



**ANNEX I TOR APPROVAL LETTER AND APPROVED
TOR FOR IEE STUDY**



Annexure for IEE study of Gorusinghe-Chandrauta Road section



नेपाल सरकार

भौतिक पूर्वाधार तथा यातायात मन्त्रालय

(वातावरण तथा सामाजिक शाखा)

प.सं.: ०८०/८१/२३

च.न. ४३

मिति:-२०८१/०४/२३

श्री सडक विभाग
बबरमहल, काठमाण्डौ ।

विषय :- प्रारम्भिक वातावरणीय परीक्षण (IEE) को कार्यसूची (TOR) स्वीकृत भएको सम्बन्धमा।

प्रस्तुत विषयमा श्री सडक विभाग, विकास सहायता कार्यान्वयन महाशाखा प्रस्तावक रहेको लुम्बिनी प्रदेश, कपिलवस्तु जिल्लाको गोरुसिंगे-चन्द्रौटा (१९ कि. मि.) सडक खण्ड स्तरोन्नतीको लागि प्रारम्भिक वातावरणीय परीक्षणको (IEE) को कार्यसूचीमा उल्लेख गरिएका असर तथा प्रभावहरूका अलावा प्रतिवेदन तयारीका समयमा अन्य असर तथा प्रभावहरू देखा परेमा सो पनि समावेश गर्नुपर्ने शर्तमा उक्त आयोजनाको प्रारम्भिक वातावरणीय परीक्षणको कार्यसूची यस मन्त्रालयको (सचिवस्तर) मिति २०८१/०४/२१ को निर्णयानुसार स्वीकृत भएको व्यहोरा अनुरोध छ।

