Tractor with trolley
- Trucks
- Excavator
- Dozer
- Graders
- Bitumen Boiler Machine
- Loader
- Dump Trucks
- Hauling Scrapers
- Pneumatic tyre rollers
- Backhoes
- Tamping Machine
- Portable Pump
- Bamboos and rope
- Manhole covers lifting hook and tripod
- Motorcycle

5. Arrangements made for disposing or processing waste

46. The waste or spoil generated during the drainage and road construction and improvement works will be first segregated as top soil/productive soil and other spoils. The top soil/productive soil will be used at the firm lands and other will be used for the compaction of inner roads/lanes and hence no huge spoils will be left over.

6. Paths for movement in the area where the proposal is to be implemented

47. All the roads will not be constructed at a time and at the time of construction of road, in co-ordination with traffic police and local government bodies, alternative routes will be followed.

I. Details of Technology

48. Under proposed drainage and road Construction and improvement works, the technology to be used is of mixed nature, requiring to deploy petty as well as national contractors for civil works (structural installations, drain works etc.) heavy machine operations for cuttings: earth, affected existing structure etc., laying sub-base and base - course materials over the surface and its levelling as well as handling of pavement materials; heavy compressor for compacting overlaid pavement materials; bitumen spreader for spraying bitumen over the overlaid base course; and pneumatic compressor for binding tougher overlaid clips with bitumen, resulting to sealed bituminous surface. Crusher plants will also establish according to materials needs at appropriate locations suiting contractor's work schedule. For work of labour nature, local people will be given priority if, when and where their sustained availability is assured to its employed. The work includes civil works, embankment protection and bioengineering, social development and environmental protection activities. Mechanized as well as labour based technology will be used. Focus will be given on labour based technology and only in difficult sections, mechanized technology will be used. The final output of the project is an all-weather finished metallic surface road with the proper drainage system. The materials to be used in the planned project works are boulder for soling, gabion boxes, sand, stone, bricks, bitumen, reinforcement, wood, hume pipe, aggregate, steel, earth, water, etc.

J. Project Activities

Earthwork

(i) Site clearance
(ii) Excavation in roadway, drain and retaining structures
(iii) Construction of roadway and drain in embankment and miscellaneous
(iv) Transport up to 10 km with placing and compacting removal materials from drainage and road,
(v) Cleaning of existing drain and disposal of removal material

Drainage and Structures

(i) Supply, place and compact pitching / soling works of stone and brick
(ii) Supplying and laying, stone pitching works in 1:4 cements and ratio for the drain and structures
(iii) Supplying and laying, stone masonry for drain and structural works in 1:4 cements and mortar
(iv) Supplying and Laying, Brick Masonry for drain and structural works in 1:4 cements and mortar
(v) Supplying and Laying 12.5mm thick Plaster for drain and structural works in 1:4cements and
(vi) Providing, Placing, Supporting and de-shuttering of plywood form work in proper line and level
(vii) Providing and placing different grades of Concrete (M10. M15, M20)
(viii) Supply, fabrication and assembling of different size of gabion boxes
(ix) Providing and placing of reinforcement bar of high yield for the causeway, cover slab, existing and proposed infrastructures including cutting, placing, binding and fixing
(x) Providing and placing of reinforcement / iron steel of high yield for Grating (drain inlet) including placing, binding, fixing and laying
(xi) Providing and Placing of Iron gate including placing, fixing, laying

Road and Pavement

(i) Preparation of subgrade

(ii) Supplying, Placing and compacting crusher gravel subbase (passing sieve of 40mm and down) over prepared subgrade according to the designed
(iii) Supplying, providing, laying, spreading, watering, leveling, compaction and all complete for crusher run base course material grading
(iv) Providing, mixing, laying, compacting, transport and all complete of asphalt concrete pavement
(v) Providing, mixing, laying, compacting, transport and all complete of Prime Coat

Miscellaneous

(i) Dismantling and reconstruction / Relocation of existing infrastructures
(ii) Reinstatement of existing road
(iii) Providing and fixing of different diameter of NP3 RCC Pipe RCC Pipe Culvert including trench excavation and joint sealing works
(iv) Environment mitigation works and Bio-Engineering

a. Supply and Planting rooted grass slips, including earthwork, preparation of slips
b. Supply and planting containerised tree and shrub seedlings
c. Supply, Preparation and planting of live pegs
d. Traffic Management, Place traffic signpost, different information board etc.
e. Drainage outlet management
f. Environment Management Plan with mitigation measures including air quality, water quality, noise level, occupational health and safety etc. as per instruction of Engineer

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Geography

49. The project is in Nepalgunj SMC, situated in Banke District of Bheri zone in the Mid-Western Development Region of Nepal. It is located approximately 510 km west of Kathmandu by road, is an industrial town as well as an economic centre for the Mid-Western Development Region. The city is lying at an average altitude of 165 m. The SMC lies between latitudes 27° 51' N – 28° 20' N and longitudes 81°29' E – 82°08' E. The SMC is surrounded by Bhabanipur, Udayapur, Puraina and Puraini Village Development Committees (VDCs) in the east; Paraspur and Indrapur VDCs in the west, Khajurapur Karkado and Basudevpur VDCs in the north and Jaispur, Bhawaniyapur, Udapur VDCs in the south. The SMC is the leading industrial and business center by its proximity to the Indo-Nepal border; it functions as an outlet for Nepalese exports and an inlet for imports. Nepalgunj SMC covers an area of 13.14 sq. km. and has been divided into a total of 17 wards. However, the ward numbers 3, 4, 8, 9, 11, 14 and 15 are the main core area of the SMC.
50. Nepalgunj, located on the flat land of Terai, suffers from chronic water-logging problems caused by inadequate capacity of drainage channels due to ad-hoc construction of the drainage system, poor maintenance of drainage facilities, roads & lanes and worsened by solid waste dumping.

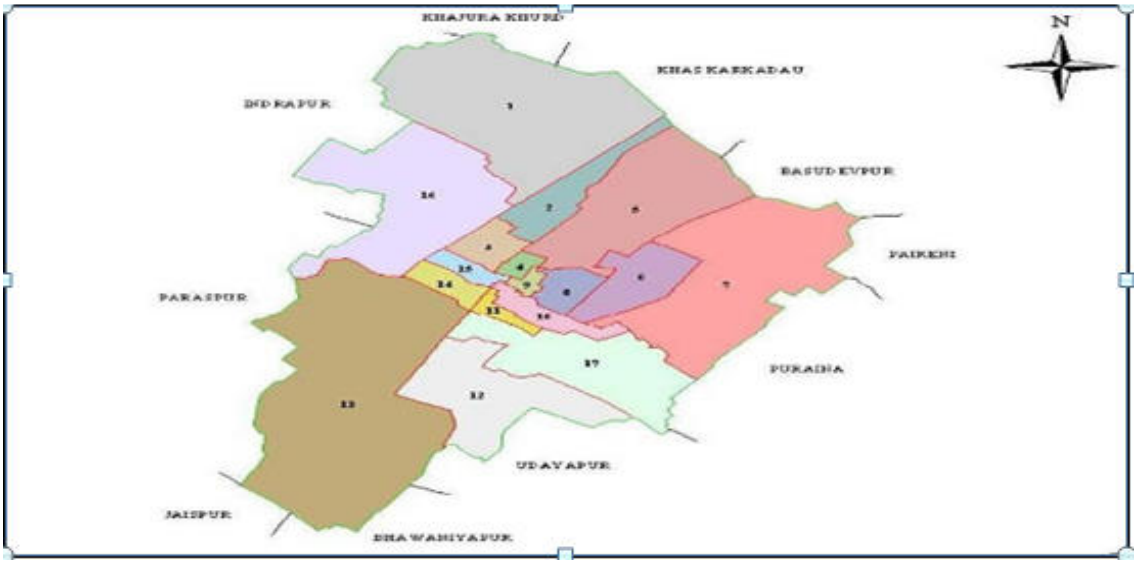


Figure 6: Administration Boundary Location (Wardwise)

Source: Detail Design Report of proposed project

2. Land Use Pattern

51. The land area required is the municipal area and the works to be done is construction and improvements of the existing drainage and roads. The amount of land required for the proposed work is presented as below:

Table: 12: Land Use Pattern of the catchment Areas

Component	**Area, Ha**
Built up Area	528.87
Cultivated Land	5835.13
Forest	59.41
Orchard	68.19
Bush	8.97
Sand	8.13
Barren Land	250.60
Water Body	26.63
Pond	39.16
Metalled Road	24.08
Earthen Road	12.54
Gravelled Road	11.03
RCC Paved Road	3.20
Brick Paved Road	0.12
Recreational	2.95
Total Catchment Area (Ha)	**6879.01**

Table: 13: Area of land converted to drainage and road due to proposed works

S.N.	**Area of Land (Sq.m)**	**Name of Road**
1	1142	From Gulma to Nareshwor Chandranath and Connecting Khajura Road
2	1660.22	Adarsha Tole, Water Park, Dhambojhi HHS and Sanbin School way and From Buspark-Southern Salyani Bagar Rapti Sadak
3	757.47	Setu B.K. Chowk –Ganeshpur Chowk Wark No. 5
4	38.02	Rapti Sadak- North Cinema Hall –Deuwa Fulbari Chowk
5	517.73	Newroad east Deuwa Fulbari to North Indra Tole Sadak
6	423.41	Triveni Mode to Ward Police Office Bit

7	18	Ward Police Bit to Fultekra Sadak
8	552.13	Char Bahini Chowk to Tribhuwan Chowk
9	37.79	Tribhuwan Chowk to Triveni Mode
10	986.88	From Pipal Chautara to Bulbuliya to Ramnagar Sadak
11	181.53	Stedium Road to Hospital (upto Steel Factory)
12		M.P. School to Rapti Sadak
13	294.41	From Pipal Chautara to Piralipurawa road
14	37.85	Char Bahini Chowk to Papal Chautara
15	1578.46	From B.P. Chowk to West ward No. 16
16	4084	Landfill Site Access Road
Total	**12309.9 Sq.m**	

Source: Detail Design Report of proposed project

52. Among 12309.9 Sqm of land; 78% i.e. (9601.72 Sqm) land is barren land, 8% i.e. (984.79 Sqm) cultivated land and 14% i.e. (1723.39 Sqm) built up area.

3. Sanitation and Sewerage

53. An on-site system is one that treats and disposes waste water on the site that the waste water is generated. However, the system in operation in the Nepalgunj town is nearly a hybrid off-site system as it relies on disposal off- site haphazardly.

54. The typical sanitation system consists of a sealed septic tank which discharges direct to a drain. Private suppliers provide septic tank emptying facilities. There is no effective control on the dumping of the contents. Table below presents the preliminary information of the Socioeconomic Household Survey in 2011 in relation to sanitation.

Table 14: Toilet use

S.No	Type of Toilet	Nos.	Percentage
1	Water-sealed toilet with flush	115	18.3
2	Water-sealed toilet without flush	175	27.4
3	Toilet without water at outside	165	26.9
4	Pit latrine on plot	115	16.8
5	Public latrine	21	2.5
6	Neighbor's toilet	17	1.5
7	Other	45	6.6
	Total	653	100

Source: PPTA, 2011

4. StormWater Drainage

55. The drainage network of Nepalgunj SMC is complex due to flat topography and not having enough capacity (under design) to drain out the storm water during peak flow, annual monsoon flooding, particularly during mid-July to August. One of the major constraints in the development of this SMC is poor drainage system although it has the potential to grow rapidly.

56. Only 42% of the population has effective access to the drainage system. As a result, parts of the SMC mainly Ganeshpur (Bus Park), Banke Gaun in Ward No. 12, Bilashpur in Ward No. 16 and Bulbulaiya in Ward No. 17 get flooded in monsoons. About 35% of the municipal population (26,800 in 2011) get stranded inside their homes for weeks hampering normal life and bound to live without safe drinking water.

57. The total length of the main existing drains is 16 km including natural watercourses. In addition, there are many smaller local road drains which are not functioning due to under design and obstructed by the disposal of solid waste in the existing drainage.

5. Road and Transport

58. Nepalgunj SMC has a good road networks, although the road condition is very bad. Except for some part of New Road, all other road surfaces have deteriorated. Most of the eastern part of the SMC is served with metallic roads while the west sector (west of the highway) with gravelled and earthen roads.

59. The train transport at Rupaidiya in the South Border, in India, makes linkage with different cities of India to Nepalgunj. There is an airport which provides air transport facilities in less developed mid-western districts like Humla, Bajura, Dolpa, Bajhang, Jumla, Mugu, Jajarkot and Rukum. These transport linkages provide very effective connectivity to Nepalgunj, enhancing its overall development.

6. Solid Waste Management

60. At present, all the wastes are collected and dumped into an open dumping in Ward No. 17, 3 km east from the SMC Office. This area has been used as an uncontrolled dumping site for the past 25 years simply by filling the low-lands (depressions) formed by Brick Factory (and Kiln) for long time in the past. Since the lowlands seem to have been saturated, the waste filling presently is site, Bulbulaiya, which is located practically crude dumping. Even hazardous and infectious hospital wastes are disposed at the site. Most of the metal and plastic scraps generated by the industries are recycled/ reused by the industries. The SMC does not have any separate system to manage special hazardous wastes (such as industrial wastes, dead animals, medical wastes etc.) except collecting them with the municipal waste and disposing finally at the currently operated uncontrolled dumping site.

7. Quarry Site

61. For the proposed work, materials required will be extracted from and up to 52 km from SMC and no specific location is chosen. During construction period, contractor will identify and approve the quarry site.

8. Sources of water

62. Groundwater is the only source of water for the town. Piped water supply in Nepalgunj SMC started with the construction of a water supply system by Indian Cooperation Mission in 1974. Initially the water supply system was operated by the Department of Water Supply and Sewerage (DWSS) which was taken over by Nepal Water Supply and Sewerage Corporation (NWSC) in 1981. The present system consists of two tube wells, one overhead tank and about 67 km of pipes of various materials and sizes. It serves about 36% of the existing population.

63. Households and other customers not connected to NWSC system draw water from private hand pumps. Some institutions/industries have their own large diameter tube wells and are completely independent of NWSC. Public hand pumps are also installed at many locations. Based on the blanket arsenic testing carried out in Nepal, there are at least 6,380 wells in the SMC out of which 67 (1.05%) have concentrations of arsenic more than the national standard of 50 ppb. This is a health concern since the water is used for drinking and cooking.

64. The shallow hand pumps are nearly all suction hand pumps indicating that the depth of groundwater is no more than about 6 meters. It has been reported that some of the shallower hand pumps often dry up in the dry season due to the lowering of water table. Poor, disadvantaged and marginalized communities are much more at risk of water contamination from poorly protected shallow tube wells.

(1) Major source of Water

Private Tap Water	Community Tap	Private Hand Pump	Neighbor's Hand Pump	Community Hand Pump	River/Stream/Pond/Spring	Open dug well	Others
2074	144	7465	136	147	1	6	12

(2) Quality of Water

Good	Fine	Poor	Not Stated
5961	3533	314	7618

(3) Water Treatment practice

Water Guard	Boil	Filter	Chlorination	Without treatment	Not Stated
635	326	1161	26	7388	7890

(4) Sufficiency of Water

Yes	No	Not Stated
9624	98	7704

(5) Average Daily Water Consumption in Ltr.

0-50	51-100	101-500	501-1000	1001-2000	2001-8027
724	1681	6022	1236	120	90

(6) Daily Water demand in lts.

0-50	51-100	101-500	501-1000	1001-2000	>2000
8671	727	380	19	2	12

(7) Willing to pay for daily water demand in NRs.

0-200	201-500	501-1000	1001-2000	>2000	Not Stated
3441	3031	1328	276	273	9057

Source: SMC Profile, Department of Water Supply and Sewerage

65. For Water quality; test will be done before, at the time and after the construction process undergoes. The water quality test will be done at every outlet of the drainages i.e. Dondra, Rataiya, Dunduwa, Ameliya Nala and other sensitive locations like Rani Talau, Hospital Roads, Bus Park, Tanga Station, Tribhuwan Chowk, BP Chowk etc.

B. Biological Environment

1. Flora and Fauna near and at the Project Area[4]

66. There are some floral and faunal species at the municipal area but no remarkable flora and fauna are harmed or impacted due to the proposed work.

- **Flora:** The trees in Banke are: *sal* (*Shorea robusta*), *karma* (*Adina cordifolia*), *sisau* (*Dalbergia sissoo*), *khayer* (*Acacia catechu*), *botdhainro* (*Lagerstroemia parviflora*), *asna* (*Terminalia alata*), *simal* (*Bombax ceiba*), and *jamun* (*Syzygium cumini*). *Sal* is an endangered species.
- **Fauna:** The wildlife bird species found in Banke are *mayur* (*Pavo cristatus*), *and dhukur* (*Streptopelia chinensis), Crow, Sparrow etc.* Among these, *mayur* is classified under CITES as Appendix I.
- **Wild animals:** found in and around projecta area are syal (Canis aureus), bandar (Macaca assamenius) etc.

[4] No rare, endangered or protected species have been identified during site visits and assessments in the subproject area. The biological information is based on secondary data and available literature for a wider area covering the entire region.

- There are a variety of snakes in the district, and *gharials* (*Gavialis gangeticus*), which are protected species.
- **Aquatic Life**: Since there is no any river and other remarkable water bodies, no aquatic life are observed.

67. No any flora and fauna are affected by the proposed works. There are terrestrial fauna like buffalo, cow, oxen, goat etc.

C. Socioeconomic and Cultural Environment

1. Population and condition relating to settlements in the area

68. Nepal is one of least urbanized countries in the world however in recent year the urbanization is increasing. From the total of 3.6% urban population out of total population in the country, it reached 17% (about 5.5 million people) resided in the urban area by the end of 2010. Nepalgunj SMC established in 1962 is one of the oldest municipalities in Nepal. Urbanization and growth of urban population is gradually changing the occupational pattern of the community from agriculture to industrial and other non-agriculture occupations.

69. According to the census, the population of Nepalgunj in 2011 was 72503 (37,178 males and 35,325 females) with a growth rate of 1.89 per annum whereas population of SMC as per census 2001 was 57535 with a growth rate of 1.87%. The population density according to 2011 census is 58 person/ha. Most of the people are living with more than 6 family members. The Table below shows the population, growth rate and population density in different census year.

Table 15: Population Growth and Density

Population of Different Census Years	1961	1971	1981	1991	2001	2011
Population	15,817	23,523	34,015	47,819	57,535	72503
Growth, %		4.05	3.76	3.46	1.87	1.89
Density (Person/ ha)	12	18	26	37	45	58

Source: CBS, 2011

Table 16: Population, Household, Density

Wards	Area in Sq.km	Households	Population	Male	Female
1	1.81	1861	8255	4190	4065
2	0.538	779	3740	1881	1859
3	0.169	377	2122	1071	1051
4	0.051	281	1852	950	902
5	1.101	1987	9950	5056	4894
6	0.428	872	4922	2509	2413
7	1.685	841	4285	2182	2103
8	0.153	613	3393	1770	1623
9	0.068	310	2081	1076	1005
10	0.2	435	2527	1303	1224
11	0.082	277	1696	867	829
12	0.803	1111	4420	2287	2133
13	2.835	2152	7959	4167	3792
14	0.128	552	2980	1538	1442
15	0.092	468	2891	1532	1359
16	1.356	1650	6773	3441	3332
17	0.682	613	2657	1377	1280
18	6.01	679	3667	1913	1754
19	6	738	4326	2277	2049
20	4	1015	5455	2802	2653
21	4	964	6567	3359	3208

22	6.01	1162	5983	3068	2915
23	13.01	1677	8962	4651	4311
24	5	1145	8910	4540	4370
25	9	1349	6830	3359	3471
26	16	2597	12233	6036	6197
27	7.96	1122	6264	3174	3090
28	5	1145	8910	4540	4370
Total	89	27628	141700	72376	69324

Source: CBS, 2011

70. Based on the population and density, the SMC can be divided into four settlement zones as described in Table below:

Table 17: SMC Zones

Zone /Wards	Area	Significance
Zone – I/ 5,1,2	Along the East and West of the Guleria Road Junction (Dhambojee Area)	Rapidly growing and becoming the main commercial central due to the wide road and entrance to the old city area. High potential to grow
Zone – II/ 13, 16	South East and South west of the SMC along highway to Indian Boarder	Least developed area due to the security reasons. Least potential to grow in near future.
Zone – III/ 6, 7, 12, 17	North East and South East from the old city centre	Potential to develop after Zone I and could serve as an extension to city core. The area needs a thorough fare road connecting the adjoining VDCs on the east from the highway.
Zone – IV/ 3, 4, 8, 9, 10, 11, 14, 15	Main City Core	High concentration/ does not have potential to grow further due to non-availability of land

Source: PPTA, 2011 and Field Survey and Municipal Data

2. Institutional, Commercial, and Other Facilities

71. There are 60 government and private educational institutions including pre-primary, primary, secondary and higher secondary schools and a single governmental campus in Nepalgunj. Bheri Zonal Hospital is the government health institution and there are 2 private nursing homes and about 19 clinics (Nepalgunj SMC's Brochure, 2009) but data collected from Nepalgunj SMC shows 247 clinics. There is also central level eye hospital which provides eye care services and runs related courses up to the post-graduate level and one Teaching Hospital.

72. In this SMC, there are around 118 government offices and around 66 non-government offices. As per public recreational space, there are 3 parks and 1 mini- zoo which is also called Mahendra Park. There are several temples and masjids in Nepalgunj. Bageshowari temple which is one of the renowned temples for the Hindus for its religious significance also lies in Nepalgunj. There are 1100 shops, 300 hotels and 75 restaurants whereas Nepalgunj SMC's Brochure, 2009 shows 726 commercial businesses and 74 hotels. There are 32 registered industries within Nepalgunj Industrial Estate, (Nepalgunj SMC's Brochure, 2009). The majority of the industries are small scale industries such as rice mills, wood and steel furniture, plywood industry, pharmaceuticals, and metal wire and food products.

3. Cultural and Socioeconomic Aspects

73. Nepalgunj has a diverse culture with people from different faiths living within mixed communities. Hinduism and Islam are two major religions in the city with Hindus comprising larger percentage of the population. Other religions like Buddhism, Sikhs and Christianity are among the minorities. Native languages spoken by the people are Awadhi, Nepali and Tharu.

74. This is also a historical city. Bageshwari is one of the most popular temples for Hindus devotees in the country as well as those from nearest border cities of India. It is dedicated to

goddess Bageshwori and the temple area also houses another famous temple- the temple of Lord Shiva with mustache known as Junge Mahādeva located at the middle of pond. There is also Gurudwara, Mashjid, Boudha Gumba and Church located at different places of city. During the time of Dashain Festival, Hindus establish the Idol or Statue of goddess Durga temporarily. Maghi is one the main festival of Tharus whereas Id, Bakari Id and Moharam are festivals celebrated by Muslims.

4. Particulars of any sentive (*(Author query: Sensitive?)* **things or objects, if any, located close to the area where the proposal is to be implemented** *(Author query: Kindly clarify.)*

75. There is different cultural heritage, airport, ponds etc. in the SMC area. Famous Bagewori temple with statue of Mahadeva with moustache (Junge Mahadev), Standing Ganesh statue, Itgad Masjid, Rani Talau etc are the sensitive and protected areas in the municipal area. No impact on the temple is expected due to the implementation of the proposed subproject. Any impact on community resources will be addressed in the resettlement plan (RP) prepared for the subproject.
76.

V. ANTICIPATED ENVIRONMENTAL IMPACTS

A. Methodology

77. Issues for consideration have been raised by the following means: (i) input from interested and affected parties; (ii) desktop research of information relevant to the proposed subproject; (iii) site visits; and (iv) evaluation of proposed design scope as per PPTA study and potential impacts.

78. Categorization of the subproject and formulation of mitigation measures have been guided by ADB's REA Checklist for roads and drainage works and ADB SPS, 2009.

Table 18: Anticipated Impacts for the proposed subproject

Scheme	Expected impacts	Comments
1. Road & Drainage upgrading • widening existing roads • blacktopping • drainage • footpaths along roads • in specific cases possible realignment of road	Will improve the situation in settlement by providing more space for traffic, drainage, increased safety for pedestrians (footpaths), and reduction of problems caused by dust and mud. Main concerns: • land acquisition for widening or realigning roads (if any) • reclaiming of existing, but not used ROW: conflicts with encroachers • impacts during construction	Category B projects, IEE required; small local interventions probably C. Land must be acquired according to rules. If squatters or other land users without a title will be affected, compensation must be provided according to ADB safeguards principles. Construction must be carried out with the aim of minimizing nuisances. Any temporary occupation of land, and any damage to land, assets or structures caused by construction activities, must be compensated.

B. Environmental Guidelines for Project Selection

79. To strengthen urban climate resilience, urban drainage designs will accommodate additional flow caused by more intense rainfall, and key facilities such as water treatment plants, landfill sites, and production tube-wells will be built with free board above the highest recorded flood level.

80. The following criteria will be used for excluding subproject sites which might have significant negative environmental impacts:

(i) ecologically sensitive area such as reserved forests critical wetlands etc.; and
(ii) encroachment on cultural features like places of worship, cultural heritage sites, graves/cemeteries, historical monuments, etc. (no such encroachments are envisaged).

81. Guidelines for project selection in Table below provide further guidance to avoid or minimize adverse impacts during the identification and finalization of subprojects.

Table 19: Environmental Criteria for Subproject Selection

Environmental Selection Guidelines	Remarks
Overall selection guideline (applicable to all components)	
i. Comply with all requirements of relevant national and local laws, rules, and guidelines.	See Section II of this EARF
ii. Avoid/minimize where possible locations in protected areas, including notified reserved forests or biodiversity conservation hotspots (wetlands, national reserves, forest reserves, and sanctuaries).	Approval from concerned authority if unavoidable
iii. Avoid possible locations that will result in destruction/disturbance to historical and cultural places/values.	Provide for the use of "chance find" procedures in the EMP that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.
iv. Avoid tree-cutting where possible. Retain mature roadside trees which are important/valuable or historically significant. If any trees must be removed, plant twenty-five new trees for every one that is lost.	Approval from Forest Department
v. Ensure all planning and design interventions and decisions are made in consultation with local communities and include women. Reflect inputs from public consultation and disclosure for site selection.	All consultations should be documented and concerns expressed by public addressed in IEEs.
vi. Synchronize all road improvement and pipe laying works (to extent possible) to minimize disturbance and optimize use of resources (e.g., water pipes laid prior to road improvements).	Coordinate planning of works with municipality.
Roads Improvement	
i. Include the provision of new or improved storm water drainage to remove the increased runoff caused by increasing the road surface area	
ii. Include tree planting alongside roads to provide a natural barrier to noise and visual impacts, and include additional man-made barriers where suitable for public safety.	
Drainage improvement	
i. Outfalls should be to suitable drainage areas (canals, etc.) and avoid flooding to adjacent private lands.	
ii. Include measures to ensure the safe disposal of canal dredge (e.g., to dumpsite or landfill) without causing an environmental hazard.	
iii. Include provision for installation of regulator to control inflow/ outflow through drain to prevent backflow of water through drain (e.g., due to high water level at downstream discharge point, such as khal/ river)	
iv. Include measures to avoid pollution of downstream water body due to disposal of polluted water from drain	Do not allow direct connection to drain from sanitation facilities and/or waste water with high organic load. Strictly follow the effluent discharge standard of DOE and consider introduction of small scale treatment of polluted drain water before disposal (if needed)

Environmental Selection Guidelines	Remarks
i. Introduce provision of rooftop rainwater harvesting system for proper storm water management or in case of drinking water scarcity	

C. Climate change adaptation and disaster risk management considerations.

82. Nepalgunj SMC needs to deal with the impacts of climate change that are mainly associated with increased rainfall, rain-driven drainage congestion and urban flash flooding. Inadequate drainage and waste management systems are contributing to localized flooding, drainage congestion, water logging and water pollution. Most waterlogged areas seem to be in the municipality's newer areas, away from its historic business district. Inadequate drainage and waste management systems are contributing to localized flooding, drainage congestion, water logging and water pollution.

83. Flash flood and water logging will be accelerated due to increase of climate change impacts. It is recommended that project design construction, especially design material, method of construction should be taken appropriate to make the Project climate-proof and disaster resilient. During the detailed design, the Environment Specialist properly consulted with the design team to incorporate this impact. The climate change impact and necessary consideration in design for adaptation is shown in Table 20.

Table 20: Climate change impact and design considerations

Climate change effect/impact factor	Impact	Design consideration for mitigation
Water level high/Sea level rise	Inundation of low laying area. Creation of nuisance due to frequent inundation if solid waste landfill and/or secondary transfer station are located on low laying area	Location of the landfill and STS should not be in the low laying area. Build the embankment around the landfill with a height considering highest flood level. Location of landfill should be at least 20m preferably 100m away from river. Tree plantation need on the embankment to create buffer zone
Salinity	All construction material will be impacted due to salinity: corrosion and dampness	All construction material should saline resistant, anti-saline admixture can be used
Cyclone and tidal surge	Wind speed will damage structurally to building, damage to plant and vegetation, tidal surge will damage embankment, cyclone may damage landfill operation, may dislocate waste and create naissance	Structural design should consider cyclone wind speed; wind breaker can be introduced around the building and site; Plant timber trees, proper cross drainages should be provided to the embankment, design should consider height of the storm surge; drain valve can be used at drain outlet to protect backwater flow from drain. Landfill daily cover and compaction should be strictly maintain in daily operation of the landfill
Floods and water logging	Erosion to internal road surface and structural damage to drain and road due to over topping and water logging; ground floor of the building can be flooded due to low plinth building;	Proper side drainage and cross drainage should be provided to road, road and drain design should consider high flood level, plinth level of building should be raised

Climate change effect/impact factor	Impact	Design consideration for mitigation
	overflow of sanitation can create nuisance and disease spreading, tube-well can be contaminated due to intrusion of flood water. Nuisance may create due to frequent flooding/waterlogging if solid waste landfill and/or secondary transfer station are located on flood prone or water logged area	considering high flood level, toilet and other sanitation structure should constructed on raised ground, tube-well should be also placed raised ground. Location of the landfill and STS should not be in the flood prone/water logging area. Build the embankment around the landfill with a height considering highest flood level.
Lack of drinking water	Effect on water supply, disease can be spread due to drink impure water	Water supply should consider water demand properly; surface water should be used as water source for treatment plant
Drought	Impact on plant and vegetation, water scarcity, delay in landfill digestion mechanism due to lake of moisture, load shedding of electricity	Pond should be excavated and re-excavated, Proper electric supply system should be established, solar electric should be used rather than conventional electric supply, more tube-well should be sunk
Construction materials' quality		Most durable materials possible, even if higher cost, e.g. concrete, high quality bricks should be chosen; anti saline admixture should be used; Construction quality should be monitored and controlled
Rising temperatures		Works during most favourable times of year and day should be executed; Preparing, placing and curing concrete and mortar, to ensure placement, etc., during most favourable times should be monitored and controlled; plain high-quality un-rendered brickwork and high quality cement mortar in preference to rendered low-grade bricks should be used; sulphate resisting cement should be used in vulnerable locations (higher heat gain during curing) or cement containing fly ash (less heat gain, so preferred)
Runoff		Trapezoidal section side drains with small low-flow section (cunette) for low flows should be used; Side drains should be lined to achieve higher discharge velocities without increasing risk of scour, etc.

D. Impact Identification and Mitigation

84. Impacts identification and its prediction have been made sticking to activities of proposed drainage and road construction and improvement works at construction and operation phases. These include both beneficial and potential adverse impacts.

85. Potential impacts have been predicted in terms of their significance (low, moderate and high), extent (site specific, local and regional) and duration (short term, medium term and long term) as well as of their nature (reversible, irreversible). Summary matrices of the potential impacts and the corresponding augmentation and safeguards are presented in Table.

86. The likely adverse impacts during construction and subsequent operation and maintenance in term of physical, biological, socio-economic, cultural and religious aspects due to project actions has been identified, predicted and evaluated. Based on the identified impacts, appropriate mitigation measures have been recommended.

Table 21: Evaluations of Environmental Impacts and Benefit Augmentation/Mitigation Measures

Impacts	Beneficial Impacts Augmentation Measures	Nature	Magnitude	Extent	Duration	Significance (Total Score)
Reduced flooding problem	Workers will be given on the technical training of the SMC waste management and supervision staff on maintenance of drainage, composting, recycling, and solid waste management, and in the operation and maintenance of the landfill and septage treatment plant, including the sludge drying beds, which will enhance their skills and capability in works in other future projects as an alternative occupation to agriculture and tourism.	Indirect	M (20)	Lc (20)	St (5)	Significant (45)
Smooth traffic flow due to widening of road	Project will reinstate/relocate community assets that are disturbed to the satisfaction of the people. Involvement of local unskilled labours with emphasis on road influence area while pursuing a labour-based technology.	Direct	M (20)	Lc (20)	Mt (10)	Significant (50)
Employment opportunity and Increase of Income	Involvement of women, dalits and ethnic minority peoples.	Direct	M (20)	Lc (20)	St (5)	Significant (45)
Increase in health and hygiene of the people reducing the risk of adverse environmental impacts associated with establishment of basic drainage facility and improved road condition	Workers will be given training and awareness programs in health and sanitation, occupational health and safety measures (OHS), community health and safety, and solid waste management (source separation including proper storage and delivery to the solid waste collection service, introduction of the 3R concept or reduce, reuse, and recycle) to the general public. These training and awareness will not only benefit the local workers, but also contribute to increase in health and hygiene of the people reducing the risk of adverse environmental impacts associated with the establishment of the basic drainage facility and improved road condition.	Indirect	M (20)	Lc (20)	St (05)	Significant (45)
Increased beauty of the SMC	The project will help to enhance this beneficial impact by generating awareness to the people about the ways of enhancing for the activities like Provision of separate footpath, proper road marking, road side greenery, proper drainage, and road maintenance. Awareness raising programmes will be conducted in collaboration with concerned stakeholders to increase the beauty of the SMC. Support will be provided to local entrepreneurs, promotion of cooperatives and linkage with concerned institutions along with support on sewerage and other drainage facilities in the market centers.	Indirect	M (20)	Lc (20)	Mt (10)	Significant (50)

Impacts	Adverse Impacts Mitigation Measures	Nature	Magnitude	Extent	Duration	Significance (Total Score)
Physical Environment						
Construction Phase						
Operation of Quarry site	Unstable sites, erosion prone areas, dense forest areas, settlements and fertile farm land will be avoided for quarrying operation. After the extraction is completed, the quarry site will be rehabilitated to suit the local landscape. Blasting will not be done for quarrying	Indirect	L (10)	Lc (20)	St (5)	Insignificant (35)
Excess Spoil and Safe Disposal	Spoil will be used to fill inner city roads, Surplus spoil will be used to fill eroded gullies, quarries and depressed areas etc. Excess spoils will be disposed in specified tipping sites i.e. **existing dumping Site at Ramnagar** in a controlled manner and will be covered by vegetation by bio-engineering techniques after surplus material is tipped. Spoils will not be disposed on fragile slopes, farmland, marshy land, forest areas, natural drainage path, canals and other infrastructures. After the disposal, the site will be provided with proper drainage, vegetation and adequate protection against erosion.	Direct	H (60)	Ss (10)	St (05)	Significant (75)
Temporary and permanent disruption to the Public Utilities,	After obtaining permission from relevant authorities, they will be reinstalled and relocated, people will be informed and notified for relocation and restoration of utilities as soon as possible to overcome public inconvenience to the satisfaction of the people	Direct	M (20)	Ss (10)	St (05)	Insignificant (35)
Degradation of air quality (particularly dust) and increase in dust/suspended particulate matter	Transportation of required construction materials (aggregates and sand) when and as required by avoiding temporary storage, use of tarpaulins, plastic sheets, and jute bags to cover the de-silted material during transport, dust suppression on surroundings by sprinkling water as required at regular intervals, routine monitoring of dust (TSP, PM10) to meet air quality standards, plantation of local species along the road side, complete ban of burning of solid wastes and provision of LPG/Kerosene to workers will be done.	Direct	M (20)	Ss (10)	St (5)	Insignificant (35)
Rise in Noise level and vibration due to construction work	Provide information to the public about the work schedule, monitor noise levels regularly at site to meet the noise standards, fit mufflers on vehicles to control noise, limit the speed of vehicles, regular maintenance of equipment and vehicles, prohibit the operation of plants and construction vehicles between 7 p.m. and 6 a.m. in residential areas, compensate the damages caused by vibration to structures if caused by construction activities, avoid working at sensitive times (during religious festivals in the area)	Direct	M (20)	Ss (20)	St (5)	insignificant (35)
Landscape disturbance and Change in land use	Borrow pits will be leveled so as to suit the aesthetics of the area and restored to its original state after the project is complete, bioengineering and plantation along the road side for maintaining greenery. Compensation to the loss of land as per Land Acquistion Act, 2034 BS by the	Indirect	M (20)	Ss (10)	St (5)	insignificant (35)

Impacts	Adverse Impacts Mitigation Measures	Nature	Magnitude	Extent	Duration	Significance (Total Score)
	formation of Compensation Fixation Commettee.					
Risk of Industrial and other waste directly discharged	Regular monitoring and preventing the entry of direct wastewater from industry into drains by enforcing strict regulations, avoiding the manual de-silting and avoiding working at rainy season	Indirect	M (20)	Lc (20)	St (5)	Significant (45)
Traffic congestion and public annoyance	A traffic plan will be developed to minimize traffic flow interference from construction activities, advance local public notification of construction activities, schedule, routing, and affected areas, including road closures, arrange for nighttime construction for activities in congested/ heavy daytime traffic areas, provide traffic diversion/alternative routes if road closure is unavoidable, and inform the public through mass media and hoarding boards.	Direct	M (20)	Lc (20)	St (05)	Significant (45)
Operation and Maintenance Stage						
Embankment erosion due to outlet of storm water drainage	Dondra, Rataiya, Dunduwa, Ameliya Nala are the major outlets. Maintenance of the slope protection measures and drainage works, adaptation of bio-engineering techniques, re-vegetation of cut and fill slope or exposed areas as soon as possible, by using native plant species.	direct	M (20)	Lc (20)	Lt (20)	Significant (60)
Pollution of ground and surface water due to seepage of waste water	Awarness programme will be applied to the local public and strict rules and regulation will be made for not to mix the waste water to the drainage, Regular cleaning and de-silting of drainage will be done, Adequate human resources and maintenance equipment and tools will be provided as part of the project, Periodic clearing of side drains (especially before the start of the monsoons) and cross-drainages to allow for the passage of the rainwater, Implementation of a maintenance program will be done	Direct	H (60)	Lc (20)	Lt (20)	Very Significant (100)
Removal and disposal of sludge	Personal protection equipment (PPE) will be provided, Manual handling of waste will be avoided and use mechanical diggers and tools will be made, Training to the maintenance workers on safe handling of waste will be provided, Regular cleaning and de-silting of the drainage will be done, Adequate human resources and maintenance equipment and tools will be provided, Maintenance workers will be provided oils for skin protection, soap to clean up later, and PPE (gloves, gum boots, face masks), Onsite training to workers on the safe handling of contaminated water and sludge, The de-silted materials will be land filled safely in designated sites in consultation with the locals, preferably in the sanitary landfill site	Direct	M (20)	Ss (10)	Mt (10)	Insignificant (40)
Biological Impacts						
Construction Phase						
Impact to the terrestrial fauna	Smooth movement of terrestrial fauna will be ensured, Awarness to the local people not to leave their cattle to the road.	Direct	L (10)	Ss (10)	St (5)	Insignificant (35)

Impacts	Adverse Impacts Mitigation Measures	Nature	Magnitude	Extent	Duration	Significance (Total Score)
	Information signboards will be erected for limiting vehicle speed; Ban the use of power horns in vehicles;					
Chemical Impacts						
Construction Phase						
Use of Bitumen and their storage, heating, spreading	Proper handling and care will be taken while storing, heating, and spreading bitumen. Care will be taken so that no bleeding will occur. Similarly, sealing and securing the storage yard with berms all around will be done for avoiding/controlling soil/groundwater contamination due to spillage of bitumen, lubricants, fuels and other chemicals.	Indirect	H (60)	Lc (20)	St (5)	Very Significant (85)
Use of fuel, lubricants, oil, acids and other chemicals for construction (vehicles, plant, equipment) and their storage.	Proper handling, monitoring and use of chemicals and petroleum products will be done, storage of chemicals will be done in closed container in such a way that no spill of such chemicals will occur.	Indirect	H (60)	Lc (20)	St (50)	Very Significant (85)
Leakage of oil, grease and other materials	Leakage of petroleum products, oils, grease, Mobil etc from vehicles will be regularly checked and monitored, washing of vehicles in the water sources will be restricted.	Indirect	H (60)	Lc (20)	St (05)	Very Significant (85)
Operation and Maintenance Phase						
Formation of different toxic gases due to blockage of the drain	Periodic clearing of side drains (especially before the start of the monsoons) and cross-drainages to allow for the passage of the rainwater, implementation of a maintenance program, ensure regular cleaning and de-silting.	Direct	M (20)	Lc (20)	Lt (20)	Significant (60)
Socio-Economic and Cultural Impacts						
Pre-Construction Phase						
Land acquisition and compensation (land Loss)	Land acquisition and Compensation will be done as per *Land acquisition act 2034 BS*	Direct	H (60)	Ss (10)	St (5)	Significant (75)
Construction Phase						
Impact on public / private utilities	Reinstatement of damaged community services and infrastructure will be done; People will be notified for the restoring of utilities as soon as possible to overcome public inconvenience; Reinstate/relocation of community assets that are disturbed, such as households, properties, electricity poles, telephone lines, drinking water pipes, etc. to the satisfaction of the people will be done.	Direct	H (60)	Ss (10)	St (5)	Significant (75)
Possible impacts on public important, religious and cultural sites	Being cultural, religious and archaeological sites like Bageshwori Temple, Itgad Masjit, Ranitalau etc. located at indirect impact zone of the proposed work, they will be less impacted and protection will be done; Working at sensitive times (during religious festivals in the area) will be avoided. Work force in sensitive areas will be increased so as to finish the work quickly	Indirect	M (20)	Ss (10)	St (5)	Insignificant (35)
Nuisance from Construction Camps	Establish workforce camps with sanitary amenities at designated sites only, monitoring of noise and vibration levels regularly at site to meet the standards, fit	Indirect	M (20)	Ss (10)	St (5)	Insignificant (35)

Impacts	Adverse Impacts Mitigation Measures	Nature	Magnitude	Extent	Duration	Significance (Total Score)
	mufflers on vehicles to control noise, prohibit the operation of crushing plants and construction vehicles during the night so as to cause the least disturbance, dust suppression in surroundings by sprinkling water as required at regular intervals.					
Pressure on Social service facilities and Traffic Congestion	Facilities regarding water supply, sanitation, food etc will be provided for labours during construction phase. Construction schedule and working time will be developed in such a way that there will be less impact on the existing traffic.	Indirect	M (20)	Ss (10)	St (5)	Insignificant (35)
Public Health hazards	Launching awareness programs concerning human health with the help of meetings, trainings, brochures, posters, and signboards. Proper sanitation system will be developed to reduce the air and water pollution, Drinking water facility and temporary pit latrine will be established at construction site to control open defecation and pollution of water bodies by the workers.	Direct	M (20)	Ss (10)	St (5)	Insignificant (35)
Occupational health and safety	Provide regular health checkups, sanitation and hygiene, health care, and control of epidemic diseases to the workforce, make available protection gear (PPE) to all construction workers and compensate for the loss of life or any type of injuries, provide insurance to the workers and training in OHS and community health and safety, rigorous training of workers on community health and safety and potential occupational health and safety measures.	Direct	M (20)	Ss (10)	St (5)	Insignificant (35)
Nuisance to pedestrian	Speed of vehicles at construction site will be limited; Ban of the use of power horns in vehicles will be done in co-ordination with Traffic Police; Stockpiling of construction materials will be done in proper areas; Dust suppression in surroundings by sprinkling water as required at regular intervals; Prohibiting entry at construction sites to the public, barricading the area and provide warning signs	Direct	M (20)	Ss (10)	St (5)	Insignificant (35)
Operation and Maintenance Phase						
Risk of health and safety hazards from hazardous materials	Awareness programmes, meetings, regular consultation to the public will be done for not to mix the waste water to the drain. Proper monitoring and preventing entry of waste water containing hazardous material into drains by enforcing strict regulations. Regular cleaning and de-silting of drains will be done; Adequate human resources and maintenance equipment and tools will be provided as part of the project; Personal protection equipment (PPE) will be provided; Manual handling of waste will be avoided. Trainings to the workers on safe handling of waste will be provided	direct	M (20)	Lc (20)	Lt (20)	Significant (60)
Blockage of drainage, nuisance to neighbouring areas due to overflow, flooding	Periodic clearing of side drains (especially before the start of the monsoons) and cross-drainages to allow for the passage of the rainwater; Implementation of a maintenance program will be strictly followed; Regular cleaning and de-silting will be done. Adequate human resources and	direct	L (10)	Ss (10)	Lt (20)	Insignificant (40)

Impacts	Adverse Impacts Mitigation Measures	Nature	Magnitude	Extent	Duration	Significance (Total Score)
	maintenance equipment and tools will be provided					
Nuisance to neighbouring areas due to odour, insects and rodent	Awareness will be provided to the people not to throw unnecessary things to the drainage; Enforcement of laws and orders for the people for throwing the waste to drain and Regular maintenance of drainage will be done	Indirect	M (20)	Lc (20)	Lt (20)	Significant (60)

NOTE:

Magnitude: This can be low-L (Minor), medium-M (moderate) and high-H (major) depending upon the severity of change.