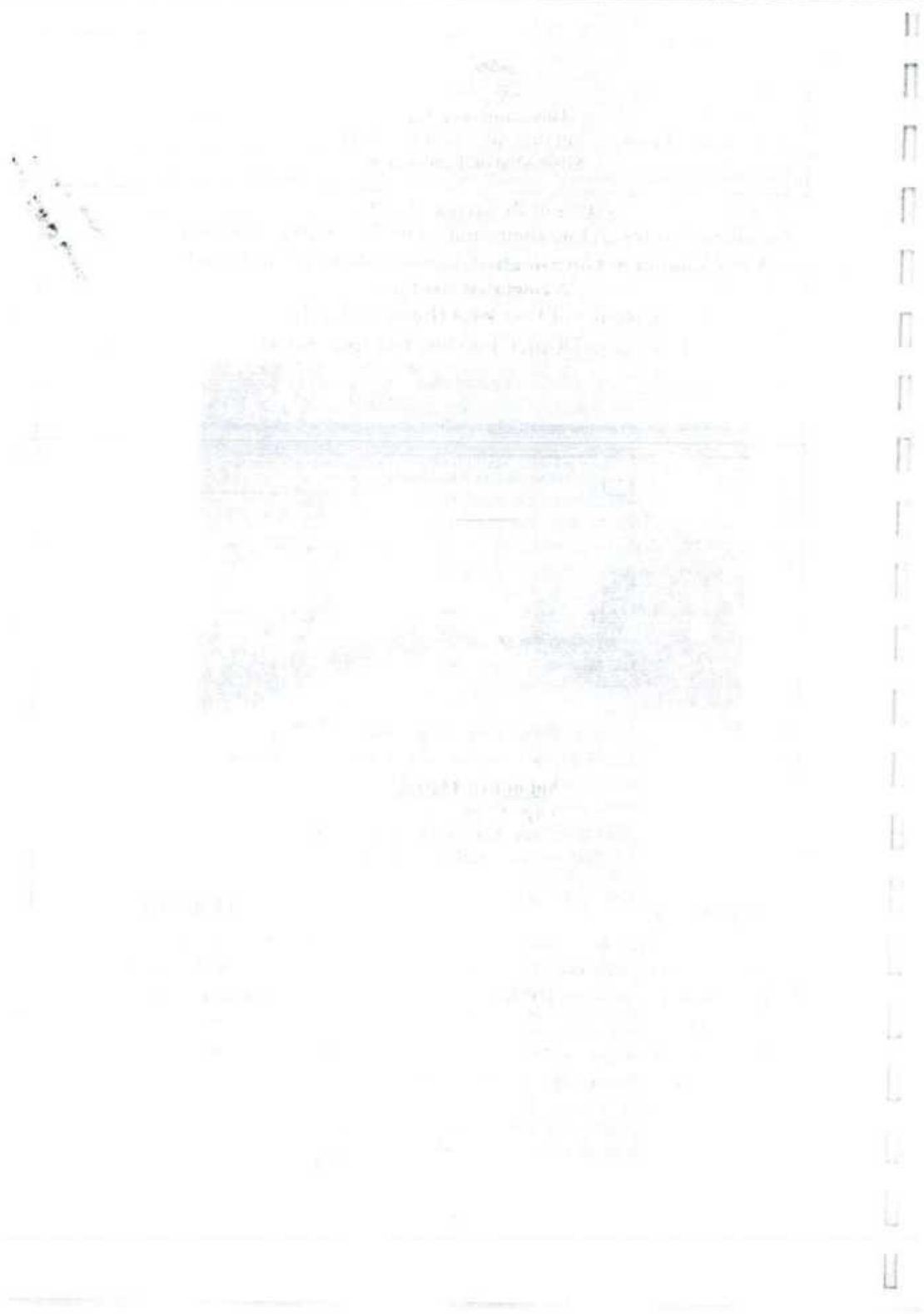

(शुभा श्रेष्ठ)
वरिष्ठ समाजशास्त्री



Annexure for IEE study of Gorusinghe-Chandrauta Road section

	Government of Nepal Ministry of Physical Infrastructures and Transport Singhadurbar, Kathmandu		
	Terms of Reference (ToR) for Preparation of Initial Environmental Examination (IEE) Report for Upgradation of Gorusinghe-Chanauta Road (19 Km) and Associated Bridges A section of East West Highway (EWH) Kapilvastu District, Lumbini Province, Nepal		
	Submitted Through: Department of Roads Geo-Environment and Social Unit (GESU) Babarmahal, Kathmandu, Nepal		
	<table border="1"> <tr> <td data-bbox="414 1355 829 1624"> Submitted by: Department of Roads Development Cooperation Implementation Division, (DCID) Project Directorate, Babarmahal, Kathmandu, Nepal Email: dorfcg@dor.gov.np </td> <td data-bbox="829 1355 1327 1624"> Submitted to: Ministry of Physical Infrastructure and Transport Singhadurbar, Kathmandu, Nepal Contact: 01-4211732 Email: info@mopit.gov.np </td> </tr> </table>	Submitted by: Department of Roads Development Cooperation Implementation Division, (DCID) Project Directorate, Babarmahal, Kathmandu, Nepal Email: dorfcg@dor.gov.np	Submitted to: Ministry of Physical Infrastructure and Transport Singhadurbar, Kathmandu, Nepal Contact: 01-4211732 Email: info@mopit.gov.np
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Annexure for IEE study of Gorusinghe-Chandrauta Road section





Annexure for IEE study of Goringhe-Chandrauta Road section

Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

Term of Reference (ToR)

ABBREVIATIONS AND ACRONYMS

°C	Degree Celsius
ACCESS	Accelerating Transport and Trade Connectivity in Eastern South Asia
BGC	Butwal Goringhe Chandrauta
CBS	Central Bureau of Statistics
CDC	Compensation Determination Committee
CFUG	Community Forest User Group
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPP	Community Participation Plan
DCID	Development Cooperation Implementation Division
DOR	Department of Road
DPR	Detailed Project Report
EIA	Environmental Impact Assessment
EPA	Environment Protection Act
EPR	Environment Protection Rules
ESMF	Environment and Social Management Framework
ESF	Environment and Social Framework
EWI	East West Highway
GBV	Gender Based Violence
GC	Goringhe Chandrauta
GoN	Government of Nepal
GPS	Global Positioning System
hr	Hour
IBA	Important Bird and Biodiversity Area
IDA	International Development Association
IEE	Initial Environmental Examination
IRC	Indian Road Congress
IUCN	International Union for Conservation of Nature
Km	Kilometer
Kmph	Kilometer Per Hour
LiDAR	Light Detection and Ranging
m	Meter
msl	Mean Sea Level
M/RM	Municipality/Rural Municipality
NAAQS	National Ambient Air Quality Standard
NTFPs	Non-Timber Forest Products
OFC	Optical Fiber Cable
PBMS	Performance Based Monitoring System
PSA	Poverty and Social Analysis
PUP	Pedestrian Underpass
RAP	Resettlement Action Plan
RoW	Right of Way





Annexure for IEE study of Goringhe-Chandrauta Road section

Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

Term of Reference (ToR)

SPF	Safeguard Policy Framework
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
viz	Namely
VUP	Vehicular Underpass
WB	World Bank





Annexure for IEE study of Gorusinghe-Chandrauta Road section

Term of Reference (ToR)
Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section

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Form of Reference (ToR)
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Term of Reference (ToR)
Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

1. NAME AND ADDRESS OF THE PROPONENT & ORGANIZATION RESPONSIBLE FOR CONDUCTING IEE

This term of reference (ToR) has been prepared to carry out Initial Environmental Examination (IEE) for upgrading the Goringhe-Chandrauta (19 Km) road section of East-West Highway (EWH) including the bridges. The name and address of the project proponent and the consultant conducting the IEE are as follows.