Geographical Extent: If the action is confined to the sub-project area, it is referred as site specific (Ss), if it occurs outside but close to the sub-project area, the extent of impact is local (Lc), if it occurs far away from the sub-project, it is referred as regional (R)

Duration: It can be short term (St- i.e. less than 3 years), medium term (Mt- i.e. 3-20 years) and long term (Lt- i.e. more than 20 years).

For the impact evaluation, the matrix method with numerical ranking is used for the quantitative ranking of the predicted impacts. The numerical scale mentioned in the National EIA Guidelines 1993 AD has been adopted for this sub-project. The numerical scale is as:

Magnitude		Extent		Duration	
High	60	Regional	60	Long Term	20
Moderate	20	Local	20	Medium Term	10
Minor	10	Site specific	10	Short Term	05

The combined score upto 44 is termed as insignificant impact; 45-74 is termed as Significant and beyond 75 is termed as very significant impact.

E. Beneficial Impacts

87. Beneficial impacts due to the construction and improvement of the drainage and road works has been assessed by the study team in the project area. The impacts have also been assessed in the category of extent, duration and magnitude. Based on the identification and prediction of the impacts, the suitable enhancement measures to maximize the project benefits has been explored and designed.

1. Reduced flooding problem

88. The construction and improvement works of the drainage and roads directly benefit the local people and SMC. These works make traffic flow smoother due to improved surface and the properly managed drainage system with construction of the adequate drain or outlet and improvement and maintenance of the old existing drains also augment and rectify the missing links of existing drains. The SMC has identified a landfill site 8 km away from the SMC with an area of 7.47 ha which further reduces the mismanagement of solid waste that results in clogged drains and flooding during monsoons. The people of the SMC are directly benefitted as the population gets relief from flood which forced them to remain inside their houses, adversely affecting their daily activities, health and hygiene condition and access to food and safe drinking water. The impact is thus direct, significant, local and long term in nature.

2. Smooth traffic flow due to widening of road

89. After the construction and improvement works, one of the major problems of the gravel and earthen road is dust which directly affects the health of the people living in the vicinity. As applicable and incorporated into the project design, sealed gravel standard or bituminous surface road will substantially reduce the dust nuisance. It will also make easy for vehicle movement thereby widening the road and reducing amount of unburnt carbon, oxides of sulphur and nitrogen. This impact has beneficial implication on human health, school children, health posts, market areas along the road pedestrians etc. will relieved from dust nuisance.

90. One of the major activities of the road works in the envisaged program is to maintain proper drainage system, retaining structure and bio-engineering. This is a direct and identified beneficial impact as proper drainage system and road with smooth traffic flow will be maintained by construction and maintenance of it. Thus, the impact is direct, local, and long-term in nature.

3. Employment Opportunity and Increase of Income

91. The first and foremost benefit that local people expect from the construction works is employment. The construction approach, which emphasizes using labour/mechanized based approach, tends to benefit directly to the people living in directly affected locality. The construction works requires wide range of workers as unskilled, skilled and semi-skilled labourers. Local people would generate substantial income from unskilled and semiskilled job. The amount of money that is disbursed in the affected people in the form of wage earning will directly enhance for the initiation of various auxiliary economic activities and enterprise development. The impact is thus direct, significant, local but short-term in nature.

4. Increase in health and hygiene of the people reducing the risk of adverse environmental impacts associated with establishment of basic drainage facility and improved road condition

92. The construction and improvement works of the drainage and road increase the hygienic condition of the individuals as well as environment by maintaining the proper drainage system and the adequate widening of the road with sealed gravel standard or bituminous

surface road, which substantially reduces the dust nuisance. It will also make vehicle movement easier thereby widening the road and reducing amount of unburnt carbon, oxides of sulphur and nitrogen. This impact has beneficial implication on human health, school children, health posts, market areas along the road pedestrians etc. will relieved from dust nuisance. Properly managed drainage system due to the construction of the adequate drain or outlet and improvement and maintenance of the old existing drains and also augment and rectify the missing links of existing drains reduces the mismanagement of solid waste that results in clogged drains and flooding during monsoons. The people of the SMC are directly benefitted as the population gets relief of flood which forced them to remain inside their houses for weeks, adversely affecting their daily activities, health and hygiene condition and access to food and safe drinking water. The impact is thus direct, significant, local and long term in nature.

5. Increased beauty of the SMC

93. The construction and improving works of the drainage and roads directly benefit to the local people and SMC. These works make the smooth traffic flow due to the widening of the road and properly managed drainage system due to the construction of the adequate drain or outlet, improvement and maintenance of the old existing drains and also augment and rectify the missing links of existing drains. These construction and improvement activities of the drainage and roads increased the beauty of SMC with smoother and less dustry roads and traffic flow reducing the traffic congestion and the clean and fresh environment with the properly managed drainage system and solid waste management system reducing flooding problems. The impact is direct, high magnitude, site specific, and long term.

F. Adverse Impacts

1. Pre-Construction Phase

a. Land acquisition and Land use change and resettlement

94. Nepalgunj SMC has the area of 1314 hectares of which 44.73 % area is covered with agricultural land followed by settlement for domestic and commercial purpose. There is no forest area within the Municipality however government property and ponds are scattered all over the Municipality which needs to be developed in planned way to improve the environment of the area.

2. Construction Phase

a. Impact due to Operation of Quarries and borrow pits

95. Construction of the drainage and road requires boulders and other types of construction materials. The extraction of materials from inappropriate places or in excessive amounts can damage the local environment. As per contract documents, the contractor can bring quarry materials from up to 52 km from the SMC and the materials will be extracted from approved quarry sites from the concerned DDC. At the time of extraction of construction materials, damage to the local environment, accelerated erosion, rainwater also create problem around quarry site. The morphology of the location also changes.

b. Impact due to haphazard spoil disposal

96. The excavation of materials generated particularly during drainage and road widening will be used in inner city roads and the excess spoil will be disposed at in existing dumping

sites. The common problems from inappropriate disposal of spoils are contamination of water bodies and gully formation and erosion of spoil, especially when combined with unmanaged surface water runoff. It can also negatively affect the drinking water quality. Inadequate spoil disposal will often cause damage to farmlands, crops and property at SMC through direct deposition, or indirectly as result of mass flow. If not properly and timely addressed, the impacts from spoil disposal during the construction and improvement of the proposed drainage and road will be direct and of high magnitude, site-specific and long-term in nature.

c. Temporary and permanent disruption to the Public Utilities, Reinstatement and relocation of the existing services such as: electric poles and cables, water supply pipelines, telephone line etc

97. Construction and improvement works of the drains and roads will lead to the temporary and permanent disruption to the public utilities like effect to certain drinking water supply pipes, electrical poles and cables, hume pipe and culverts which must be rehabilitated.

Table 22: Affected Community Resources

S.N	Name of Road	Chainage		Length	Quantity
		From	To		
1. Electric Pole					
1	Ganesh pur Road				
i	Salayani Bag to Hulaki Sadak	0+000	1+176	1175.59	12.00
ii	Setu BK Chowk To Ganeshpur Road	0+000	0+247	246.93	2.00
2	Ramanagar Road	0+000	2+057	2056.60	27
3	Hospital Road				
i	Charbahini to Pipal Chautara	0+000	0+665	665.07	3
ii	BP Path	0+000	0+140	139.98	1
4	DDC Road				
i	Stadium Road to Hospital Road	0+000	0+498	497.91	6
ii	MP School to Rapti Path (Mangal Path)	0+000	0+616	616.30	1
iii	Pipal Chautara to Piralpuruwa	0+000	0+229	228.79	
5	Subsitution of Stadium Road				
i	Nagashwor-Chandannath-Khajura Road	0+000	0+829	828.61	15
ii	Adarsha Road	0+000	0+436	435.66	5
6	Rapti Path				
i	Tribeni Mode to Nagar Police	0+000	0+715	715.10	26
ii	Nagar Police to Phultekra	0+000	1+022	1021.59	20
7	Inner Town Road				
i	Sadar Line Road				
a	Charbahini to Nagar Bhawan	0+000	0+531	530.91	21
b	Nagar Bhawan to Tribeni Mode	0+000	0+590	589.51	32
ii	Dewa Phulbari Road	0+000	0+489	489.06	7
iii	Indra Tole	0+000	0+212	212.43	
	Total			**10450.04**	**178**
2. Telephone Pole					
1	Ganesh pur Road				
i	Salayani Bag to Hulaki Sadak	0+000	1+176	1175.59	4.00
ii	Setu BK Chowk To Ganeshpur Road	0+000	0+247	246.93	2.00
2	Ramanagar Road	0+000	2+057	2056.60	8
3	Hospital Road				
i	Charbahini to Pipal Chautara	0+000	0+665	665.07	1
ii	BP Path	0+000	0+140	139.98	
4	DDC Road				
i	Stadium Road to Hospital Road	0+000	0+498	497.91	1
ii	MP School to Rapti Path (Mangal Path)	0+000	0+616	616.30	2
iii	Pipal Chautara to Piralpuruwa	0+000	0+229	228.79	
5	Subsitution of Stadium Road				
i	Nagashwor-Chandannath-Khajura Road	0+000	0+829	828.61	
ii	Adarsha Road	0+000	0+436	435.66	
6	Rapti Path				

S.N	Name of Road	Chainage		Length	Quantity
		From	To		
i	Tribeni Mode to Nagar Police	0+000	0+715	715.10	12
ii	Nagar Police to Phultekra	0+000	1+022	1021.59	19
7	Inner Town Road				
i	Sadar Line Road				
a	Charbahini to Nagar Bhawan	0+000	0+531	530.91	19
b	Nagar Bhawan to Tribeni Mode	0+000	0+590	589.51	10
ii	Dewa Phulbari Road	0+000	0+489	489.06	1
iii	Indra Tole	0+000	0+212	212.43	
	Total			**10450.04**	**79**
3. Hume Pipe					
1	Ganesh pur Road				
i	Salayani Bag to Hulaki Sadak	0+000	1+176	1175.59	
ii	Setu BK Chowk To Ganeshpur Road	0+000	0+247	246.93	
2	Ramanagar Road	0+000	2+057	2056.60	8
3	Hospital Road				
i	Charbahini to Pipal Chautara	0+000	0+665	665.07	2
ii	BP Path	0+000	0+140	139.98	
4	DDC Road				
i	Stadium Road to Hospital Road	0+000	0+498	497.91	
ii	MP School to Rapti Path (Mangal Path)	0+000	0+616	616.30	
iii	Pipal Chautara to Piralpuruwa	0+000	0+229	228.79	
5	Subsitution of Stadium Road				
i	Nagashwor-Chandannath-Khajura Road	0+000	0+829	828.61	4
ii	Adarsha Road	0+000	0+436	435.66	1
6	Rapti Path				
i	Tribeni Mode to Nagar Police	0+000	0+715	715.10	
ii	Nagar Police to Phultekra	0+000	1+022	1021.59	
7	Inner Town Road				
i	Sadar Line Road				
a	Charbahini to Nagar Bhawan	0+000	0+531	530.91	
b	Nagar Bhawan to Tribeni Mode	0+000	0+590	589.51	
ii	Dewa Phulbari Road	0+000	0+489	489.06	
iii	Indra Tole	0+000	0+212	212.43	
	Total			**10450.04**	**16**
4. Transformer					
1	Ganesh pur Road				
i	Salayani Bag to Hulaki Sadak	0+000	1+176	1175.59	
ii	Setu BK Chowk To Ganeshpur Road	0+000	0+247	246.93	1
2	Ramanagar Road	0+000	2+057	2056.60	
3	Hospital Road				
i	Charbahini to Pipal Chautara	0+000	0+665	665.07	
ii	BP Path	0+000	0+140	139.98	
4	DDC Road				
i	Stadium Road to Hospital Road	0+000	0+498	497.91	
ii	MP School to Rapti Path (Mangal Path)	0+000	0+616	616.30	1
iii	Pipal Chautara to Piralpuruwa	0+000	0+229	228.79	
5	Subsitution of Stadium Road				
i	Nagashwor-Chandannath-Khajura Road	0+000	0+829	828.61	
ii	Adarsha Road	0+000	0+436	435.66	
6	Rapti Path				
i	Tribeni Mode to Nagar Police	0+000	0+715	715.10	
ii	Nagar Police to Phultekra	0+000	1+022	1021.59	3
7	Inner Town Road				
i	Sadar Line Road				
a	Charbahini to Nagar Bhawan	0+000	0+531	530.91	3
b	Nagar Bhawan to Tribeni Mode	0+000	0+590	589.51	1
ii	Dewa Phulbari Road	0+000	0+489	489.06	
iii	Indra Tole	0+000	0+212	212.43	
	Total			**10450.04**	**9**
5. Culvert					
1	Ganeshpur Road				
i	Salayani Bag to Hulaki Sadak	0+000	1+176	1175.59	2.00

S.N	Name of Road	Chainage		Length	Quantity
		From	To		
ii	Setu BK Chowk To Ganeshpur Road	0+000	0+247	246.93	
2	Ramanagar Road	0+000	2+057	2056.60	2
3	Hospital Road				
i	Charbahini to Pipal Chautara	0+000	0+665	665.07	2
ii	BP Path	0+000	0+140	139.98	
4	DDC Road				
i	Stadium Road to Hospital Road	0+000	0+498	497.91	
ii	MP School to Rapti Path (Mangal Path)	0+000	0+616	616.30	2
iii	Pipal Chautara to Piralpuruwa	0+000	0+229	228.79	
5	Subsitution of Stadium Road				
i	Nagashwor-Chandannath-Khajura Road	0+000	0+829	828.61	2
ii	Adarsha Road	0+000	0+436	435.66	2
6	Rapti Path				
i	Tribeni Mode to Nagar Police	0+000	0+715	715.10	4
ii	Nagar Police to Phultekra	0+000	1+022	1021.59	3
7	Inner Town Road				
i	Sadar Line Road				
a	Charbahini to Nagar Bhawan	0+000	0+531	530.91	1
b	Nagar Bhawan to Tribeni Mode	0+000	0+590	589.51	
ii	Dewa Phulbari Road	0+000	0+489	489.06	3
iii	Indra Tole	0+000	0+212	212.43	
	Total			**10450.04**	**23**

Source: Detail Design Report 2014

d. Degradation of air quality (particularly dust) and increase in dust/suspended particulate matter

98. At the construction phase, there will be emission of dusts. This will be, temporary, intense along the construction sites. Dust will also affect the road side vegetation and structures. These pollution has the potential impacts to health are respiratory, eye disease due to exposure to dust. The impact will be indirect, medium magnitude, site-specific and short term in nature.

e. Rise in Noise level and vibration due to construction work

99. During construction, the construction activities and movement of vehicles will slightly increase noise level and vibration due to the nature of work which directly or indirectly affects the road users as well as the local residential areas. The impact will be indirect, medium magnitude, site-specific and short term in nature.

f. Landscape disturbance and Change in land use

100. As mentioned earlier, due to construction and improvement of the existing drainage and road, some part of agricultural, and settlement area will be converted to road and barren land, affecting agricultural products, and settlement area. The forest area to be additionally occupied by the works is not remarkable as the road is already existing road. Since there is no big or large cuttings which would effect on landscape, impact on landscape disturbance is not identified as significant impact of the Project construction. Impact is direct, of medium magnitude, local, and long term in nature.

g. Risk of Industrial and other wastes directly discharged to the drain

101. During purposed works, the discharge of the industrial waste and other waste directly into the drains could create a nuisance to the surroundings and possess health hazards to the public, workers and also affects the aquatic life. People of the local residential areas and the neighbouring areas are mostly affected due to the unwanted bad odour smell of the waste

water. The whole environment will be polluted. The waste water in such drainage contains various types of untreated organic and inorganic toxic materials. Such waste water leads to the formation of different toxic gases such as Hydrogen Sulphide, Sulphur dioxide etc. and also wil be the favourable place for the survival of Insects and rodents like mosquito and others. Such polluted environment cause the risks of spreading water-borne diseases including malaria, dengue fever etc. in the local as well as neighbouring areas.

h. Traffic congestion and public annoyance

102. During drainage and road construction and improvement works, traffic movement will be affected and disturbed due to road blockage and inappropriate piling of construction materials and equipment in and near the road. Movement of people and vehicles will be disturbed due to rough road. Traffic congestion and temporary disruption to local access is due to open trenches, excavation across roads, or road closures due to construction could have impacts on pedestrians, vehicles, and businesses. During construction, though the route is diverted to another route, the flow of traffic in the construction area and other secondary route leads to the traffic congestion. This impact is indirect, medium magnitude, short term and site specific in nature.

i Impacts to the terrestrial fauna

103. During the construction and improving works of drainage and roads, the movement of the terrestrial fauna of the project area will be affected. Earth excavation, construction materials and stockpiling, and plying of vehicles will produce dust (TSP, PM10), hydrocarbons (CO, CO2, CH4), SO2, NOX, H2S, etc., noise, and vibrations, which create nuisances even to the terrestrial fauna too.

j. Use of Bitumen and their Storage, heating, Spreading etc.

104. Bitumen, which is to be used in sealing of proposed road, is highly combustible and risky of fire hazards unless it is kept away from the fire igniting source as well as from the public. Hence its storage prior to usage in sealing works is of key concern during road sealing works, and need to be of adequately safe in storage. Bitumen can have adverse impact while heating and spreading.

k. Use of fuel, lubricants, oil, acids and other chemicals for construction (vehicles, plants and equipment) and their storage

105. Putting mechanical workshop, gas station etc into operation at the project site in order to ensure upkeep of all vehicles, operating machines including heavy ones deployed in proposed work requires use of substantial quantity of lubricants, vehicles refuelling etc. to keeping it in functional upkeep works, refueling etc also generates some wastes and spillage. Acids used in battery recharging, other chemicals etc used at workshop are other types of workshop wastes. Fossil fuel is also required in operating crushed plant on quarry site where power supply is not available.

106. While its safe storage and usage is required and ensured, workshops wastes are potential source of environmental hazards unless it is handled correctly. Impact is direct, of high magnitude, local and long term in nature.

l. Leakage of oil, grease and other materials

107. During construction the contractor will store fuel, oil and lubricants, diesel and petrol, bitumen, solvents and other toxic chemicals for use in construction work. Inappropriate use of

such materials or accidents of tanker will cause spillage or leakage, polluting surface and ground water, contaminate soil, cause fire and explosion and nuisance to human health. Bitumen drum often get damaged during transit, leading to leakage in storage place which are often not cleaned up afterwards get grazed by cattles with grass after the completion of construction work which will lead to the health hazard to those cattles.

G. Operation and Maintenance Phase

1. Embankment erosion due to outlet of storm water drainage

108. At the time of operation and maintenance of drains, the drain get clogged due to sedimentation or due to heavy flood and the embankments at Rataiya nala, Dondra Nala, Danduwa Nala, Amiliya nala will becomes very weak due to the seepage of waste water, rain water and others. With this storm water drainage discharge phenomenon of outlet, it becomes at worst at source of occasional environmental threat to the residents as well as impairing water sources. It will also cause erosion of embankment and erosion of agricultural land, enhance gully formations at Dondra, Rataiya, Dunduwa, Ameliya Nala. The impact is direct, of medium magnitude, site specific and medium term in nature.

2. Pollution of ground and surface water sources due to seepage of waste water

109. The long **term** operation of the drains of busy city Nepalgunj receives the seasonal stormwater during monsoon and the waste water thrown from its SMC household pollutes the ground water and surface water sources of the existing area due to seepage of waste water through the drains. Similarly, run-off from road surface will cause water pollution. The disposal of spoils and other construction materials and waste into water bodies will also degrade the water quality. This impact is indirect, medium magnitude, short term and site specific in nature.

3. Removal and disposal of sludge

110. During the operational phase, some parts of drain will be clogged. Due to this, the wates water in the drain remains in still condition which leads to the emission of different toxic gases. Removal and disposal of sludge without any treatment leads to the nuisance to the public and also pollutes the surface water, soil and disturb the aquatic life too. Open dumping of waste, including in and around the landfill site will cause the nuisance to workers, local people due to emissions of methane gas from landfill site. During the removal of waste from SMC, nuisance due to waste collection remains and waste spillage during transportation is occurred.Impact is direct, low magnitude, local and long term in nature.

4. Aquatic life hazard due to mixing of drain at the water sources

111. There are no remarkable water bodies at the SMC except Fultekra pond, Bagigaun pond and Rani Talau. The drain is mixed to Fultekra pond and other ponds and water bodies are not affected. Hence the impact is very less and not significant.

5. Formation of different toxic gases due to blockage of the drain

112. During the operation stage, sometimes due to inadequate size of drain, no proper outlets of drainage system will cause the blockage of drain which leads to the formation of different toxic gases such as hydrogen sulphide, methane and others. These gases spreading in environment of the project area will leads to the sore throat, cough shortness of breath, irritation of the eyes, nose and throat etc.

H. Socio-Economic and Cultural Impacts

1. Land acquisition and compensation (land Loss)

113. Nepalgunj SMC has the area of 1314 hectare of which 44.73 % area is covered with agricultural land followed by settlement for domestic and commercial purpose. There is no forest area within the SMC however government property and ponds are scattered all over the SMC which needs to be developed in planned way to improve the environment of the area. The project will acquire very less amount of private, public and government land as the project covers maximum improvement works. The land within Road width will be compensated as per the land acquisition act.

Table: 23: Area of land converted to drainage and road due to proposed works

S.N.	Area of Land (Sq.m)	Name of Road
1	1142	From Gulma to Nareshwor Chandranath and Connecting Khajura Road
2	1660.22	Adarsha Tole, Water Park, Dhambojhi HHS and Sanbin School way and From Buspark-Southern Salyani Bagar Rapti Sadak
3	757.47	Setu B.K. Chowk –Ganeshpur Chowk Wark No. 5
4	38.02	Rapti Sadak- North Cinema Hall –Deuwa Fulbari Chowk
5	517.73	Newroad east Deuwa Fulbari to North Indra Tole Sadak
6	423.41	Triveni Mode to Ward Police Office Bit
7	18	Ward Police Bit to Fultekra Sadak
8	552.13	Char Bahini CHowk to Tribhuwan Chowk
9	37.79	Tribhuwan Chowk to Triveni Mode
10	986.88	From Pipal Chautara to Bulbuliya to Ramnagar Sadak
11	181.53	Stedium Road to Hospital (upto Steel Factory)
12	-	M.P. School to Rapti Sadak
13	294.41	From Pipal Chautara to Piralipurawa road
14	37.85	Char Bahini Chowk to Papal Chautara
15	1578.46	From B.P. Chowk to West ward No. 16
16	4084	Landfill Site Access Road
Total	**12309.9 Sq.m**	

Source: Field visit and Department of Survey, Survey office, Nepalgunj

114. Among 12309.9 Sqm of land; 78% i.e. (9601.72 Sqm) land is barren land, 8% i.e. (984.79 Sqm) cultivated land and 14% i.e. (1723.39 Sqm) built up area.

I. Construction Phase

1. Impact on public / private utilities

115. The local have to face some damages to their properties, households, taps, etc. due to the construction and improvement of existing Drainage and road.

116. Construction and improvement activities could have adverse impacts on community services and infrastructure during construction activities, such as electricity poles, telephone lines, drinking water pipes, culverts, high tension lines, teleplone poles, sewerage lines, roads, etc.

117. Due to this drainage and road construction and improvement works, altogether 253 concrete houses, 56 ordinary houses made of stones, mud and woods are found to be either completely displaced or some parts to be affected. Similarly other structures are also going to be displaced or affected are included in physical environmental impacts.

Table 24: Affected Structures due to drainage and road improvement works

S.N.	Name of the Structure	Katchi Structure		Pakki Structure		Remark
		HH	Length (m)	HH	Length (m)	
1	Peti	10	10.56	255	304.23	
2	House	56	84	253	334.92	
3	Peti + Wall	4	5	30	33.24	
4	House + Peti	2	2.45	62	87.85	
5	Peti + Slab	11	14.05	51	57.22	
6	Boundary Wall	0	0	217	297.925	
7	House + Slab	0	0	3	6.7	
8	Septic Tank	0	0	1	2.1	
9	Hand Pump	0	0	1	1 no.	
10	Temple	0	0	0	0	
11	Toilet	0	0	2	2.3	
12	Tap	0	0	1	1 no.	

Source: field visit Jan 2013

2. Possible impacts on public important, religious and cultural sites

118. Some cultural, religious, public important and archaeological sites observed near the drainage and road alignment are affected as Nepalgunj is also one of the places of different religious community and culture. There are some Temples, Masjits, Rani Talau, etc which lies in the indirect impact zones of the drainage and road alignment. Nuisance to the public, important, religious and social/cultural sites like Bageshwori temple, Itgad Masjit, Rani Talau etc. due to generation of noise and vibrations and power horns and access due to excavations and vehicle movements. No Temple or other cultural site will be impacted due to the proposed subproject. Any impact on community resources will be addressed in the resettlement plan (RP) prepared for the subproject.

119.

3. Nuisance from Construction Camps

120. Although the proposed works requires establishing a less number of camp sites; labor and workforce at various locations depending on contractor's work schedule and proximity of work activity to be undertaken from the labour force campsite, the campsites used by these forces become a source of disturbance to local people. Earth excavation, construction materials and stockpiling, and plying of vehicles will produce dust (TSP, PM10), hydrocarbons (CO, CO2, CH4), SO2, NOX, H2S, etc., noise, and vibrations, which create nuisances to the public, important social/cultural sites, and schools. Plying of trucks on non-metallic roads will produce huge amounts of dust, thereby causing the air quality to deteriorate and increasing noise levels to above 90 dB, affecting health. Labor camp if not managed properly can create great impact. There will be problem associated with solid waste management, noise pollution, drinking water supply, etc. This impact is direct, medium magnitude, short term and site specific in nature.

4. Pressure on social service facilities and Traffic Congestion

121. Labour and workforce deployed in proposed drainage and road construction and improvement works requires using public utilities on the work site as their daily livings. Their need exerts pressure and competes on existing essential services available in limited capacity. These services includes telephone, water supply, solid waste management, health services, transportation, school, etc, which will surplus its carrying capacity if its existing magnitude is not temporarily upgraded to suit and cater additional needs. Traffic congestion and temporary disruption to local access is due to open trenches, excavation across roads, or road closures due to construction could have impacts on pedestrians, vehicles, and businesses. During

construction, though the route is diverted to another route during the construction and improvement works, the flow of traffic in the construction area and other secondary route leads to the traffic congestion. This impact is indirect, medium magnitude, short term and site specific in nature.

5. Public Health hazards

122. Public health risks associated with the project areas construction works and the environment with noise emission, dust production and bad smell of the drainage works. Properly unclosed borrow pits also cause the risks of spreading water-borne diseases including malaria, dengue fever etc. Contagious diseases like HIV/AIDS, STDs etc will surface up conspicuously and spread over extensively as any one- local and in-migrant labor force infected with diseases- becomes sexually active. Impact is indirect, medium magnitude, site specific and short term in nature.

6. Occupational health and Safety

123. As labor forces requires to undertake works especially in hazardous materials handling, heavy equipment operations, tree felling, slope stabilization etc. they are exposed to various safety risks and health hazards if and when these works undertaken without adequate safety measures. Other potential impacts to health are respiratory, eye disease due to exposure to dust. Health risk is also commonly associated with the poor labor camp conditions, use of unsafe water supply sources, poor sanitation condition (lack of latrines and washing facilities) also cause the risk of epidemic diseases that includes dysentery, diarrhoea, cholera etc.

124. Properly unclosed borrow pits also cause the risks of spreading water-borne diseases including malaria, dengue fever. Contagious diseases like HIV/AIDS, STDs etc will surface up conspicuously and spread over extensively as any one- local and in-migrant labor force infected with diseases- becomes sexually active. Impact is indirect, medium magnitude, site specific and short term in nature.

7. Nuisance to pedestrian

125. During the construction phase, there will be emission of dusts. This will be, temporary, intense along the construction sites. Dust will also affect the road side vegetation, structures and the pedestrian using the constructed route. During construction, the construction activities and movement of vehicles will slightly increase noise level due to the nature of work which directly or indirectly affects the road users as well as the local residential areas. The impact will be indirect, medium magnitude, site-specific and short term in nature.

J. Operation and maintenance Phase

1. Risk of health and safety hazards to public from hazardous materials which may be contained in water

126. During operation and maintenance works, the removal of the accumulated water and sludge from the drains could be a nuisance to the surroundings and pose health hazards to the public. People of the local residential areas are mostly affected due to the unwanted bad odour smell of the waste water. The existing environment of whole local area will be polluted. The waste water in such drainage contains various types of untreated organic and inorganic toxic materials. The workers involved in such maintenance work of drainage without proper safety measures posses the high risk of health.

2. Blockage of drainage and nuisance to neighbouring areas due to overflow and flooding

127. The size of drain being not adequate enough to pass all the storm water during Moonsoon, there will be the blockage and overflow of such waste water in that area and leads to flooding and nuisance to the local areas and neighbouring areas.Large areas of the SMC get inundated during the monsoons, and a large section of the population is forced to remain inside their houses for weeks, adversely affecting their daily activities and access to food and safe drinking water. The municipal drainage system is an incomplete system with many lines (except two) without proper outlets. In many parts, the size of the drain is smaller than what is required. Similarly, drains built on the Nepalgunj-Sukhet Road are not functioning due to improper slopes and dumping of solid wastes, which promote mosquito breeding. The southern and northwestern parts of the SMC are still without drains, thereby causing inundation during the monsoons. The other heavily flood-affected areas are Phultekra in ward no. 6, Salyani Bagiya and Ganeshpur in wards no. 2 and 5, and New Road and Bageswori in ward no. 4. These areas get inundated for weeks after the rains subside, affecting the SMC economically.

3. TrafficCongestion

128. During operation and maintenance phase of the existing drainage and road works, the stockpiling of the maintenance materials and machine in the project area will leads to the traffic congestion. Though the route is diverted to another route during the Maintenance and improvement works, the flow of traffic in the other secondary route suffers the traffic congestion.This impact is indirect, medium magnitude, short term and site specific in nature.

4. Nuisance to neighbouring areas due to odour, insects and rodent

129. During operation and maintenance of drainage works, the removal of the accumulated water and sludge from the drains could be a nuisance to the surroundings and pose health hazards to the public People of the local residential areas and the neighbouring areas are mostly affected due to the unwanted bad odour smell of the polluted water. The existing environment of whole local area will be polluted. The water in such drainage contains various types of untreated organic and inorganic toxic materials. Such water creates the favourable environment for the survival of Insects and rodents like mosquito and others. Such polluted environment cause the risks of spreading water-borne diseases including malaria, dengue fever etc. in the local as well as neighbouring areas.

VI. ALTERNATIVES FOR IMPLEMENTATION OF THE PROPOSAL, ALTERNATIVE ANALYSIS

A. Alternatives for Implementation of the Proposal

130. The scope of proposed project is to construction and improvement of the existing road to black topped standard and drains to stone/brick masonary standards. The proposed works would entail and implemented all mitigation measures aiming to avert and or minimize adverse impacts associated with the drainage and road construction. Since, the proposed project is the construction and improvement works of the existing drainage and roads but as the aim of alternative analysis is to arrive at a development option, which maximizes the benefits while minimizing the unwanted impacts. The study team will discuss the alternative analysis considering the following sub sections:

B. Design

131. As the sub-project is construction and improvement of existing drainages and roads, its alternative analysis is not essential, irrelevant, not requiring. At the time of construction and supervision, if needed alternative design will be done.

C. Project Site (Route)

132. As the proposed work is to follow the existing roads and drainage, alternative route is irrelevant but requiring its improvement in surface condition to sealed bituminous standards with adequately drainage system and related components addressed in line with upgrading salient features. It aims to avoid and practice unnecessary vegetation removal (including trees) along the alignment unless it restricts sight on a road stretch during construction phase and its removal or clearance is the need of the site situation only.

D. Process, Time Schedule

133. For this construction and improvement works of drainage and road, construction approach will favour a option of a combination of mechanical and labour as it suits in view of respect need to approved road, drain design(including construction specifications) and labour as and where available and willing to. No rigidity to any norms. E.g. local labour will favour to practice during constructions.

134. As the construction and improvement works of drainage and road requires its completion within the stipulated time, suitable work schedule requires matching resource (manpower, materials etc) availability, weather seasons, type of works to be undertaken etc so that work is completed within the schedule, and no significant environmental impairment is to cause by construction and improvement activities undertaken. Accordingly this schedule however entails and anticipates avoiding foreseeable environmental impacts.

E. Raw Materials (Resources) To Be Used

135. Drainage and road construction and improvement work requires a diverse type of raw materials-natural (locally available boulders, earth, sand, rock etc) and market sourced (e.g. brick, cement, steel, bitumen, gabion etc) during construction and improvement works of the drainage and road.

F. No Action Option

136. In the event of drainage and road construction and improvement not undertaken, existing drainage and road conditions-drainage and road blockage in wet season, rough road surface, occasional fatalities associated with the road accidents , flooding, air pollution due to bad smell from the drains etc. remain to continue, and thus affecting road transportation serviceability, requiring road users to suffer in respect of travel hours as well as denial of access to better social services linked up with road quality, and remain the local stakeholder in isolation from the other parts of the country.

VII. ENVIRONMENTAL MANAGEMENT PLAN

137. The EMP is to ensure that the activities are undertaken in a responsible, non-detrimental manner by providing proactive, feasible, and practical working tools and specific actions necessary to mitigate environmental impacts of the subproject. The EMP also assigns responsibilities, timescales, and performance indicators/standards for each mitigation measure to make sure that they are implemented and not ignored. An environmental

monitoring plan is also included in the EMP which recommends protocols and responsibilities for monitoring the subproject.

138. For this roads and drainage improvement subproject, the contractor will be required to (i) establish an operational system for managing environmental impacts, (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate a budget for compliance with these EMP measures, requirements and actions. The contractor will also be required to post relevant EMP information on the work sites at all times.

A. Institutional Arrangement

139. Executing and implementing agencies. The Ministry of Urban Development (MoUD) having prior experience in managing urban and water supply projects financed by ADB, will be the executing agency of the overall project. The participating municipalities will be the implementing agencies.

B. Safeguard Implementation Arrangement

140. **Project coordination unit.** A PCO has been established for the overall management of the ongoing IUDP project and the same will function for the proposed RUDP financing. The PCO is headed by Project Director (PD) supported by officials including two Deputy Project Director's and other project managers. The PCO receives support from the PMSC and DSC established under the IUDP. PMSC and DSC will be providing support to the PCO for the RUDP in the same fashion. While there is no designated environmental safeguards officer in the PCO, The Deputy Project Director's and the Project Director are regularly apprised of the safeguards management by the PMSC and DSC. Key tasks and responsibilities of the PCO relating to safeguard (environment) are as follows:

- confirm existing IEEs/EMPs are updated based on detailed designs, and that new IEEs/EMPs are prepared in accordance with the EARF and subproject selection criteria related to safeguards;
- confirm whether IEEs/EMPs are included in bidding documents and civil works contracts;
- provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by project implementation unit (PIU) and contractors;
- establish a system to monitor environmental safeguards of the project, including monitoring the indicators set out in the monitoring plan of the EMP;
- facilitate and confirm overall compliance with all government rules and regulations regarding site and environmental clearances, as well as any other environmental requirements (e.g., location clearance certificates, environmental clearance certificates, etc.), as relevant;
- supervise and provide guidance to the PIUs to properly carry out the environmental monitoring and assessments as per the EARF;
- review, monitor, and evaluate the effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
- consolidate monthly environmental monitoring reports from PIUs and submit semi-annual monitoring reports to ADB;
- ensure timely disclosure of final IEEs/EMPs in locations and form accessible to the public; and

- address any grievances brought about through the grievance redress mechanism in a timely manner.

141. **Project implementation unit.** The participating municipalities will establish a PIU within the municipal structure. The PIUs will (i) be responsible for land acquisition if any; (ii) take necessary action for obtaining rights of way if required; (iii) plan, implement and monitor public relations activities, gender mainstreaming initiatives and community participation activities at municipal level; (iv) disseminate information related to the project to the public and media; (v) ensure compliance with loan covenants concerning safeguards measures; and (vi) facilitate implementation of safeguards plans. The PIUs will each designate a safeguard focal person5 and will receive assistance from the assigned DSC to:

- update IEEs/EMPs during detailed design stage and prepare new IEEs/EMPs in accordance with the EARF;
- conduct environmental compliance audit of existing facilities as per Item F, Appendix 6 of ADB SPS, 2009;
- include IEEs/EMPs in bidding documents and civil works contracts;
- comply with all government rules and regulations;
- take necessary action for obtaining rights of way;
- oversee implementation of EMPs including environmental monitoring by contractors;
- take corrective actions when necessary to ensure no environmental impacts;
- submit monthly environmental monitoring reports to PCO;
- conduct continuous public consultation and awareness;
- address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs; and
- organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.

142. **Design and Supervision Consultants (DSC).**DSC will be engaged to work closely with and advise the PCO, to be involved in project supervision including monitoring during construction phase. The DSC will have environmental specialist(s), but not limited to:

- Work under the general supervision of the team leader and deputy team leader;
  - Review the environmental guidelines and requirement of the government of Nepal and ADB's SPS, 2009, environmental subproject selection guidelines and EARF and guide the implementation of future subprojects;
  - Provide technical support to the PCO and PIUs including review and update of EARF and guidelines for specific type of subprojects and assist in preparing terms of reference for environmental assessment;
  - Assist and guide the PIU's and contractor's environmental officers to provide support to environmental management functions including updating subproject IEEs in respect to EMP;
  - Assist in preparing IEEs and assist in monitoring impact and mitigation measures associated with subprojects;
  - Assist PIUs working in the steps for preparing the IEE and EIA, capacity building and training, preparation of guidelines and procedure and subproject specific guidance;
  - Provide support and guidance in undertaking environmental monitoring by PIUs;

[5] It is recommended that existing municipality senior officer (executive engineer) will also work as responsible safeguard officer in addition to his/her regular responsibilities within the municipality.

- Support PCO in submitting semi-annual environmental monitoring reports to ADB;
- Facilitate in grievance redress and corrective actions;
- Train PIU officials regarding environmental requirement and issues; and
- Perform any other task assigned by the team leader, deputy team leader and the project director.

143. **Civil works contracts and contractors.** EMPs are to be included in bidding and contract documents and verified by the PIUs and PCO. The contractor will be required to designate an environmental supervisor to (i) coordinate with DSC on updating the IEE/EMP based on detailed designs, and (ii) ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract. The contractors responsibilities are:

- **Bidding stage:**
  - Understand the EMP requirements and allocate necessary resources (budget, staff, etc.,)
  - Understand the regulatory compliance requirements related to labour welfare, safety, environment etc.,
  - Make available a budget for environmental measures in the EMP
- **Construction stage:**
  - Ensure that all regulatory clearances (both project related and contractor related) are in place before start of the construction work.
  - Mobilize EHS supervisor prior to start of work
  - Confirm with PIU availability of rights of way at all project sites prior to start of work.
  - Prepare Method Statement and get it approved prior to start of work
  - Prepare SEP and submit to PCO/PIU for approval
  - Prepare the following duly incorporating EMP measures, and submit to the PIU : (i) Construction waste management (CWM) plan; (ii) Traffic management (TM) plan; (iii) Occupational Health & Safety (OHS) Plan
  - Implement the mitigation measures as per the EMP including CWM & TM Plans
  - Follow the EMP/SEP measures/guidelines for establishment of temporary construction camps, construction waste disposal sites, and material borrow areas, etc.,
  - Implement EMP and ensure compliance with all the mitigation and enhancement measures
  - Conduct environmental monitoring (air, noise, water etc.,) as per the EMP
  - Undertake immediate action as suggested by PIU / PMU / PMC to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation
  - Submit monthly compliance reports on EMP implementation
  - Act promptly on public complaints and grievances related to construction work and redress in a timely manner in coordination with PIU
  - Comply with applicable government rules and regulations
  - Site clean-up and restoration

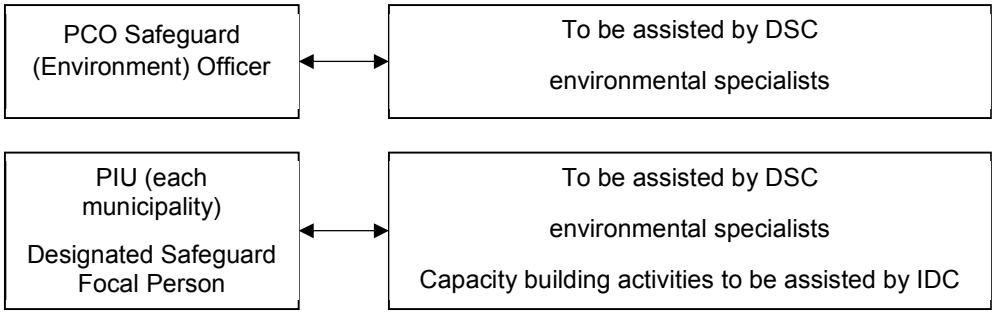


Figure 7: Safeguards Implementation Arrangement

C. Institutional Capacity Development Program for EMP Implementation

144. The DSC environmental specialists will be responsible for trainings on environmental awareness and management in accordance with 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 environment and environmental considerations in city roads and drainage, solid waste management and water supply projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project along with the frequency of sessions is presented in Table 25.

D. EMP Tables

145. Tables 25 to 26 provide the specific mitigation measures, responsibilities of PIU, DSC and contractors. The contractor will be required to submit to PIU, for review and approval, a site environmental plan (SEP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEP; and (iv) budget for SEP implementation. No works are allowed to commence prior to approval of SEP.

E. Environmental Monitoring Program

146. Tables 25 to 26 provide the indicative monitoring program based on the EMP tables. The detailed and final environmental monitoring program has to be provided by the contractor as part of the SEP. During the construction period, it is the contractor's responsibility to ensure mitigation measures are implemented and to conduct environmental sampling and analysis. PCP and PIU will verify and conduct site inspections from time to time. The contractor is required to submit results of environmental monitoring which PIU will include in the environmental monitoring reports.