1.1 Project Proponent

Government of Nepal (GoN) has proposed to upgrade the Goringhe-Chandrauta section of the road to four lane standards from existing two lane in Kapilvasta Nepal. Development Cooperation Implementation Division, (DCID), Department of Roads (DoR) under the Ministry of Physical Infrastructure and Transport (MoPIT) is implementing agency or Project Proponent. Detail address of the proponent is given below;

Contact Details of Proponent

Department of Roads
Development Cooperation Implementation Division, (DCID)
Project Directorate,
Babarmahal, Kathmandu, Nepal
Phone No: 015903753.
Email: dorfeb@dor.gov.np

1.2 Project Consultant

LEA Associates South Asia Pvt. Ltd, India in association with Geocom International Pvt. Ltd. & Material Test Pvt. Ltd. Nepal has assigned to carry out the Initial Environmental Examination of the road section. The address of the consultant is:

Contact Address of Consultant

Joint venture of LEA, Geocom & Material Test (P)
Dhobighat, Lalitpur
Contact: 01-5153049
Email: accgeocom@gmail.com





Annexure for IEE study of Gorusinghe-Chandrauta Road section

Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section

Term of Reference (ToR)

2. INTRODUCTION OF THE PROPOSAL

2.1 General Introduction of the Proposal

Government of Nepal has approved proposal for upgrading the Gorusinghe-Chandrauta section of the EWH. It has proposed to be upgraded through mobilization of contractor for the road/ bridge construction as well as supervision consultant for construction supervision. The Government of Nepal under Accelerating Transport and Trade Connectivity in Eastern South Asia (ACCESS) – Nepal Phase I Project intends to hire consulting services for supervision of Butwal-Gorusinghe-Chandrauta road section (69 Km) as well as to conduct a detailed design of Gorusinghe-Chandrauta (19 Km) road improvement works including Environment and Social Study and technical design review of Butwal-Gorusinghe Road section. The road is 19 km in length and includes construction of road as well as the bridges and culverts in proposed section.

The Government of Nepal (GoN) is working towards accelerating the economic development of the country while redressing regional imbalances and inequalities. Recognizing that the access to road transport is key determinant of economic opportunity and delivery of social services. In this context, GoN has received funding from International Development Association (IDA)¹ for upgrading Gorusinghe-Chandrauta (19 Km) road section of EWH. The project road is part of Accelerating Transport and Trade Connectivity in Eastern South Asia (ACCESS) - Nepal Phase I Project located in the Western Part of Nepal in Kapilvastu District. These interventions pave the way toward equality, economic growth, job creation, higher incomes, and better living conditions. The proposed Road under ACCESS highway improvement project will upgrade 19 Km Road Section in Gorusinghe-Chandrauta, Kapilvastu. Improvement of road may have environmental impacts depending on the location, size and extent of the project. To address such impacts as well as inclusion of appropriate mitigation measures, an Initial Environmental Examination (IEE) study is required as per the requirement Environmental Protection Act (EPA), 2076 and Environmental Protection Rules (EPR), 2077 for the Government of Nepal.²



¹ The IDA is part of the World Bank, a multi-lateral institution, supporting a range of development activities, like primary education, health services, clean water and sanitation, agriculture, business climate improvements, infrastructure, and institutional reforms.

² in India



Term of Reference (ToR)
Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section

2.1.1 Relevancy of the Proposal

The proposal is a transportation service sector project for upgrading of existing road of the national highway from existing two-lane road to four lanes from Gorusinghe - Chandrauta for a total 19 Km. The proposed project will support capacity, quality, and safety improvements of the East-West Highway (EWH) in the proposed section. In the similar manner as per the DOR's EWH upgradation activity it will be further linked with Butwal-Gorusinghe Highway section of Asian Highway Standard.

2.1.2 Rationality of Conducting an IEE

During implementation of project, environmental assessment is required to increase beneficial impact and minimization adverse impact on environment. According to Environment Protection Act (EPA) 2076, and Environment Protection Rule (EPR), 2077 (addendum 2078); Schedule 2, Rule 3, transport sector E (8); Initial Environmental Examination (IEE) is required for upgrading of national highways or feeder roads of length 10-50 Km. As of Rule 7, Sub-rule 8 of the EPR 2077, this IEE report will be prepared in English language since the project is World Bank funded. A brief summary report including executive summary in Nepali language will also be prepared along with the IEE report as per the provision of same sub-rule.

2.1.3 Objectives of the IEE study

The objective of IEE is to describe the environmental condition of a project, including potential impact, formulation of mitigation measures, and preparation of institutional requirement and environmental monitoring. IEE also identifies and evaluates any significant negative impacts due to implementation of the project on physical, biological, socio-economic, cultural environment and their components. Other specific objectives are-

- To identify and prepare baseline condition of existing physical, biological, socio-economic and cultural environment of the project area.
- To identify, predict and evaluate the impacts of the project on physical, biological, socio-economic, cultural aspects of the environment for different project alternatives and select the best.
- To recommend appropriate and practical mitigation measures for significant adverse impacts and measures for augmentation of beneficial impacts for the selected alternatives.
- To make sure IEE is sufficient for implementation of the proposed road or not.





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Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section

- To inform decision makers on the outcome of implementation of the proposal.

2.1.4 Objectives of the ToR for IEE study

The ToR provides the necessary guidance for conducting IEE and help to make study comprehensive and up-to-date in accordance with the Environmental Protection Act, 2076, Environmental Protection Regulations, 2077 and World Bank's SPF document. This ToR will provide the necessary technical guidance and study blueprint for IEE. The main objectives of terms of reference (ToR) for IEE are as follows.

- Delineate the scope of works for IEE study.
- Identify the potential environmental and social issues that need further evaluation in terms of impact significance, mitigation actions, monitoring plan and overall environmental management during project development and operation.
- Clarify the responsibilities of different institutions involved in the project cycle.
- Systematizing the IEE working procedures in accordance with the EPA 2076 and EPR 2077.
- List out the sectorial policies and legislations to be incorporated in the IEE report and
- Frame the IEE in the stipulated timescale.

2.2 Project Description

2.2.1 Background

The project is extended from Gorusinghe to Umeri/Shivapur Chowk about 6 km west from Chandrauta (Junction of Krishnagar road). It connects western Nepal with the capital Kathmandu through the highway and air links (via the Gautam Buddha International Airport). The proposed section is located in Kapilvastu district of Lumbini Province. Project road start at Bridge Belwagurdawa Nadi at 640+200 (Major Bridge) having GPS 27°39'27.50" N, 82°59'47.15" E and extends 19 km westward that ends at Umeri/Shivapur Chowk at chainage 660+038 having GPS 27°41'24.59" N, 82°50'22.45" E. The chainage continues with the EWH starting from eastern border of Nepal i.e. Kakarvitta. It is connected with end part of the Butwal-Gorusinghe road upgradation project towards east where the construction work has recently been initiated. The location map of proposed road alignment is shown in the Figure 1.