147. PIU and DSC will work closely with the contractor in developing site-specific monitoring checklists.

Table 25: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
1. Prior to Construction Activities						

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
Consents, permits, clearances, no objection certificate (NOC), etc.	Failure to obtain necessary consents, permits, NOCs, etc can result to design revisions and/or stoppage of works	• Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. • Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. • Include in detailed design drawings and documents all conditions and provisions if necessary	Project coordination office (PCO), project implementing unit (PIU), Design Supervision Consultants (DSC)	• Incorporated in final design and communicated to contractors.	• Prior to award of contract	• No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PCO and PIU. • Mitigation measures are included as part of TOR of PCO, PIU, DSC
Updating of IEE based on detailed design	Site-specific impacts not identified, mitigation measures not appropriate and sufficient to address impacts	• Update IEE and EMP based on detailed design • Ensure updated EMP is provided to contractors • Relevant information disclosed	PCO	• Updated IEE and EMP reviewed, approved and disclosed	• Upon completion of detailed design	• No additional cost required
Existing utilities	Disruption of services.	• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction activities • Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • Require contractors to prepare spoils	PCO, PIU, DSC	• List of affected utilities and operators; • Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (**Appendix 3**), and traffic manageme	• During detailed design phase • Review of spoils management plan: Twice (once after first draft and once beforefinal approval)	• No cost required. • Mitigation measures are included as part of TOR of PCO, PIU, DSC.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		management plan (see **Appendix 3** for outline) and traffic management plan (see **Appendix 4** for sample)		nt plan (**Appendix 4**)		
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	• Determine locations prior to award of construction contracts.	PCO, PIU, and DSC	• List of selected sites for constructio n work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. • Written consent of landowner/ s (not lessee/s) for reuse of excess spoils to agricultural land	• During detailed design phase	• No cost required. • Mitigation measures are included as part of TOR of PCO, PIU, and DSC.
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	• Prepare list of approved quarry sites and sources of materials	PCO, PIU, and DSC	• List of approved quarry sites and sources of materials; • Bid document to include requiremen t for verification of suitability of sources and permit for additional quarry sites if necessary.	• During detailed design phase, as necessa ry with discussi on with detailed design enginee rs and PIUs	• No cost required. • Mitigation measures are included as part of TOR of PCO, PIU, and DSC.
EMP Implementati on Training	Irreversible impact to the environment, workers, and community	• Project manager and all key workers will be required to undergo EMP implementation including spoils management,	Construction Contractor	• Proof of completion (Safeguard s Complianc e Orientation)	• During detailed design phase prior to mobiliza tion of workers	• Cost of EMP Implement ation Orientatio n Training to contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		Standard operating procedures (SOP) for construction works; health and safety (H&S), core labor laws, applicable environmental laws, etc		• Posting of proof of completion at worksites • Posting of EMP at worksites	to site	is responsibility of PCO and PIU. • Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may cause localized changes in topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Utilize readily available sources of materials. If contractor procures materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements. • Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.	Construction Contractor	• Records of sources of materials	• Monthly by PIU	• Cost for implementation of mitigation measures responsibility of contractor.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of	• Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with local authority on designated disposal areas. • All earthworks must to be conducted during dry season to maximum extent possible to avoid	Construction Contractor	• Areas for stockpiles, storage of fuels and lubricants and waste materials; • Number of silt traps installed along trenches leading to water bodies; • Records of	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	the difficult working conditions that prevail during monsoon season such as problems from runoff. • Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. • Take all precautions to minimize the wastage of water in the construction activities. • Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. • Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. • While working across or close to any water body, the flow of water must not be obstructed. Ensure no construction materials like earth, stone, or		surface water quality inspection; • Effectiveness of water management measures; • No visible degradation to nearby drainages or water bodies due to construction activities	finalized during detailed design stage and final location of subproject components	

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		appendage are disposed of in a manner that may block the flow of water of any watercourse and cross drainage channels. • Monitor water[6] quality according to the environmental management plan.				
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; • Use tarpaulins to cover soils, sand and other loose material when transported by trucks. • Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. • Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). • Monitor air quality.	Construction Contractor	• Location of stockpiles; • Number of complaints from sensitive receptors; • Heavy equipment and machinery with air pollution control devices; • Certification that vehicles are compliant with air quality standards.	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	• Cost for implementation of mitigation measures responsibility of contractor.
Acoustic environment	Construction activities will be on settlements,	• Involve the community in planning the	Construction Contractor	• Number of complaints from	• Visual inspection by	• Cost for implementation of

[6] Water Quality at drainage outfall will also be monitored periodically to ensure that no sewer or industrial effluents are being discharged through the drains.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. • Plan activities in consultation with Nepalganj local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. • Use of high noise generating equipment shall be stopped during night time. • Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; • Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. • All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). • Monitor noise levels. Maintain maximum sound levels not exceeding 80		sensitive receptors; • Use of silencers in noise-producing equipment and sound barriers; • Equivalent day and night time noise levels	PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. • If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. • Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.				
Aesthetics	The construction activities do not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-	• Prepare the Debris Disposal Plan • Remove all construction and demolition wastes on a daily basis. • Coordinate with Nepalganjlocal authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils • Suitably dispose of collected materials from drainages, unutilized materials and debris either	Construction Contractor	• Number of complaints from sensitive receptors; • Worksite clear of hazardous wastes such as oil/fuel • Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris • Transport route and worksite cleared of any dust/mud	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject compon	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	term, site-specific within a relatively small area and reversible by mitigation measures.	through filling up of pits/wasteland or at pre-designated disposal locations. • All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. • Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. • In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. • The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference			ents	

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
Landscape disturbance and Change in land use		hierarchy: reuse, recycling and disposal to designated areas; • bioengineering and plantation along the road side for maintaining greenery				
B. Biological Characteristics						
Biodiversity	Activities being located in the built-up area of Nepalgunj. There are no protected areas in or around subproject sites, and no known areas of ecological interest. There are no trees at the site that need to be removed.	• Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. • If during detailed design cutting of tress will be required, compensatory plantation for trees lost as per the ministry of forests requirements will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. • All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. • Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during	Construction Contractor	• PCO and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) • Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc.	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		implementation. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. • Prohibit employees from poaching wildlife and cutting of trees for firewood.				
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare and implement a Traffic Management Plan (see **Appendix 4** for sample) • Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. • Maintain safe passage for vehicles and pedestrians throughout the construction period. • Schedule truck deliveries of construction materials during periods of low traffic volume. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes	Construction Contractor	• Traffic route during construction works including number of permanent signage, barricades and flagmen on worksite as per Traffic Management Plan (see **Appendix 4** for sample); • Number of complaints from sensitive receptors; • Number of signages placed at project location • Number of walkways, signages, and metal sheets placed at project location	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		when required. • Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. • Leave spaces for access between mounds of soil. • Provide walkways and metal sheets where required to maintain access across for people and vehicles. • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. • Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. • Ensure any damage to properties and utilities will be restored or compensated to pre-work				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		conditions.				
Socio-economic status	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. Manpower will be required during the XXX-months construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.	• Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. • Secure construction materials from local market.	Construction Contractor	• Employment records; • Records of sources of materials • Records of compliance to Nepal Labor Regulations and other applicable standards	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Nepalgunj, where there are a variety of human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in general. Excavation may also	• Provide safety signage at all sites visible to public • Provide safety barriers near any trenches, and cover trenches with planks during non-work hours. • Obtain details from municipality, nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; • Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to	Construction Contractor	• Utilities Contingency Plan Number of complaints from sensitive receptors	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	damage existing infrastructure (such as water distribution pipes, electricity pylons, etc.) located alongside the roads. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	identify any local concerns so that these can be addressed. • Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. • Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. • If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible	• Provide safety signage at all sites visible to public • Provide safety barriers near any trenches, and cover trenches with planks during non-work hours. • Contractor's activities and movement of	Construction Contractor	• Number of permanent signage, barricades and flagmen on worksite as per Traffic Management Plan (see **Appendix 4** for sample);	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and samplin	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	by mitigation measures. Poor safety signage and lack of barriers at work site and trenches will create hazard to pedestrians and children.	staff will be restricted to designated construction areas. • Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. • If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. • Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.[7] • Under no circumstances may open areas or the surrounding bushes be used as a toilet facility.		• Number of complaints from sensitive receptors; • Number of walkways, signage, and metal sheets placed at project location • Agreement between landowner and contractors in case of using private lands as work camps, storage areas, etc.	g sites to be finalized during detailed design stage and final location of) subproj ect compon ents	

[7]These products come in powder forms, and once mixed with water (being the catalyst) simply expand, and crack the rock from hole to hole. This product is environmentally friendly and can be washed away after it has been used.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		• Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. • A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. • Interested and affected parties need to be made				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the national/regional environmental specialist's attention immediately; and (iv) taking remedial action as per national/regional environment specialist's instruction. • The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the national/regional environmental specialist within 48 hours of receipt of such complaint/grievance.				
Workers health and safety	There is invariably a safety risk when construction works such as excavation and earthmoving	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards	Construction Contractor	• Site-specific H&S Plan • Equipped first-aid stations • Medical insurance	• Visual inspection by PIU and supervision consultants on monthly	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	on workers H&S. • Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. • Produce and implement a site health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[8] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports		coverage for workers • Number of accidents • Records of supply of uncontaminated water • Condition of eating areas of workers • Record of H&S orientation trainings • Use of personal protective equipment • % of moving equipment outfitted with audible back-up alarms • Permanent sign boards for hazardous areas • Signage for storage and disposal areas • Condition of sanitation facilities for workers	basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	

[8]Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. • Provide medical insurance coverage for workers; • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		visitor/s do not enter hazard areas unescorted; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and • Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	Construction works will be on existing	• All fossils, coins, articles of value of antiquity,	Construction Contractor	• Records of chance	• Visual inspecti on by	• Cost for implement ation of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	roads and in built-up areas of Nepalganj thus risk for chance finds is low.	structures and other remains of archaeological interest discovered on the site shall be the property of the government. • Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. • Stop work immediately to allow further investigation if any finds are suspected.		finds	PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	mitigation measures responsibility of contractor.
E. Others						
Submission of EMP implementation report	Unsatisfactory compliance to EMP	• Appointment of supervisor to ensure EMP implementation • Timely submission of monitoring reports including pictures	Construction contractor	• Availability and competency of appointed supervisor • Monthly report	• Monthly monitoring report to be submitted by PIU to PCO • PCO to submit semi-annual monitoring report to ADB	• Cost for implementation of mitigation measures responsibility of contractor.
3. Post-construction Activities						
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	• Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and • All excavated roads shall be reinstated to original condition. • All disrupted	Construction Contractor	• PCO report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all constructio	• Prior to turn-over of completed works to municipality	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		utilities restored • All affected structures rehabilitated/compensated • The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. • All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and re-grassed using the guidelines set out in the revegetation specification that forms part of this document. • The contractor must arrange the cancellation of all temporary services. • Request PCO/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.		n related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.		

Table 26: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
Post-construction clean-up	Damage due to debris,	• Remove all spoils wreckage, rubbish, or	Construction Contractor	• PCO/DSC report in	• Prior to turn-over	• Cost for implementati

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	spoils, excess construction materials	temporary structures (such as buildings, shelters, and latrines) which are no longer required; and • All excavated roads shall be reinstated to original condition. • All disrupted utilities restored • All affected structures rehabilitated/compensated • The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. • All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and re-grassed using the guidelines set out in the revegetation specification that forms part of this document. • The contractor must arrange the cancellation of all temporary services. • Request PCO/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.		writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.	of completed works to municipality	on of mitigation measures responsibility of contractor.

Table 27: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Water quality	Run-off from stockpiled debris/sediments from drainages which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-	• Take all precautions to prevent entering of run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the	• Nepalgunj Municipality	• No visible degradation to nearby drainages or water bodies due to construction activities	• Duration of repair works	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	term, site-specific within a relatively small area and reversible by mitigation measures.	drainage leading to the water bodies. • Remove all debris/sediments immediately. • Dispose debris/sediments at a designated site such as landfill. It is important that the designated disposal site's base is of a non-permeable membrane in order to prevent leachate that can contaminate the soil and groundwater.				
Air quality	Moving debris/sediments from drainages may create dusts during dry season. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Use tarpaulins to cover soils, sand and other loose material.	• Nepalgunj Municipality	• No complaints from sensitive receptors	• Duration of repair works	• Included in O&M cost
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Plan activities in consultation with Nepalganj local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. • Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.	• Nepalgunj Municipality	• No complaints from sensitive receptors	• Duration of repair works	• Included in O&M cost
B. Biological Characteristics						
Biodiversity	Activities in the built-up area of Nepalgunj. There are no protected	• No trees, shrubs, or groundcover may be removed	• Nepalgunj Municipality	• No complaints from	• Duration of repair works	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	areas in or around subproject sites, and no known areas of ecological interest.	or vegetation stripped without the prior permission. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal).		sensitive receptors		
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Traffic may be interrupted temporarily. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Maintain safe passage for vehicles and pedestrians during maintenance activities. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. • Notify affected sensitive receptors by providing sign boards informing nature and duration of maintenance activities and contact numbers for concerns/complaints. • Leave spaces for access between mounds of soil. • Provide walkways and metal sheets where required to maintain access across for people and vehicles. • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. • Consult businesses and institutions regarding	• Nepalgunj Municipality	• No complaints from sensitive receptors	• Duration of repair works	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		operating hours and factoring this in work schedules. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Workers health and safety	Workers need to be mindful of the occupational hazards working in confined spaces such as closed drains. Potential impacts are negative and long-term but reversible by mitigation measures.	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. • Ensure that all site personnel have a basic level of H&S training. • Produce and implement a O&M health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Provide H&S orientation training	• Nepalgunj Municipality	• No complaints from sensitive receptors • No complaints from workers related to O&M activities • Zero accident	• Duration of repair works	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. • Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	Construction works will be on existing drainages and built-up areas of municipality thus risk for chance finds is low.	• All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. • Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological	• Nepalgunj Municipality	• Records of chance finds	• Duration of repair works	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		interest. • Stop work immediately to allow further investigation if any finds are suspected.				

F. Implementation of Mitigation Measures

148. The mitigation measures will be integrated into project design and tender documents. Using this approach, the mitigation measures will automatically become part of the project construction and operation phase. By including mitigation measures in the contract or in specific items in the Bill of Quantities, monitoring and supervision of mitigation implementation will be covered under the normal engineering supervision provisions of the contract.

1. Project Design

149. The mitigation measures will be integrated in the design of the project itself. Such a step will enhance the mitigation measures in terms of specific mitigation design, cost estimation of the mitigation measures, and specific implementation criteria. The mitigation measures integration in the design phase will also help in strengthening the benefits and sustainability of the project.

2. Project Contract

150. The project contractor will be bound by the parameters identified in the environmental assessment pertaining to specific mitigation measures in the contract. The final acceptance of the completed works will not occur until the environmental clauses have been satisfactorily implemented.

3. Bill of Quantities

151. The tender instruction to bidders will explicitly mention the site-specific mitigation measures to be performed, the materials to be used, labour camp arrangements and waste disposal areas, as well other site specific environmental requirements.

4. Supervision and Monitoring

152. The purpose of supervision is to make sure that specific mitigation parameters identified in the environmental assessment and as bound by the contract is satisfactorily implemented. Likewise, monitoring is necessary such that the mitigation measures are actually put into practice.

a. Environmental Monitoring

153. The IEE prescribes the mitigation measures in order to minimize adverse impacts and to enhance beneficial impacts. Environmental monitoring plan is an important tool to ensure the implementation of mitigation measures for minimizing adverse impacts and maximizing the beneficial impacts. Environmental monitoring generates useful information and improves the quality of implementation if mitigation measures.

b. Monitoring Responsibility

154. Monitoring is an integral part of the project proponent so as to know the unlikely impacts and implement corrective measures. The proponent, Nepalgunj SMC/Project

Implementation Unit (PIU) will develop in-built monitoring mechanism to show its additional commitment for environmental improvement and mitigate undesirable environmental changes, if any during construction and operational phase. Nepalgunj SMC/Project Implementation Unit (PIU) will be supported by team of PMSC, DUDBC/PCO and Project team for environmental monitoring effectively.

155. According to EPR, 1997, the MoUD is responsible for monitoring and evaluation of the impact of the implementation of the project. The MoUD checks whether the Nepalgunj SMC/Project Implementation Unit (PIU) is carrying out monitoring activities as per the IEE, and if the prescribed mitigation measures are being implemented.

156. Nepalgunj SMC/Project Implementation Unit (PIU) with PMSC, DUDBC/PCO support will make arrangement for sub-project level monitoring. It will constitute a monitoring team, which will be independent from the implementation team and will consist of relevant persons in the context of a sub-project being monitored, for example persons from the forest, agriculture, social and NGO sectors. The monitoring team will be constituted separately for each monitoring event. Project's district management team will be responsible for forming the monitoring team, financing the monitoring works, providing logistic and other necessary support. The sub-project specific monitoring plan as given in Table above will be followed. At least one monitoring in each construction seasons is necessary.

157. The sub-project level monitoring team will submit its report to Nepalgunj SMC/Project Implementation Unit (PIU), which will forward a copy to the MoUD. Total cost of environmental monitoring (field visits, observation, review or reports and report preparation) is estimated NRs. 465000 as given in Table below.

Table 28: Environmental Monitoring Cost

Manpower Requirement	Duration (month)	Rate (NRs.)	Amount (NRs.)
Team Leader / Environmental Specialist	1	75000	75000
Engineer	½	60000	30000
Forest Expert/ Biologist	½	60000	30000
Socio-economist	½	60000	30000
Cost of Monitoring by Nepalgunj SMC / PIU and MoUD	1	100000	100000
Supporting Staff	1	25000	25000
Transportation Cost		LS	75000
Report Preparation & Sampling/lab test		LS	100000
Total			**465000**

c. Types of Monitoring and Monitoring Parameters

158. Monitoring is an ongoing component of the environmental assessment process and subsequent environmental management and mitigation activities. There are basically three types of environmental monitoring:

Baseline Monitoring. This is done if the project is not going to be implemented recently (in this project not required).

Compliance monitoring. It verifies whether contract environmental clauses and the mitigation measures are properly implemented in the field.

Impact monitoring. It confirms whether the environmental mitigation measures specified in the project design and contract are correctly formulated.The nature and purpose of

environmental monitoring will be different in the pre-construction phase, construction phase and operation phases of the project.

Table 29: Framework for Monitoring Environmental Issues

S.N	Monitoring Parameters	Monitoring Indicators	Monitoring Mechanism	Schedule	Responsible Agency
A.	**Pre-Construction Phase**				
1	Public Consultations	Integration of local people's environmental concerns	Discussion with local residents, representatives and stakeholders	During the study and design process and prior to approval	Municipality/ CSC/ expert as required
2	Incorporation of Mitigation Measures	Incorporation of Mitigation Measures and Environmental codes of conduct into design and construction works	Review detail design and drawings to ensure environmental monitoring provisions are included, BOQ documents	During project approval	Municipality/ Project /DUDBC,PCO
B.	**During Construction Phase**				
3	Drainage Condition	Construction and location of drainage facilities	Site inspections at places where such drains are required, observation on water logging problem	During construction and operation	Municipality/ CSC
4	Protection of Top Soil	Storage and reinstatement of top soil for later use	Inspection of site clearance activities, process of storage and reinstatement of top soil	During construction	CSC
5	Disruption to public utilities	Compensate or reinstate/relocate community assets that are disturbed, such as irrigation canals, electricity poles, telephone lines, drinking water pipes, sewerage lines, roads, etc. to the satisfaction of the people	Site observation, discussion and seeking of feasible solutions and field observation to visually assess if disturbed community assets have been reinstated.	During and immediately after construction	Project /Municipality/ CSC
6	Spoil Disposal	Affected aesthetic value, affected agriculture, initiated land erosion by local blocked drainage, hazard to downhill slope residents and agricultural lands.	Site observation and interviews, photos, geo-referencing sites	During construction	Municipality/ CSC
		Safe disposal of excavated materials and other construction wastes generated by construction workers	Disposal site observation and disposal practice	During construction	Municipality/ CSC
		Impacts on agricultural land due to spoil, soil erosion, water logging etc.	Site Observation and discussion with local residents	During construction	Municipality/ CSC
		Proper reclamation of disposal sites	Observation of finished disposal sites	Before starting, in between and after completion	Municipality
7	Traffic Congestion and Public annoyance	Develop a traffic plan to minimize traffic flow interference from construction activities. Provide traffic diversion/alternative routes if road closure is unavoidable, and inform the public through mass media and hoarding boards.	Visual observation of traffic; complaints from travellers and the public; existence of signage and effectiveness of speed control and diversion measures	Weekly during construction	Project /CSC /Municipality
		Impact to terrestrial fauna	Visual inspection; discussion with locals	Continuously during construction/ operation	Municipality
		Nuisance to pedestrian	Visual observations; feedback from nearby residents and pedestrian	Every week	Municipality

S.N	Monitoring Parameters	Monitoring Indicators	Monitoring Mechanism	Schedule	Responsible Agency
8	Water Pollution	Quality of surface water, observation of open defecation and waste disposal around water sources near construction sites and direct discharge of industrial waste to drain	Use field kit / visual observation	Once a month	Project /CSC
		Impact on fish and other aquatic life due to water pollution	Visual observations; water quality of receiving waters, including groundwater	Once a month	CSC
		Quality of surface water and river due to use of fuel, lubricants, oil, acids and other chemicals for construction and leakage of oil, grease and other materials	Visual observations; water quality of surface water and river, including groundwater	Once a month	CSC
9	Air Pollution	Quality of Air pollution near settlements due to increase in dust/suspended particulate matter and rise in noise level and vibration due to construction works	Observation of good construction practices and discussion with residents and workers and sound level monitoring	Monthly	CSC
10	Cultural sensitive spots	Protection of culturally sensitive spots	Site observation, discussion with local residents	Upon demand	Municipality
		Inflow of labour and cash will disrupt social setting and affect law and order situation and disputes between local labour and the outside work force	Site observation, discussion with local residents, Crime records and causes; camp issues; enforcement of remedies; security situation in camps	Once a month or as required	Municipality
11	Quarry sites and Burrow Pits and landscape disturbance	Initiated erosion, changes in river regime, erosion by river systems, landslide due to quarrying, degradation of vegetation, water logging, waterborne diseases	Site inspection, discussion with local residents	Weekly during quarry operation	Project /CSC
12	Health Hazard	Occupational Health Saftey.	Check health records; clinic and first aid facilities; health complaints; number of trainings provided; check list of workers and whether insurance has been provided	Every week	CSC
13	Change in economy	Operation and closure of quarries and burrow pits	Site inspection, discussion with local residents	Weekly during quarry operation and closure	Project /CSC
		Numbers of people employed by the project during construction, numbers of women in work forces	Record kept by the project management, discussion with stakeholders	Start of construction then once every month	CSC/ Municipality
C.	**Operation Phase**				
14	Drainage Pattern	Surface flow interruption and its consequences, status of rehabilitation, service	Visit the area, mapping, discussion with local people, water logging problem,	Upon demand, Half yearly	Municipality
		Blockage of drainage and nuisance to neighbouring areasdue to formation of different toxic gases	Visual Observation	Weekly	Municipality
15	Air pollution, Vehicular emission, noise	Air quality, increase in noise pollution, dust emission, traffic load, quality of vehicle	Travel along the road, discussion with local people, pedestrians, passengers, transport operators, visual operation, air quality measurement (NOx, PM10, SO2, SPM)	Upon demand, Half yearly	Municipality

S.N	Monitoring Parameters	Monitoring Indicators	Monitoring Mechanism	Schedule	Responsible Agency
16	Water Quality	Observation of open defecation and waste disposal around water sources and Quality of ground and river water due to seepage of waste water	Visual observation, measurement of water sample using field kit	Annually	Municipality
17	Road Quality and Status	Observation of embankment erosion due to outlet of storm water drainage and Maintenance road check	Maintenance record, Visual inspection of road and road structures	Half yearly	Municipality
18	Change in Socio-economic and culture	Observation of risk of health and safety hazards to workers from hazardous materials which will be contained in waste water	Observations, interview with local people, DDC, Police stations and VDC records.	During operation	Municipality

G. Training Activities on EMP Implementation

159. Table 30 presents the outline of capacity building program to ensure EMP implementation. The detailed cost and specific modules will be customized by DSC in consultation with PCO and PIU after assessing the capabilities of the target participants and the requirements of the project. The responsibility of organizing and conducting the training will be by the DSC Environmental Specialist.