Terms of Reference (ToR)
 Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

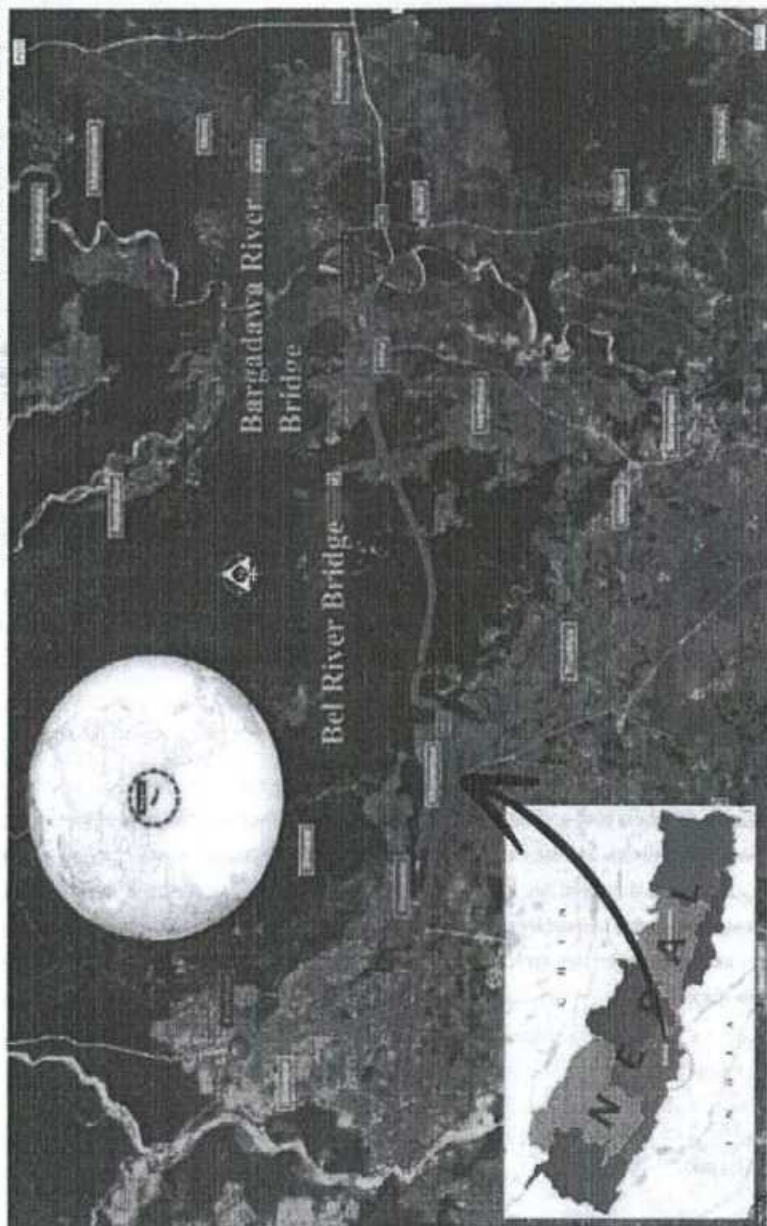


Figure 1: Google Earth map of project area

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Annexure for IEE study of Goringhe-Chandrauta Road section

Term of Reference (ToR)
Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

2.2.2 Salient Features

The project road is part of Accelerating Transport and Trade Connectivity in Eastern South Asia (ACCESS)-Nepal located in the Western Part of Nepal in Kapilvastu District. It starts from Belwagurdawa Nadi Bridge (CH 640+200) i.e., continuation of Butwal-Goringhe Section and ends at Umari/Shivpur Chowk, about 6 km west from Krishnagar chowk at Chandrauta. The project road passes through Buddhabumi and Shivpur municipality crossing through two major settlements viz Goringhe and Chandrauta via small built sections such as Imiliya, Champapur, Kharendrapur and Shivpur etc. The road section passes entirely through plain terrain (generally varies from 100-150 masl). This road section passes through the community forests and collaborative forest in the major part. At Chandrauta and urban area existing road is 15 m wide. All existing bridges in the section are of double lane configurations. In an average, the finished road level rises 0.5-1 m above the natural ground level, except at embankment for bridge approaches where it reaches above 6 meters. The existing RoW is 25 m each side (total of 50 m ROW) from central line. As such there will be no need to acquire additional land for the project except in case of improving of reverse curves. The pavement condition of most of the section of project corridor is not fully satisfactory. The project highway runs through flat terrain and the horizontal and vertical geometry for almost the entire length appears to be generally acceptable. However, at few major junctions and reverse curves and, it seemed to be deficient and needs improvement. It is estimated that the road upgradation cost will be 8 Arb, 46.68 crore Nepalese Rupee, having 44.56 crore rupee of per km construction cost.

Goringhe-Chandrauta road section do not pass through any of the protected areas of the country however, covers diverse habitat including settlements, farmlands, river crossing and forests. The project area lies within Terai Arc Landscape (TAL) and its eastern half section is lies within the Kapilvastu Important Bird and Biodiversity Area (IBA). The project site is an important reservoir for groundwater as there are several small wetlands and connected forest that facilitate for the wildlife dispersal.





Annexure for IEE study of Goringhe-Chandrauta Road section

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Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

2.2.2.1 Key Features of the Project and design considerations

The detail salient features of the proposed upgrading section of the road project are listed in table 1.

Table 1: Salient Features of the Project

Description	Features
Name of the project	Upgrading of Goringhe - Chandrauta road (19 Km) section of EWH to four lane standards.
Province	Lumbini
District	Kapilvastu
Affected municipality	Buddhabhumi Municipality and Shivraj Municipality
Geographical Location	
Geographical features	Terai
Geology	Plain/Rolling
Climate	Tropical/Sub-tropical
Altitude	100 m-150 m msl
Total length	19 km
Starting point	Belwagurdawa Nadi (CH 640+200) GPS: 27°39'27.50" N, 82°59'47.15" E
End point	Umari/Shivpur Chowk (CH 660+038) GPS: 27°41'24.59" N, 82°50'22.45" E
Road standard	National highway
Right of Way	25 m each side from central line (50 m RoW)
Existing Carriage way width, shoulder	Two-lane facility (7 m carriageway) without paved shoulders and earthen shoulders
Design speed	100 Km/h in plain terrain and 80 Km/h in rolling terrain
Design period for operation	20 years
Surface type	Bituminous
Type of work	Upgrading of the Road
Cross section (Annex 2)	
Carriageway width of structure	Rural and forest area - 24.0 m, Urban area- 50 m including Utility duct
Width of Parapet	0.350 m (Both Side)
Width of Footpath	1.0 m (Both Side)



Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section

Terms of Reference (ToR)

Description	Features
Cross Drainages (Culverts and bridges)	
Total bridge	4 Major bridges and 8 minor bridges, 1 VUP & 2 PLPs
Culverts	64 box culverts and 7 pipe culverts
Total width of cross drain structure	24 m for culverts 20 m for bridges
Earth Works (Cutting and Filling)	
Cutting quantity (m ³)	320,000
Filling quantity (m ³)	300,000
Structures (Masonry, RCC and RE walls)	
RCC Retaining wall (m ³)	16,674
RE Retaining wall (m ³)	26,590
Project Cost and Duration	
Estimated Grand total Project Cost	Nrs. 8,46,68,87,860.25
Cost Per Km	Nrs. 44,56,25,676.86
Project Duration	3 yrs construction and 5 years FBMS and 3 months post PBMS

Source: Design Report of GC Road Section 2024

2.2.2.2 Geometric Design

Regarding geometric design criteria, the Nepal Road Standards 2070 (2013) and other relevant standards will be considered while upgrading the road. Based on the standard to be followed, the following basic standards has proposed for the project road:

Table 2: Geometric design for project road

SN	Design Specification	Unit	Proposed Design Standards	
1	Terrain Classification		Plain and rolling	Mountainous and Steep
	Cross Slope of the Ground	%	Up to 25 Percent	More than 25 Percent
2	Design Speed	km/hr	Plain and Rolling Terrain	Mountainous and Steep Terrain
	Desirable		100	60
	Minimum		80	40
4	Carriageway Width	m	7 m	
5	Median Width	m	Plain and rolling for 4 lanes	
	Open Country with isolated Built-Up Area		2.5	
	Built up Area		1.63 Jersey crash barrier	

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SN	Design Specification	Unit	Proposed Design Standards	
	Approaches to Grade Separated Structures		2.5 m	
6	Paved Shoulder width	m	Plain/Rolling	
			2.5	
7	Camber	%		
	Carriageway (Flexible/Rigid)		2.5/2.0	
	Paved Shoulders (Flexible/Rigid)		2.5/2.0	
	Earthen Shoulders		3	
8	Gradients		Ruling	Limiting
	a) Plain and rolling	%	2.5	3.3
	b) Mountainous/Steep		5.0/6.0	6.0/7.0
9	Super elevation		5.0 when the Curve radius is more than desirable minimum	
	Maximum in normal situation	%	7.0 when the curve radius is less than desirable	
10	Minimum Horizontal Curve Radius (Plain and rolling) for 100 kmph	m		
	Desirable		400	
	Absolute		360	
11	Minimum Horizontal Curve Radius (Mountainous and Steep)	m		
	Desirable		80	
	Absolute		50	
12	Sight Distance		100 km /hr	80km / hr
	Stopping Sight Distance	m		
	Intermediate Sight Distance		180	130
	Overtaking Sight Distance		360	260
			640	470
13	Minimum Vertical Curve Length (SSD case)	m		
	Crest		73.6	
	Sag		41.5	
14	Minimum Vertical Curve Length (ISD case)	m		
	Crest		135	
	Sag		41.5	
15	Design Service Volume	PCUs/d	10000-40000	





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SN	Design Specification	Unit	Proposed Design Standards
16	For 4 Lane Road in Plain Terrain maintaining LOS B	day	
	Widening at curve locations	m	
	Up to 40 m		1.5
	41-60 m		1.2
	61-100 m		0.9
	101-300 m		0.6

Source: Design Report of GC Road Section 2024

The proposed plan view of the road for upgradation will be as presented in figure 2. There will be median of 3 m at the center which will be followed by 0.5 m Kerb shy each side. There will be 7 m dedicated formation either side for movement of vehicles in either side representing two lane each. In the similar manner there will be 2.5 m of paved shoulder either-sides and 0.5 m.