Table 30: Outline Capacity Building Program on EMP Implementation

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation program .	- RUDP Environmental safeguard requirements - Implementation arrangement -monitoring & reporting -Corrective actions	½ day orientation workshop - at the start of the program	PCO, PIUs – all senior and mid-level officials and engineers involved in DWSSIP
Training program on EMP implementation & monitoring	Module 1 – Orientation - ADB SPS; - Government of Nepal Environmental Laws and Regulations. Module 2 – Environmental Assessment Process. - Environmental process, identification of impacts and mitigation measures, formulation of an EMP, implementation, and monitoring requirements; - Review & approval of environmental assessment reports Module 3: EMP Implementation, monitoring & reporting - Incorporation of safeguard clauses and EMP in bid and contract documents -Pollution prevention and abatement (IFC EHS Guidelines) -.Monitoring & evaluation - Formulation of corrective action plans (CAP) -Reporting Module 4: Consultation & disclosure - Grievance redress mechanism	2 day training program - .prior to invitation of any bids for civil works under RUDP	PCO & PIU staff
Construction stage			
Orientation program	- Contractual requirements -Legal & regulatory requirements -EHS requirements -Site Environment Plan (SEP) preparation, EMP implementation and reporting -roles and responsibilities	½ day orientation course to during mobilization	Contractors and PIUs, DSC supervising staff

Description	Contents	Schedule	Participants
Training program/ workshop for contractors and supervisory staff.	- Environmental issues during construction; - Site specific SEP - EMP Implementation - Day to day monitoring - Periodic ambient monitoring - Reporting -Consultation & grievance redress	1 day workshop immediately after mobilization	Contractors and PIUs, DSC supervising staff
Periodic refresher training workshop	Same as above	½ day workshop thrice a year	Contractors and PIU, DSC supervising staff
Stakeholder workshop Experience and best practices sharing.	- Experience of EMP implementation – issues and challenges; - Best practices followed.	½ day workshop Once in a year during implementation	PIU, and stakeholder agencies ()

H. Cost estimates

160. Costs of all mitigation measures during the construction phase will be included in the tender and contract documents and will be borne by the contractors. The contractors and engineers shall be made aware of the importance of meeting environmental safeguard standards in the contracts, and the importance of preparing, submitting and getting the SEP (to be prepared for each subproject, according to the EMP) approved before construction starts.

161. One day awareness training has been estimated at $ 1,000. An NGO will be hired at an approximate cost of US 10,000 per annum for community outreach and awareness programs.

162. The annual and total environmental cost for 5 years is given in Table 31.

Table 31: Indicative Cost of EMP Implementation

S. N.	Description	Unit Cost (USD)	Total Cost (USD)	Source of Fund
1	Environment Specialist DSC 6 Months	2,500	15,000	DSC Package
2	Public awareness campaign + IEC (on an intermittent basis)	10,000 per year	30,000	Project cost
3	EMP awareness training to contractors & engineers (1 day training)	Lump sum	1,000	Project cost
4	Air, noise & water quality monitoring (specific sites will be provided to construction contractors after detailed design & awarding of the contract	Lump sum	2,000	Contractor cost
5	Cost of mitigation measures according to EMP by the Contractor	-	-	Contractor cost

VIII. CONSULTATION, INFORMATION DISCLOSURE ANDGRIEVANCE REDRESS MECHANISM

A. Public Consultation and Information Disclosure

163. Meaningful stakeholder consultation and participation is part of the project preparation and implementation strategy. A consultation and participation program has been prepared for the project, and will be implemented with the assistance of consultants. By addressing stakeholder needs, there is greater awareness of the benefits and "ownership" of the project among stakeholders, which in turn contribute to sustainability.

164. Consultation, participation, and disclosure will ensure that information is provided and feedback on proposed project design is sought early, right from the project preparation phase, so that the views/preferences of stakeholders, including potential beneficiaries and affected people, can be adequately considered in project design, and continue at each stage of project preparation, processing, and implementation.

165. Project-affected persons (APs) will be consulted at various stages in the project cycle to ensure: (i) incorporation of views/concerns of APs on compensation/resettlement assistance and environmental impacts and mitigation measures; (ii) inclusion of vulnerable groups in project benefits; (iii) identification of help required by APs during rehabilitation, if any; and (iv) avoidance of potential conflicts for smooth project implementation. It will also provide adequate opportunities for consultation and participation to all stakeholders and inclusion of the poor, vulnerable, marginalized, and project-affected persons in the project process. Relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders.

166. A variety of approaches will be adopted. At minimum, stakeholders will be consulted regarding the scope of the environmental and social impact study before work commences, and they will be informed of the likely impacts of the project and proposed mitigation once the draft IEE and resettlement plan reports are prepared. The reports will record the views of stakeholders and indicate how these have been taken into account in project development. Consultations will be held with a special focus on vulnerable groups.

167. The key stakeholders to be consulted during project preparation, EMP implementation, and project implementation include:

(i) beneficiaries;
(ii) elected representatives, community leaders, religious leaders, and representatives of community-based organizations;
(iii) local NGOs;
(iv) local government and relevant government agency representatives, including local authorities responsible for land acquisition, protection, and conservation of forests and environment, archaeological sites, religious sites, and other relevant government departments;
(v) residents, shopkeepers, and business people who live and work alongside the roads where pipes will be laid, and near sites where facilities will be built; custodians and users of socially and culturally important buildings;
(vi) PCO staff and consultants; and
(vii) ADB and the Government of Nepal.

168. The stakeholder consultation and focussed group discussion summary conducted during the preliminary stage are provided as below:

Summary of Focus group discussion and key issues identified during Consultations

Place, Date and Discussion on Subprojects	Participants	Key issues discussed
Ward 2 and Ward 7 of Municipality Date: 7 May 2016	Local representatives, Political representatives	• Traffic congestion is not a major issue, no major concern on air pollution • Road and drains' improvement is very necessary, drains need to be covered • Regular repair and maintenance is important for longevity of road • All the proposed infrastructure implementation is needed for Nepalganj town, greenery must be provided and maintained along the drains
Ward 9 & 11 of Municipality	Local representatives, key municipal representatives	• Road and drains' improvement is necessary • Drains must be covered. • All development works are essential, greenery must be provided. • Bust stops must be provided as required along the length of the roads

The future consultations will be conducted during the construction and operation stages as part of the project implementation and management plan. The PCO and PIU are responsible for public consultation during project implementation.

B. Information Disclosure

169. Information is disclosed through public consultation and making relevant documents available in public locations. The following documents will be submitted to ADB for disclosure on its website:

(i)
(ii) For category B projects:
  (a) final IEE;
  (b) a new or updated IEE and corrective action plan prepared during project implementation, if any; and
  (c) environmental monitoring reports.

170. MoUD will send written endorsement to ADB for disclosing these documents on ADB's website. MoUD will also provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.

C. Grievance Redress Mechanism

171. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of AP's concerns, complaints, and grievances about the social and environmental performance at the level of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

172. **Common GRM.** A common GRM will be in place for social, environmental, or any other grievances related to the project; the resettlement plans (RPs) and IEEs will follow the GRM described below, which is developed in consultation with key stakeholders. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected persons' grievances related to the project. The multi-tier GRM for the project is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.

173. Affected persons (APs) will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes Installed by project municipalities, or through telephone hotlines at accessible locations, by e-mail, by post, or by writing in a complaint's register in municipal offices. Appendix 6 has the sample grievance registration form. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The project coordination office (PCO) safeguard officer will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party through the PIU designated safeguard focal person.

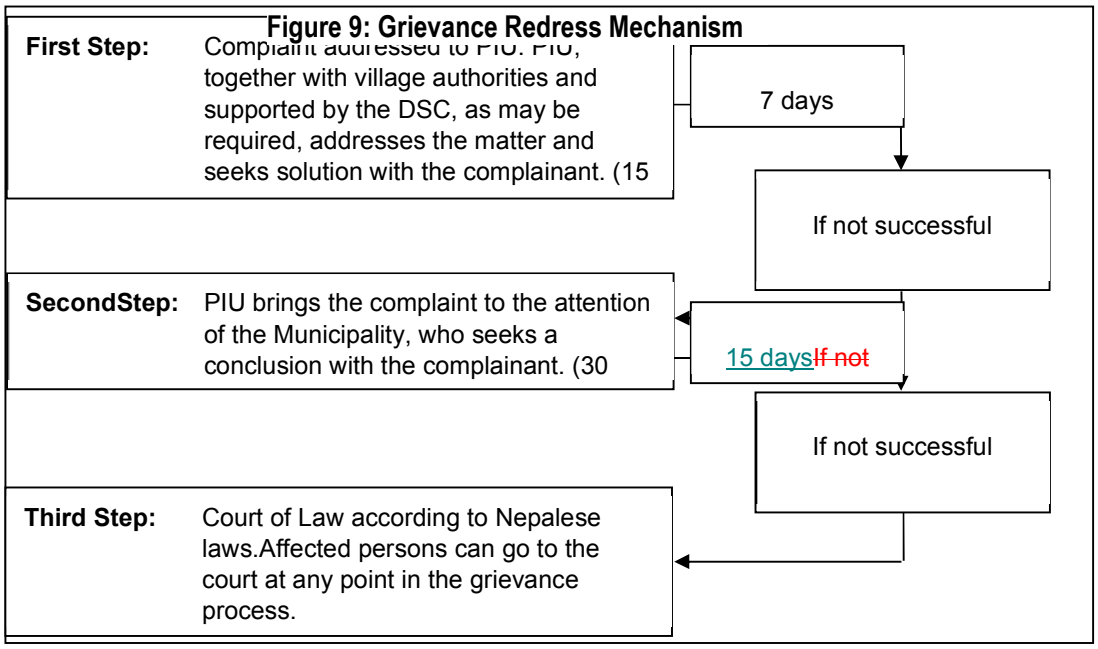
174. PIU will be the main responsible body for handling grievances. For this reason, PIU will appoint one Grievance Officer in charge of receiving, handling, and documenting all cases. PIU, supported by the DSC as may be required, will also be responsible for informing the affected population on their rights to grievance and the mechanisms to be followed.

Once an affected person submits a grievance, PIU, after registering the complaint, will seek in a first step to find a solution and come to an agreement with the complainant. Depending on the nature of the complaint, this may also involve the contractor, DSC or other involved parties. The contractors and PIU grievance officer can immediately resolve on-site in consultation with each other, and will be required to do so within 7 days of receipt of a complaint/grievance.

175. If a solution cannot be found, PIU will report the case to the municipality. Municipality will appoint an arbitration board to hear and settle the case. The arbitration board will attempt to resolve the complaint/grievance within 15 days. The PIU grievance officer will be responsible to see through the process of redressal of each grievance.
176.

177. If again a solution cannot be reached, or if the parties do not agree with the decision of the arbitration board, each party can take the case to court according to applicable legislation. The court verdict will be final and binding for all parties.

Figure 9: Grievance Redress Mechanism



178. **Recordkeeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by PIU. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PCO office, municipal office, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.

179. **Periodic review and documentation of lessons learned.** The PCO safeguard officer will periodically review the functioning of the GRM in each municipality and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

180. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the concerned PIU at municipal level; while costs related to escalated grievances will be met by the PCO. Cost estimates for grievance redress are included in resettlement cost estimates.

D. Staffing Requirement and Budget

181. Costs required 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.

182. For budgeting purposes, it is assumed that all new subprojects will be classified by ADB as category B (requiring IEE), and that the report will be deemed satisfactory by DOE. Some subprojects may require a simpler environmental review, but this is discounted for budgeting purposes. MOUD will aim to produce a single document that is acceptable to both

ADB and GON to avoid duplication of effort, and the documents produced by the PPTA will be used as a guide.

183. Each of the IEEs prepared to date involved approximately 2 weeks of effort by an experienced environmental specialist conducting the following activities: (i) site visit to assess environmental conditions and potential impacts of the scheme; (ii) liaison with the city corporation and others to obtain any environmental/social data that might be available locally (e.g. population figures, designated sites, etc.); (iii) consultation with the local community to inform them about the scheme and identify their views and concerns; (iv) assessment of impacts and development of mitigation; and (v) desk study and report preparation.

184. The infrastructure involved in each scheme is generally straightforward and will take between 3 and 9 months to build. 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 DSC environment specialists under supervision of PCO.

185. 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.

186. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of the PIUs. All monitoring during the operation and maintenance (O&M) phase will be conducted by MOUD and PIUs; therefore, there are no additional costs.

IX. CONCLUSION

187. Overall, the impacts of the Project will be very positive, befitting the environment and the people. Some negative impacts are anticipated during implementation but in specific areas and for short duration (dust, noise, traffic problems, access to buildings etc.). It is expected that the adverse environmental impacts of the planned subproject will in general not be significant and can be easily and reasonably mitigated and prevented through mitigation measures and regular monitoring during the design, construction and operation phases.

188. If the project is properly implemented and environmental issues are duly considered, there will be a significant improvement in the health of the environment and people due to the proposed subproject, and thereby an improvement in the quality of life. In addition, local people will get direct employment as workers, which will contribute significantly improving their livelihood. These benefits from the implementation of the proposed road sub-project are more significant and long term in nature compared to the adverse impacts, most of which can be mitigated or avoided. Moreover, relevant issues raised during public consultation have also been addressed.

189. The IEE has shown that none of the anticipated environmental impacts of constructing and improving the drainage and road are significant enough to need a detail follow-up EIA or a special environmental study. Therefore, this IEE is sufficient for the implementation of the sub-project.

DRAINAGE: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

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: Preparing the Integrated Urban Development Project**

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA:			
1. Densely populated?	x		The SMC has a population density of 6,000 people per km^2.
2. Heavy with development activities?		x	It is a commercial hub for the midwestern development region.
3. Adjacent to or within any environmentally sensitive areas?			
1. Cultural heritage site	x		Only the surroundings of the Bageshwari Temple are annually flooded, and drainage improvements will solve this problem.
2. Protected area		x	
3. Wetland		x	
4. Mangrove		x	
5. Estuarine		x	
6. Buffer zone of protected area		x	
7. Special area for protecting biodiversity		x	
8. Bay		x	
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE…			
1. Impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services?		x	Drains will be part of the road rehabilitation.
2. Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		x	The project will enhance the existing environmental conditions of the areas. Good construction practices will be specified in the EMP so as to deter deterioration of existing environmental conditions.

Screening Questions	Yes	No	Remarks
3. Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds, and forests)?		x	Not applicable
4. Dislocation or involuntary resettlement of people?		x	The existing roads are to be improved and rehabilitated.
5. Disproportionate impacts on the poor, women and children, indigenous peoples, or other vulnerable group?		x	Not applicable. The subproject will, in fact, be beneficial because of improved roads with job opportunities.
6. Degradation of cultural property and loss of cultural heritage and tourism revenues?		x	No cultural property and heritage sites lie along the existing roads which are to be rehabilitated.
7. Occupation of low-lying lands, floodplains, and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutant industries?		x	Not applicable
8. Water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters)?		x	Not applicable
9. Air pollution due to urban emissions?	x		Air pollution due to dust and construction vehicles during rehabilitation of the roads will occur, but mitigation measures will be mentioned in the EMP.
1. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	x		Risks and vulnerability during construction and operation are temporary, reversible, and short-term in duration. The EMP will include mitigation measures related to occupational health and safety.
2. Road blocking and temporary flooding due to land excavation during rainy season?	x		A traffic management plan will form part of the EMP so that roadblocks are minimized. Excavation during the rainy season will be avoided.
3. Noise and dust from construction activities?	x		Good construction practice to mitigate noise and dust pollution will be part of the EMP.
4. Traffic disturbances due to construction material transport and wastes	x		A traffic management plan will form part of the EMP so that roadblocks are minimized.
5. Temporary silt runoff due to construction?	x		Good construction practices to mitigate soil erosion and silt runoff will be part of the EMP.
6. Hazards to public health due to ambient, household, and occupational pollution, thermal inversion, and smog formation?		x	Not applicable
7. Water depletion and/or degradation?		x	Not applicable
8. Overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		x	Not applicable
9. Contamination of surface and ground waters due to improper waste disposal?		x	. Not Applicable
10. Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		x	.Not Applicable

Screening Questions	Yes	No	Remarks
11. Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		x	As only rehabilitation of drains will be done, a large number of construction workers will not be necessary. The local labor available will suffice.
12. Social conflicts if workers from other regions or countries are hired?		x	As only rehabilitation of drains will be done, a large number of construction workers will not be necessary. The local labor available will suffice.
13. 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?		x	Not applicable
14. 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?	x		The EMP will include mitigation measures related to occupational health and safety.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
1. Is the project area subject to hazards such as earthquakes, floods, storm surges, tsunami, or volcanic eruptions and climate changes?	x		The project area is prone to annual floods, and the drainage subproject will remedy the existing problems.
2. Could changes in temperature, precipitation, or extreme events patterns over the project lifespan affect technical or financial sustainability (e.g., increased extreme rainfall increases flooding, damaging proposed infrastructure)?		x	The design of the drainage system will consider the worst flooding scenario.
3. Are there any demographic or socioeconomic aspects of the project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		x	Not applicable
4. Could the project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by paving vulnerable groundwater recharge areas, or using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		x	Not applicable

URBAN DEVELOPMENT: REHABILITATION OF CITY ROADS: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

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: Preparing the Integrated Urban Development Project**

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA…			
1. Densely populated?	x		The SMC has a population density of 6,000 people per sq.km
2. Heavy with development activities?		x	It is a commercial hub for the Mid-western Development Region.
3. Adjacent to or within any environmentally sensitive areas?			
4. Cultural heritage site		x	
5. Protected area		x	
6. Wetland		x	
7. Mangrove		x	
8. Estuarine		x	
9. Buffer zone of protected area		x	
10. Special area for protecting biodiversity		x	
11. Bay		x	
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE…			
12. Impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services?		x	Drains will be part of the road rehabilitation. .
13. Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		x	The project will enhance the existing environmental conditions of the areas. Good construction practices will be specified in the EMP so as to deter deterioration of existing environmental conditions.
14. Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds, and forests)?		x	Not applicable

Screening Questions	Yes	No	Remarks
15. Dislocation or involuntary resettlement of people?		x	The existing roads are to be improved and rehabilitated.
16. Disproportionate impacts on the poor, women and children, indigenous peoples, or other vulnerable group?		x	Not applicable. The subproject will, in fact, be beneficial to women and children because of improved drainage.
17. Degradation of cultural property and loss of cultural heritage and tourism revenues?		x	No cultural property and heritage sites lie along the existing drainage system which is to be rehabilitated.
18. Occupation of low-lying lands, floodplains, and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutant industries?		x	Not applicable
19. Water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters)?		x	Not applicable
20. Air pollution due to urban emissions?	x		Air pollution due to dust and construction vehicles during rehabilitation of the drains will occur, but mitigation measures will be mentioned in the EMP.
21. Risks and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation?	x		Risks and vulnerability during construction and operation are temporary, reversible, and short-term in duration. The EMP will include mitigation measures related to occupational health and safety.
22. Road blocking and temporary flooding due to land excavation during rainy season?	x		A traffic management plan will form part of the EMP so that roadblocks are minimized. Excavation during the rainy season will be avoided.
23. Noise and dust from construction activities?	x		Good construction practice to mitigate noise and dust pollution will be part of the EMP.
24. Traffic disturbances due to construction material transport and wastes?	x		A traffic management plan will form part of the EMP so that roadblocks are minimized.
25. Temporary silt runoff due to construction?	x		Good construction practice to mitigate soil erosion and silt runoff will be part of the EMP.
26. Hazards to public health due to ambient, household, and occupational pollution, thermal inversion, and smog formation?	x		Not applicable
27. Water depletion and/or degradation?		x	Not applicable
28. Overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		x	Not applicable
29. Contamination of surface and ground waters due to improper waste disposal?		x	Construction waste disposal will be part of the EMP.
30. Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		x	Not applicable
31. Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		x	As only rehabilitation of existing roads will be done, a large number of construction workers will not be necessary. The local labor available will suffice.