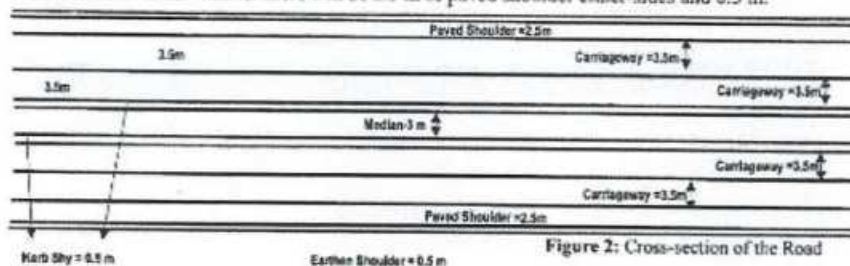


Figure 2: Cross-section of the Road

2.2.2.3 Pavement Design

Pavement has been designed to with stand the traffic volume and axle load for 20 years period. Adequate drainage will be provided below the pavement layers and sub-grade level. Pavement layers in general will consist of granular sub-base, crushed stone base and asphalt concrete. Capping layer of suitable material will also be provided in those areas, where deemed necessary. Pavement will be designed as per Pavement Design Guidelines (Flexible Pavement)-2014 (Second Edition 2021), published by Department of Roads, Overseas Road Note 31 published by Transport Research Laboratory of UK and IRC-37-2018 as well as suggestions of DoR. The bituminous surface pavement (Asphalt) will be designed to meet the expected traffic level and sub-grade strength. The design of the intersections for access to approach for other connecting roads will to be provided to ensure the safety of vehicles diverging from or merging into high-speed road. Intersection will be considered for major feeder roads, minor feeder roads, district roads. Road





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furniture will be provided in the form of road signs, crash barriers, road markings, delineators, foot paths, covered side drains. The pavement design for the project road will be carried out adopting various parameters. The parameters that can adopted considering provisions/stipulations made in NRS 2070 and IRC-37-2018 as well as suggestions of DoR. The following parameters has been proposed for the pavement design.

This project being WB funded project, it will be sensible for the safeguard issues. Hence the project will perform environmental assessment for the WB as well based on the SPF of the bank. Similarly, ESMF as well as Baseline Report of this project for WB will also be considered so that the IEE will also align with the WB report so that both the reports have consistency. Furthermore, other prepared documents like RAP as well as Poverty and Social Analysis report will be accessed for IEE especially in social aspect.

Table 3: Pavement design for the project

Proposed Pavement Type	Flexible Pavement
Design Period	20 years
Design Subgrade	Based on outcome of field survey
Axle Load Distribution	50%/50%
Vehicle for axle load consideration	All commercial vehicles
Design Codes	NRS 2070 IRC 37-2018 (verification by IIT Pave Software)

2.2.2.4 Bridges

There are four major bridges and eight minor bridges in the project where additional double lane bridges will be constructed US/DS of the existing bridge. All the bridges have been designed based on the guideline provided by Nepal Bridge Standards - 2067 of DOR. The designed discharge of 100 yrs. return period of the river has been considered for bridges. Similarly, all bridges are designed as per IRC loadings. Details of the bridges and constriction status/modality has presented below and environmental concerns of all bridges are covered by the IEE study;

S.N	Chainage	Type	Span Arrangement	Length	Type of construction
1	640+262	MJBR	3*21.00 m	63	Additional two lane will be constructed
2	641+637	MNBR	1*7*2.525 m	7	Dismantled and complete 4 lane
3	642+199	MNBR	1*7*2.525 m	7	"
4	643+976	MNBR	1*7*2.525 m	7	"





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S.N	Chainage	Type	Span Arrangement	Length	Type of construction
5	645+789	MNBR	1*7.5*4.025 m	7.5	"
6	647+038	MNBR	1*6.5*4.567 m	6.5	"
7	648+157	MNBR	1*12.6 m	12.6	Additional two lane will be constructed
8	648+389	MNBR	1*6.5*4.066 m	6.5	Dismantled and complete 4 lane
9	648+561	MNBR	3*21.00 m	63	Additional two lane will be constructed
10	649+257	MNBR	1*17.0 m	17	Additional two lane will be constructed
11	650+768	MNBR	1*7*3.414 m	7	Dismantled and complete 4 lane
12	651+614	MNBR	1*7.5*5.055 m	7.5	"

Source: Design Report of GC Road section 2024

2.2.2.5 Culverts

All existing culverts will be tested for capacity adequacy and accordingly inferior culverts will be modified. New culverts have been designed for 50 years return period of flood. There are 64 slab culverts and 7 pipe culverts designed for cross drain of the discharge.