Screening Questions	Yes	No	Remarks
32. Social conflicts if workers from other regions or countries are hired?		x	As only rehabilitation of existing roads will be done, a large number of construction workers will not be necessary. The local labor available will suffice.
33. 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?		x	Transport, storage, and use of fuel will be part of the EMP.
34. 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?	x		The EMP will include mitigation measures related to occupational health and safety.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
35. Is the project area subject to hazards such as earthquakes, floods, storm surges, tsunami, or volcanic eruptions and climate changes (see Appendix I)?	x		The project area is prone to annual floods, and the drainage and road subproject will remedy the existing problems.
36. Could changes in temperature, precipitation, or extreme events patterns over the project lifespan affect technical or financial sustainability (e.g., increased extreme rainfall increases flooding, damaging proposed infrastructure)?		x	The design of the road drainage system will consider the worst flooding scenario.
37. Are there any demographic or socioeconomic aspects of the project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		x	Not applicable
38. Could the project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by paving vulnerable groundwater recharge areas, or using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		x	Not applicable

SAMPLE OUTLINE SPOILS MANAGEMENT PLAN

I. Spoils information

   A. Materials type
   B. Potential contamination
   C. Expected volume and sources
   D. Spoil classification

II. Spoils management

   A. Transportation of spoil
   B. Storage of spoil
   C. Contaminated spoil
   D. Approved reuse and/or disposal sites

III. Records of reuse and/or disposal

SAMPLE OUTLINE TRAFFIC MANAGEMENT PLAN

A. Principles

1. 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 traveling 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; and

(v) addressing issues that may delay the project.

B. Operating Policies for TMP

2. 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.

1. **Figure A2 to Figure A12**illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

3. 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 ULB/CMC/Public Works Department (PWD) to use the local streets as detours;

(ii) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;

(iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;

(iv) determining if additional traffic control or temporary improvements are needed along the detour route;

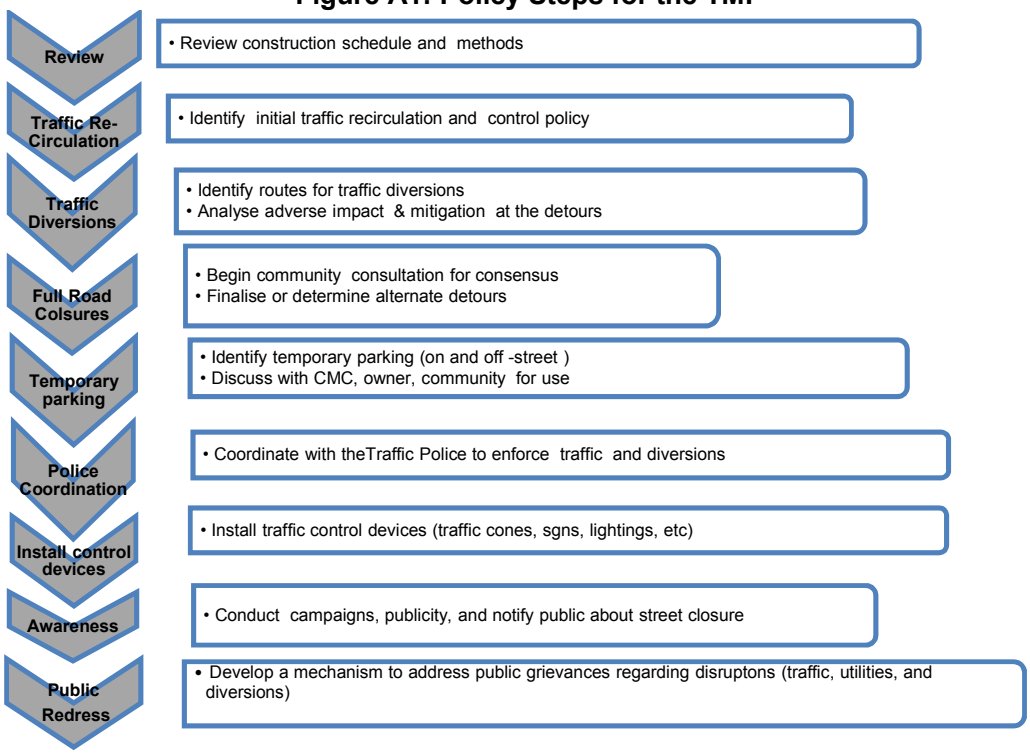
(v) considering how access will be provided to the worksite;

(vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and

(vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

4. 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

5. 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.

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The

reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

7. The PIU 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 behaviour along the work zones; and
(iii) reduced speeds enforced at the work zones and traffic diversions.

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

9. 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 PIU, 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 behaviour 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. Install traffic control devices at the work zones and traffic diversion routes

10. 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

11. 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”).

12. **Figure A2 to Figure A12** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Lane closure on a two-line road with low volume (with yield sign)
- Lane closure on a two-line road with low volume (one flagger operation)
- Lane closure on a two lane road (two flagger operation)
- Lane closure on a four lane undivided Road
- Lane closure on divided roadway
- Half road closure on multi-lane roadway
- Street closure with detour

13. 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.

14. 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.

15. 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.

Figure A2&A3: Work on shoulder or parking lane and shoulder or parking lane closed on divided road

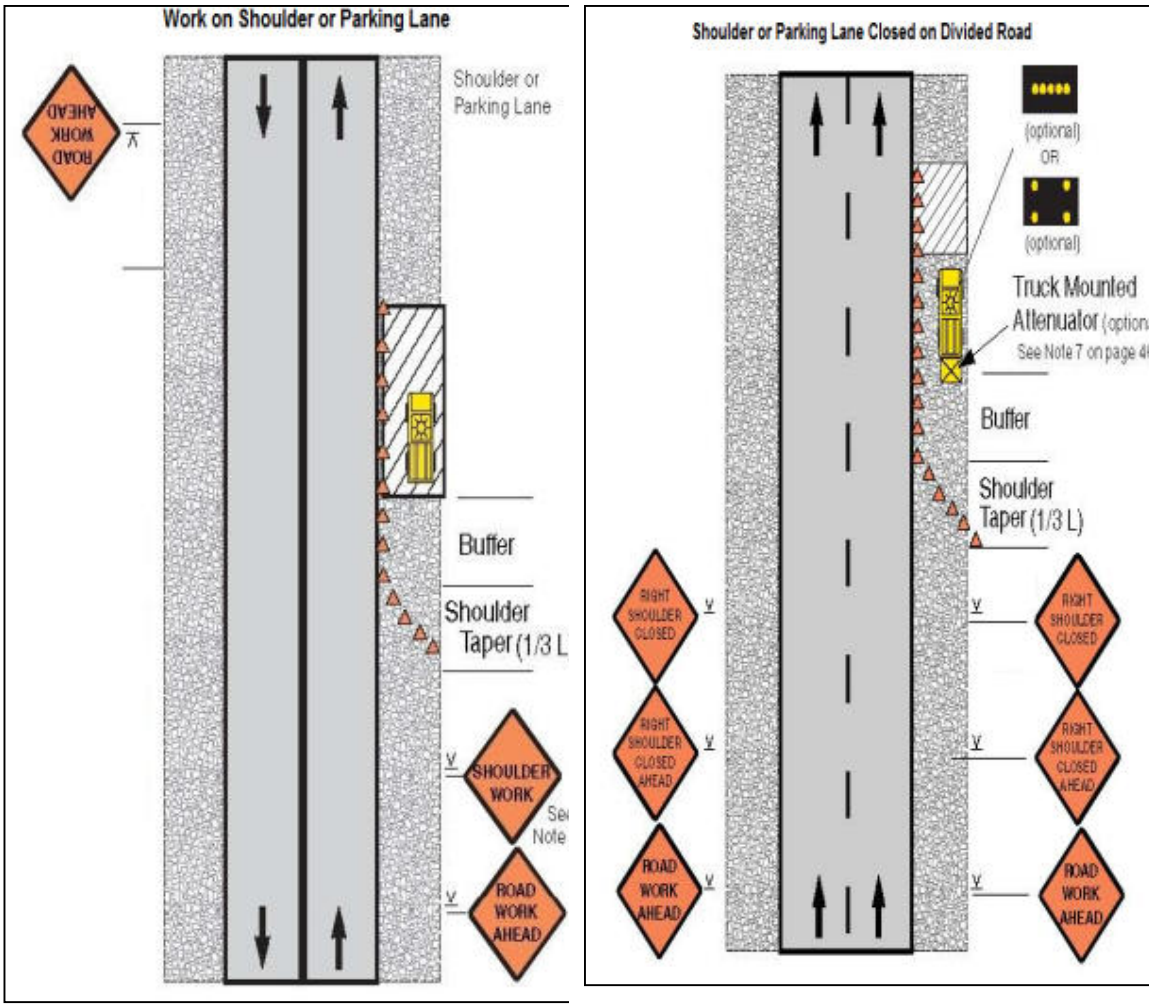


Figure A4&A5: Work in Travel lane & Lane closure on road with low volume

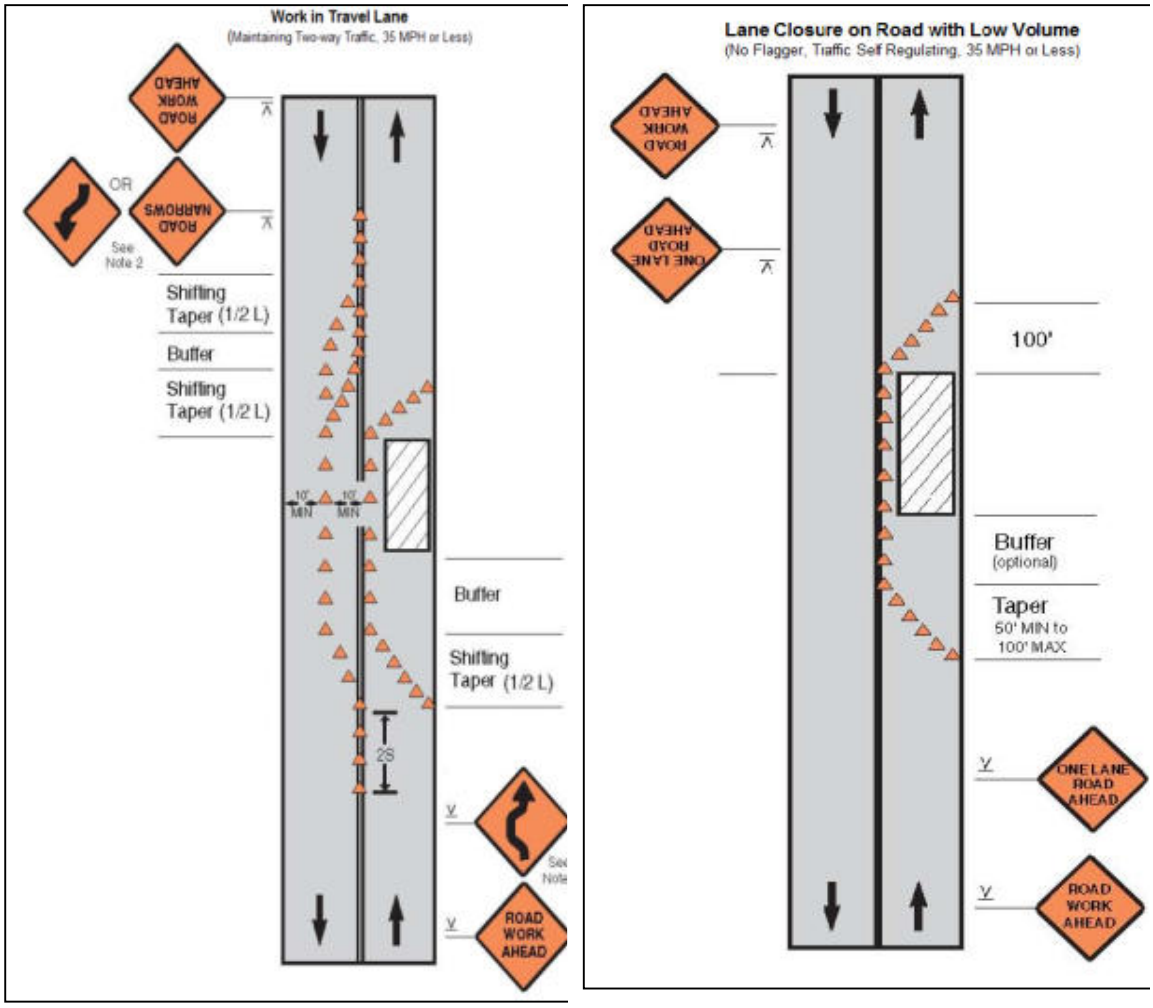


Figure A6&A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)

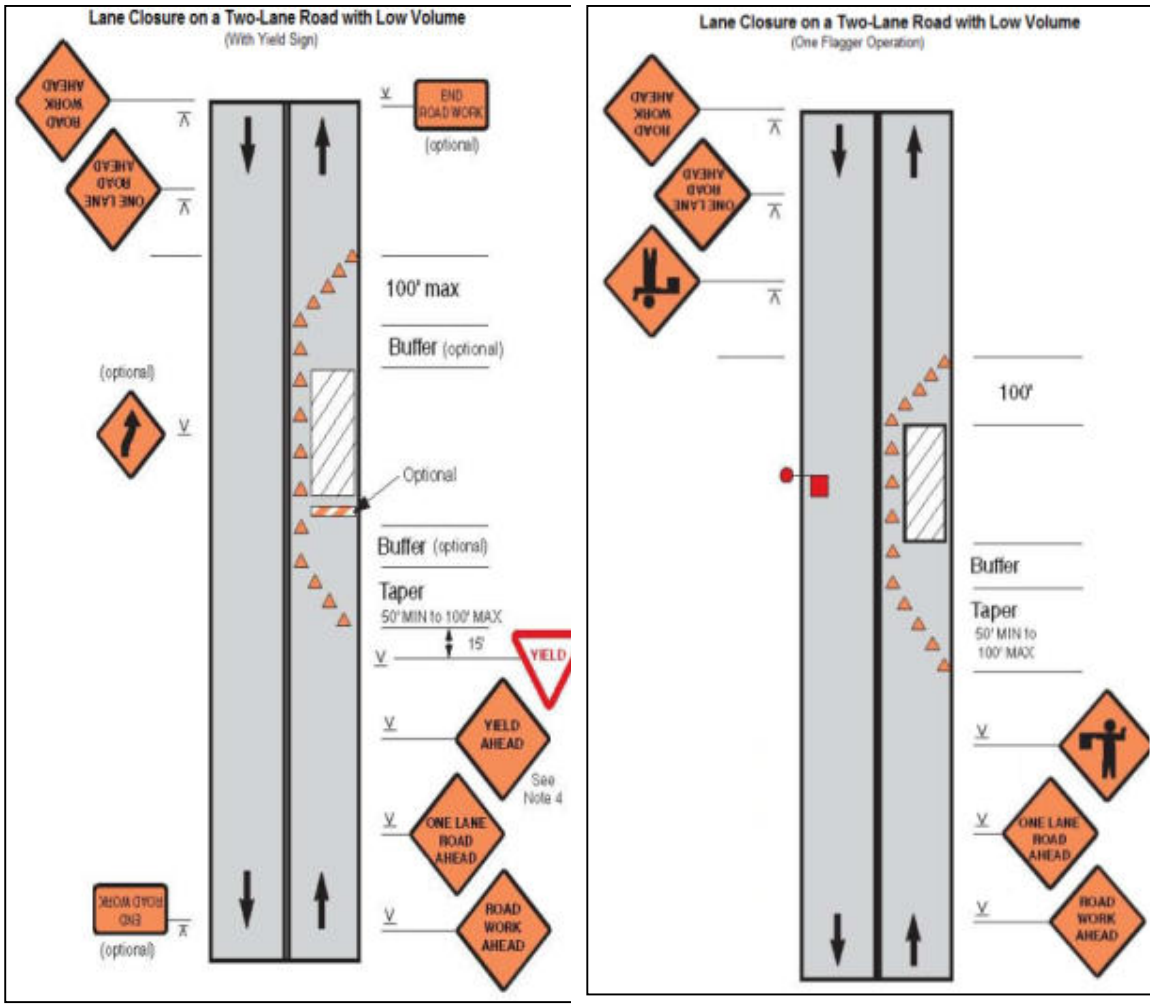


Figure A8&A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

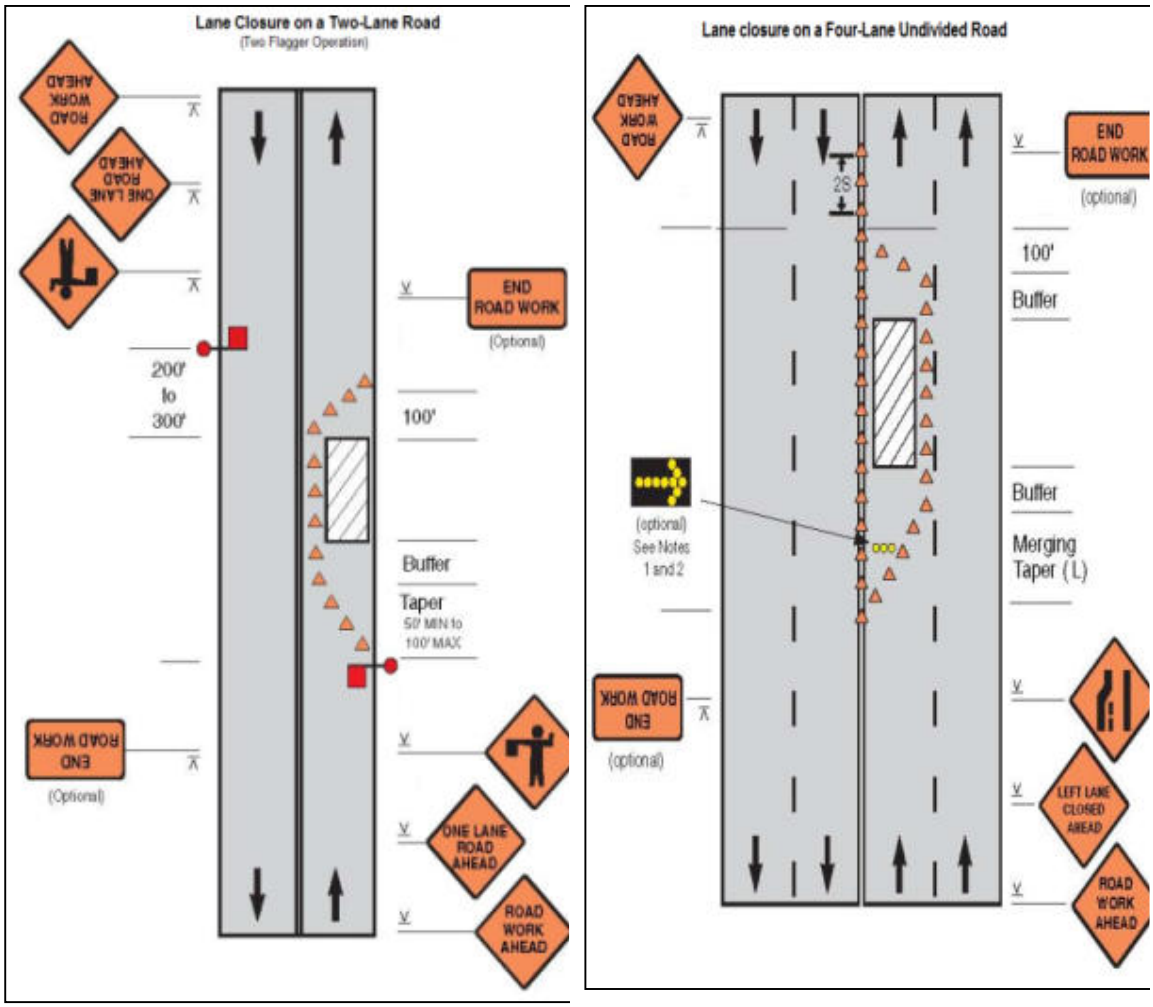


Figure A10&A11: Lane Closure nn Divided Roadway & Half Road Closure On Multi-Lane Roadway

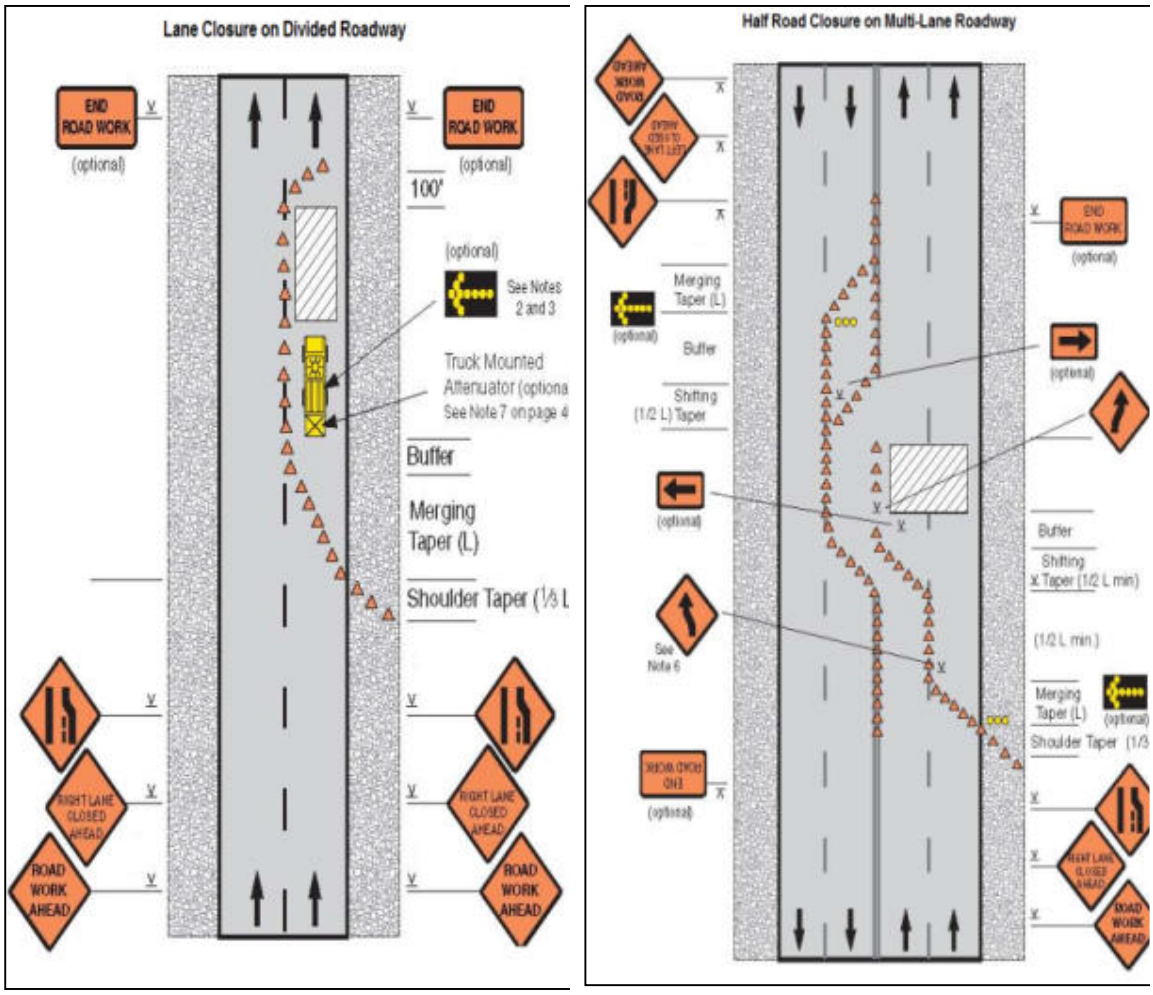
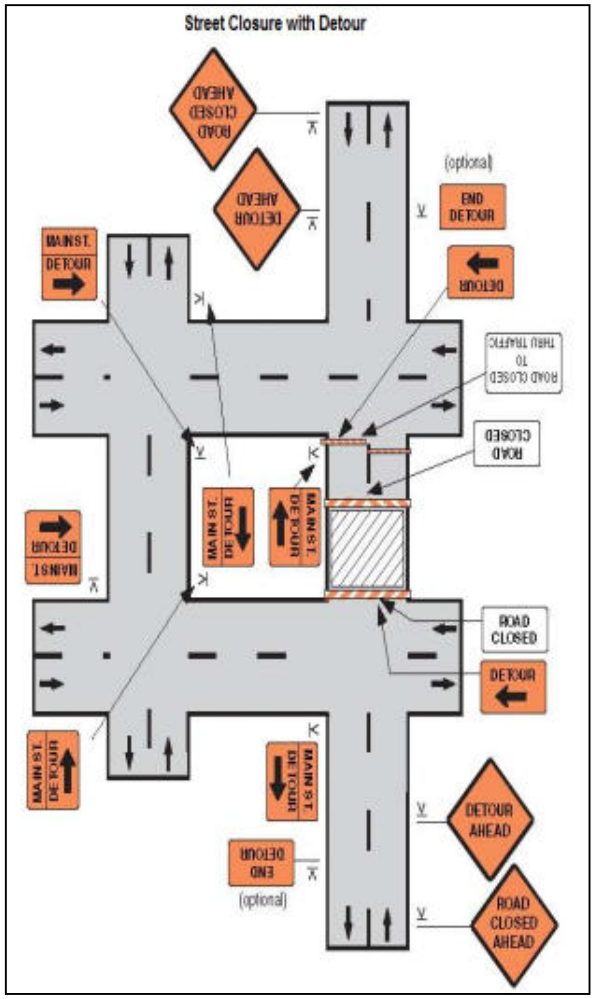


Figure A12: Street closure with detour



NATIONAL AMBIENT AIR QUALITY STANDARDS FOR NEPAL

Parameters	Units	Averaging Time	Concentration in Ambient Air, maximum	Test Methods
TSP (Total Suspended Particulates)	$\mu g/m^3$	Annual	-	
		24 hours*	230	High volume sampling
PM_{10}	$\mu g/m^3$	Annual	-	
		24 hours*	120	Low volume sampling
Sulfur dioxide	$\mu g/m^3$	Annual	50	Diffusive sampling based on weekly averages
		24 hours**	70	
Nitrogen dioxide	$\mu g/m^3$	Annual	40	Diffusive sampling based on weekly averages
		24hours**	80	
Carbon monoxide	$\mu g/m^3$	8 hours**	10,000	
		15 minutes	100,000	Indicative samplers ***
Lead	$\mu g/m^3$	Annual	0.5	Atomic Absorption Spectrometry, analysis of PM_{10} samples****
		24 hours	-	
Benzene	$\mu g/m^3$	Annual	20	Diffusive sampling based on weekly averages
		24 hours	-	

***Note:** 24-hour values shall be met 95% of the time in a year. For 18 days per calendar year, the standard may be exceeded, but not on 2 consecutive days.

****Note:** 24-hour standards for NO_2 and SO_2 and 8-hour standard for CO are not to be controlled before MOPE has recommended appropriate test methodologies.

*****Note:** Control by spot sampling at roadside locations: minimum one sample per week taken over 15 minutes during peak traffic hours, i.e. in the periods of 8 a.m.–10 a.m. or 3 p.m.–6 p.m. on a workday.

******Note:** If representativeness can be proven, yearly averages can be calculated from PM10 samples from selected weekdays from each month of the year.

RECOMMENDED NOISE EXPOSURE LIMITS FOR THE WORK ENVIRONMENT— ADOPTED FROM OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

S.No.	Noise Exposure (dB)	Permissible Exposure (Hours and Minutes)
1.	85	16 hours
2.	87	12 hours –18 minutes
3.	90	8 hours
4.	93	5 hours – 18 minutes
5.	96	3 hours – 30 minutes
6.	99	2 hours – 18 minutes
7.	102	1 hour – 30 minutes
8.	105	1 hour
9.	108	40 minutes
10.	111	26 minutes
11.	114	17 minutes
12.	115	15 minutes
13.	118	10 minutes
14.	121	6.6 minutes
15.	124	4 minutes
16.	127	3 minutes
17.	130	1 minute

Source: Marsh, 1991

Recommended Average Equivalent Sound Levels for Protecting the Public Health and Welfare

S.No.	Land Use	Measure	To Protect Against Activity Interference and Hearing Loss Effects (dB)
18.	Residential including farm residences	Leq (24)	55
19.	Commercial	Leq (24)	70
20.	Hospitals	Leq (24)	55
21.	Industrial	Leq (24)	70
22.	Educational	Leq (24)	55
23.	Recreational areas	Leq (24)	70
24.	Farmland and general unpopulated land	Leq (24)	70

Source: U.S. Environmental Protection Agency, 1974
Note: Leq (24) = Equivalent sound level in decibels for 24 hours

NEPAL VEHICLE MASS EMISSION STANDARD, 2056 (1999)

1. Vehicles Fueled with Gasoline (Positive Ignition Engines)

1. For passenger cars with upto six seats and gross vehicle weight (GVW) less than 2.5tons

1.1 Type 1 Test–Verifying exhausts emissions after a cold start

	Grams per km	
	Carbon monoxide (CO)	Hydrocarbons plus oxides Of Nitrogen (HC+NOx)
Type approval*	2.72	0.97
Conformity of production**	3.16	1.13

Note: The test shall be as per the driving cycle adopted by different countries, with cold start on chassis dynamometer.

1.2 Type II Test–Carbonmonoxide emission at idling speed

This test applies to vehicles fuelled with leaded gasoline only.

The carbonmonoxide content by volume of exhaust gases emitted with engines idling must not exceed 3.5% at the settings used for the Type I test.

1.3 Type III Test–Verifying emissions of crank case gases

The crank case ventilation system must not permit the emission of any of the crank case gases into the atmosphere.

1.4 Type IV Test–Determination evaporative emission

This test applies to all vehicles fuelled with leaded and unleaded gasoline. Evaporative emissions shall be less than 2g/test.

1.5 Type V Test–Durability of pollution control devices

This test applies to vehicles fuelled with unleaded gasoline only.

The test represents an endurance test of 80,000km driven on the road or on a chassis dynamometer.

Not with standing the above requirements, a manufacturer may choose to use the deterioration factors from the following table:

Deterioration Factor	
CO	HC+NOx
1.2	1

2. Forlight-duty commercial vehicles with gross vehicle weight (GVW) less than or equal to 3.5tons.

2.1 Type 1 Test–Verifying exhausts emissions after a cold start

Reference mass		Grams per km	
(kg)		Carbon monoxide(CO)	Hydrocarbons plus oxides Of nitrogen(HC+NOx)
RM<1250	Type approval	2.72	0.97
	Conformity of production	3.16	1.13
1250<RM<1700	Type approval	5.17	1.4
	Conformity of production	6.0	1.6
RM>1700	Type approval	6.9	1.7
	Conformity of production	8.0	2.0

Note: The test shall be as per the driving cycle adopted by different countries, with cold start on chassis dynamometer. Reference mass means the “unladen mass” (mass of the vehicle in running order without crew, passengers, or load, but with the fuel tank full and the usual set of tools and spare wheel on board, when applicable) of the vehicle increased by a uniform figure of 100kg. Includes passenger vehicles with seating capacity more than six persons or reference mass more than 2,500kg.

2.2 Type II Test–Carbonmonoxide emission at idling speed

This test applies to vehicles fuelled with leaded gasoline only.

The carbonmonoxide content by volume of the exhaust gases emitted with engines idling must not exceed 3.5% at the settings used for the Type I test.

2.3 Type III Test–Verifying emissions of crank case gases

The crank case ventilation system must not permit the emission of any of the crank case gases

into the atmosphere.

2.4 Type IV Test–Determination of evaporative emission

This test applies to all vehicles fuelled with leaded and unleaded gasoline. Evaporative emissions shall be less that 2g/test.

2.5 Type V Test–Durability of pollution control devices

This test applies to Vehicles fuelled with both leaded and unleaded gasoline.

The test represents an endurance test of 80,000km driven on the road or on a chassis dynamometer.

Not with standing the above requirements, a manufacturer may choose to use the deterioration factors from the following table:

Deterioration	
CO	HC+NOx

3. For two-wheelers and three-wheelers

3.1 Type I Test–Verifying exhaust emissions after a cold start

	CO(grams/km)		HC+NOx (grams/kilometer)	
	2-wheeler	3-wheeler	2-wheeler	3-wheeler
Type approval	2.0	4.0	2.0	2.0
Conformity of	2.4	4.8	2.4	2.4
production				

Note: The test shall be as per the driving cycle adopted by different countries, with cold start on chassis dynamometer.

3.2 Type II Test–Carbonmonoxide emission at idling speed

This test applies to vehicles fuelled with leaded gasoline only.

The carbonmonoxide content by volume of the exhaust gases emitted with engines idling must not exceed 3.5% at the settings used for the Type I test.

3.3 Type III Test–Verifying emissions of crank case gases

The crank as eventilation system must not permit the emission of any of the crank case gases into the atmosphere.

Not applicable for two-wheelers.

3.4 Type I V Test–Determination of evaporative emission

This test applies to vehicles fuelled with leaded and unleaded gasoline. Evaporative emissions shall be less than 2g/test.

Not applicable for two wheelers

3.5 Type V Test–Durability of pollution control devices

This test applies to vehicles fuelled with unleaded gasoline only.

The test represents an endurance test of 80,000km driven on the road or on a chassis dynamometer.

Not with standing the above requirements, a manufacturer may choose to use the deterioration factors from the following table:

Deterioration Factors	
CO	*HC+NOx*
1.2	*1.2*

Note: Incase of two-wheelers, this test is only applicable if fitted with antipollution devices.

B. Vehicles Fueled with Diesel (Compression Ignition Engines)

1. For passenger cars with upto six seats and gross vehicle weight (GVW) less than 2.5tons

1.1 Type 1 Test–Verifying exhaust emissions after a cold start

		Grams per km	
	CO	HC+ NOx	PM(Particulate Matter)
Type approval	2.72	0.97	0.14
Conformity of production	3.16	1.13	0.18

Note: The test shall be as per the driving cycle adopted by different

countries, with cold start on chassis dynamometer.

1.2 Type II Test–Carbonmonoxide emission at idling speed

Not applicable

1.3 Type III Test–Verifying emissions of crank case gases

Not applicable

1.4 TypeI V Test–Determination of evaporative emission

Not applicable

1.5 Type V Test–Durability of pollution control devices

The test represents an endurance test of 80,000km driven on the road or on a chassis dynamometer.

Not with standing the above requirements, a manufacturer may choose to use the deterioration factors from the following table:

Deterioration Factors		
CO	HC+NOx	PM
1.1	1.0	1.2

2. Forlight-duty commercial vehicles with gross vehicle weight (GVW) less than or equal to 3.5tons.

2.1 Type1Test–Verifying exhausts emissions after a cold start

Reference mass		Grams per km	
(kg)		Carbon monoxide(CO)	Hydrocarbons plus oxides of nitrogen (HC+NOx)
RM<1250	Type approval	2.72	0.97
	Conformity of	3.16	1.13
	production		

1250<RM<1700	Type approval	5.17	1.4
	Conformity of	6.0	1.6
	production		
RM>1700	Type approval	6.9	1.7
	Conformity of	8.0	2.0
	production		

Note: The test shall be as per the driving cycle adopted by different countries, with cold start on chassis Dynamometer.

Reference mass means the “unladen mass” (mass of the vehicle in running order without crew, passengers, or load, but with the fuel tank full and the usual set of tools and spare wheel on board, when applicable) of the vehicle increased by a uniform figure of 100kg. includes passenger vehicles with seating capacity of more than six persons or reference mass more than 2500kg.

2.2 Type II Test–Carbonmonoxide emission at idling speed

Not applicable

2.3 Type III Test–Verifying emissions of crank case gases

Not applicable

2.4 Type IV Test-determination of evaporative emission

Not applicable

2.5 Type V Test–Durability of pollution control devices

The test represents an endurance test of manufacturer, who may choose to use the deterioration from the following table:

Deterioration Factors		
CO	HC+NOx	PM
1.1	1.0	1.2

3. For heavy-duty vehicles and vehicles with gross vehicle weight (GVW) more than 3.5tons

3.1 Type I Test–Verifying exhausts emissions after a cold start

Pollutants	Type approval	Conformity of production
CO (grams per KWH)	4.5	4.9
HC (grams per KWH)	1.10	1.23
NOx (grams per KWH)	8.0	9.0
PM (grams per KWH) for engines with power less than 85KW	0.61	0.68
PM(grams per KWH) for Engines with power more than 85KW	0.36	0.40

Note: The test shall be as per the test driving cycle adopted by different countries with 13 mode emissions engines dynamometer test.

3.2 Type II Test–Carbonmonoxide emission at idling speed

Not applicable

3.3 Type III Test–Verifying emissions of crank case gases

Not applicable

3.4 TypeI V Test–Determination of evaporative emission

Not applicable

3.5 Type V Test–Durability of pollution control devices

Not applicable

Note:

* Please see the explanatory note

** Please see the explanatory note

 As mentioned by the decision of HMG/N of 2056.12.02

 As added by the decision of the HMG/N of 2056.12.02

(Author query: Kindly check font formatting. Should be Arial, 11 pt.)

Explanatory Notes

1. Type approval: Most countries require some form of certification or type approval by the vehicle manufacturer to demonstrate that each new vehicles old is capable of meeting applicable emission standards. Usually, type approval requires emission testing of prototype vehicles representative of planned production vehicles. Under ECE and Japanese regulations, such compliance is required only for new vehicles. U.S. regulations require that vehicles comply with emission standards throughout their use fullives when maintained according to the manufacturing specifications.

The advantage of a certification or type approval program is that it can influence vehicle design prior to mass production. It is more cost-effective because the manufacturers identify and correct the problems before production actually begins.

2. Approval of a vehicle: Vehicle manufacturers apply for approval of a vehicle type with regard to exhaust emissions, evaporative emissions, and durability of pollution control devices to the authority responsible for conducting the tests. The application for approval also includes details like description of engine type comprising all the particulars, drawings of the combustion chamber and of the piston, descriptions of pollution control devices, etc. If the vehicle type submitted for approval meets the requirements of various types of tests mentioned, only then is the approval of that vehicle granted.

3. Conformity of production: The conformity of production is an assembly line testing system. The objectives of assembly line testing are to enable regulatory authorities to identify certified production vehicles that do not comply with applicable emission standards, to take remedial actions (such as revoking certification and recalling vehicles) to correct the problem, and to discourage the manufacture of non-complying vehicles. This test provides an additional check on mass-produced vehicles to assure that the designs found adequate in certification are satisfactorily translated into production, and that quality control on the assembly line is sufficient to provide reasonable assurance that vehicles in use meet standards. The basic difference between TA and COP is that TA is based on proto type vehicle or design of the vehicle, while COP measures emissions from real production vehicles.

4. As per the requirements set forth by the European Union, a sufficient number of random checks are made of serially manufactured vehicles bearing the type approval mark of vehicles bearing all the types of tests mentioned above. The tolerance limits are provided for conformity of production in Type I test.

Source: GoN, Ministry of Science, Technology and Environment

RECOMMENDED STANDARDS FOR VIBRATION FROM CONSTRUCTION SITES

Type of Restriction	**Area Classified**	
Standard value	I and II	85 dB
Work prohibited time	I	7 p.m.–7 a.m.
	II	10.00 P.M. - 6.00 A.M.
Maximum working duration	I	10 hours per day
	II	14 hours per day
Maximum consecutive working days	I and II	6 days
Working prohibited days	I and II	Saturdays and holidays

Source: Vibration Regulation Law 64 of 1976, Japan

Notes:

1. Area I stands for areas to which one of the following descriptions applies:
2. areas where maintenance of peace and quiet is particularly needed to preserve the residential environment
3. areas which require maintenance of peace and quiet since they are needed for residential purposes
4. areas for commercial and industrial as well as residential purposes which need measures to prevent vibration pollution
5. the neighborhood of schools, hospitals, and the like
6. Area II stands for areas where there is a need to preserve the living environment of inhabitants, other than Area I.
7. Vibration level shall be measured at the boundary line of the specified construction work site.

Recommended Limits for Road Traffic Vibration

Area	**Daytime**	**Night time**	**Applicable areas**
I	65 dB	60 dB	Areas where maintenance of quiet is particularly needed to preserve a good living environment, and where quiet is called for us as they are used for residential purpose.
II	70 dB	65 dB	Areas for commercial and industrial as well as residential purposes, where there is a need to preserve the living environment of local inhabitants, and areas mainly serving industrial proposes which are in need of measures to prevent the living environment of local residents from deteriorating.

Source: Vibration Regulation Law 64 of 1976, Japan

Note: Vibration level shall be measured at the boundary line of the road.

SAMPLE GRIEVANCE REGISTRATION FORM

(To be available in Nepali 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 to 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 included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
Mode of communication: Note/letter E-mail Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	

SAMPLE SEMIANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

I. INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number	Roles
1. PMU				
2. PIUs				
3. Consultants				

- Overall project and subproject progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components /List of Works	Contract Status (specify if under bidding or contract awarded)	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M)[1]	If On-going Construction	
				%Physical Progress	Expected Completion Date

[1]If on-going construction, include %physical progress and expected date of completion.

II. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS[2]

Package No.	Subproject Name	Statutory Environmental Requirements[3]	Status of Compliance[4]	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish[5]

III. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

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

IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT PLAN (REFER TO EMP TABLES IN APPROVED IEE/S)

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-wise IEE Documentation Status

Package Number	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
	Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

[2] All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

[3] Specify (environmental clearance? Permit/consent to establish? Forest clearance?Etc.)

[4] Specify if obtained, submitted and awaiting approval, application not yet submitted

[5] Example: Environmental Clearance requires ambient air quality monitoring; and Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

Package-wise Contractor/s' Nodal Persons for Environmental Safeguards

Package Name	Contractor	Nodal Person	Email Address	Contact Number

- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

Summary of Environmental Monitoring Activities (for the Reporting Period)[6]

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						

[6] Attach Laboratory Results and Sampling Map/Locations.

Overall Compliance with CEMP/ EMP

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

V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

- Briefly describe the approach and methodology used for environmental monitoring of each subproject.

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

- Discuss the general condition of surroundings at the project site, with consideration of the following, whichever are applicable:

(i) Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s;
(ii) Identify if muddy water is escaping site boundaries or if muddy tracks are seen on adjacent roads.
(iii) Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these are intact following heavy rain.
(iv) Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area in the Appendix.
(v) Confirm spill kits on site and site procedure for handling emergencies.
(vi) Identify any chemical stored on site and provide information on storage condition. Attach photograph.
(vii) Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
(viii) Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
(ix) Provide information on barricades, signages, and on-site boards. Provide photographs in the Appendix.
(x) Indicate if there are any activities being under taken out of working hours and how that is being managed.

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

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

Air Quality Results

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

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

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

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

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Monitoring Results)	
			Day Time	Night Time

VII. GRIEVANCE REDRESS MECHANISM

- Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

VIII. COMPLAINTS RECEIVED DURING THE REPORTING PERIOD

- Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

IX. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

X. APPENDIXES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- all supporting documents including **signed** monthly environmental site inspection reports prepared by consultants and/or contractors
- Others

ANNEX- 11:
STAKEHOLDER CONSULTATION / FOCUS GROUP MEETINGS

The Project Implementation Unit (PIU)-Nepalgunj held consultations on the IEE with five wards of the municipality through 3 meetings. The participants in each meeting included political party representatives, local elite, civil society representatives, and ward residents.

The PIU explained the project scope, expected impacts, and proposed mitigation measures. An English translation of a summary of the main issues raised by participants of the three meetings is provided below.

- Meeting No. 1 – The meeting was held on 7 May 2017 with Ward 2 and Ward 12. The participants concluded that there would be some impact during the construction phase and requested PIU to ensure adequate mitigation measures are implemented. The participants requested PIU to ensure that the drains are covered and that greenery is planted along the main roads.
- Meeting No. 2 – The meeting was held in Ward 4. The participants requested PIU to ensure adequate mitigation measures are implemented. The participants requested PIU to ensure that the drains are covered and that greenery is planted along the main roads. They also requested improvement to the water supply system, which is outside the scope of the project.
- Meeting No. 3 - The meeting was held with Ward No. 9 and 11. The participants requested PIU to ensure that the drains are covered and that greenery is planted along the main roads. They also requested for the project to construct bus stops.