2.2.2.6 Side Drain

Closed rectangular box type of side drain has provisioned along the roadside. Size of side drain have been selected on the basis of 20 years return period of flood.

2.2.2.7 Protection Works

Protection works will be provided especially in the embankments area as well as upstream and downstream of culverts, bridges, roadsides etc. All protection structures have been designed for a design life of 50 years.

2.2.3 Delineation Zone

The Zone of Influence (Zoi) of the project area has been categorized as Direct Impact Zone (DIZ), Indirect Impact Zone (IIZ) and Zone of Influence (Zoi). Description of impact zone is given in Table 4.

Table 4: Impact Zonation

Impact Zone	Criteria of Zonation
Direct Impact Zone (DIZ)	Right of way of the road 25 m either side of the central line of the road.
Indirect Impact Zone (IIZ)	The zone between DIZ and IIZ with 300 m belt in each side of the road. In this area, physical, biological, socio-economic and cultural environment will experience impacts during the implementation.
Zone of Influence (Zoi)	Project affected wards of Buddhabhumi (ward no 9) and Shivaraj (Ward no 3, 4, 5, 6, i) Municipality of Kapilvastu district are Zoi of the project.





Direct Impact Zone (DIZ)

According to Nepal Road Standard 2070, the Right of Way (RoW) of Highway 50 m (25 m on either side of the road from center). For the purpose of IEE study, the formation width of the road will be considered as DIZ. Similarly, other project facilities where construction activity remains active will also be deal as DIZ e. g. construction yard, stockpiling areas, borrow pit area etc. As per the design of the road this area can extend throughout the RoW i.e entire 50 m in the urban area however can be limited to 30 m in rural and forest area.

Indirect Impact Zone (IIZ)

Indirect Impact Zone will be the surrounding environment next to Direct Impact Zone (DIZ) of the road alignment and as well as ancillary activities like borrow pit, construction yard and stockpiling and will be affected indirectly by project activities. It will be the area beyond the DIZ and within 300 m aerial distance in each side of the road which are mostly limited to project affected ward level.

Zone of Influence (Zoi)

It is the project affected wards of Local Government beyond the IIZ where the beneficial as well as adverse project impacts can exists. Affected wards of Buddhabhumi Municipality (ward no 9) as well as Shivraj Municipality (Ward no 1,3,4,5 and 6) lies within Zoi of the project.

2.2.4 Ancillary Facilities

a. Source of Construction Material and Quarry sites and water

The basic materials required for the road upgradation are soil, gravel and crushed rock. Gravel will be used for sub-base upgrading, and crushed stones are used for base-course upgrading and for bituminous surfacing and the existing crusher plant will be used. As the project area lies in terai region, there are some low land areas along the road. These areas have to be raise hence burrow materials are crucial for such sections. This project has to manage the sufficient burrow and quarry materials. This study has to perform mapping of the burrow and quarry area as a part of the IEE study. This study has identified the following sources for the burrow material source. Details of the available burrow pit sources are presented in Table 4.



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Table 5: Borrow Pit Sources

S.N.	Location/Name of Village	Co-ordinate	Material Type	Site Identification				Approximate Quantity (Cum)				Available land/ Terrain	Surrounding land/ Terrain
				Offset	Distance from E/W Highway (km)			Length (m)	Breadth (m)	Depth (m)	Total (cum)		
1	Pirapani, Arghakhanchi	27°46'25.03"N, 83°3'32.87"E	Soil Sample	4 km	19		23	300	70	20	4200000		
2	Buddhabhumi	27°37'57.06"N, 82°57'42.02"E		-	2.3		0.8	3.1	400	200	2	160000	Agricultural land
3	Shivraj	27°41'7.87"N, 82°50'2.43"E		-			0.5	0.5	380	400	1.5	228000	Agricultural land
4	Gadrunj Khola	83°1'8.12" E, 27°44'28.57" N					River Source						
5	Agewa Nala	82°57'18.95" E, 27°42'42.46" N					River Source						
6	Surahi Khola	82°49'16.78" E, 27°41'48.83" N					River Source						
7	Rapti River	82°45'5.29" E, 27°49'44.86" N					River Source						
8	Banganga River	83°10'57.35" E, 27°42'44.78" N					River Source						

Source: Design Report of GC Road section 2024

b. Rock and Sand Quarries

Rock quarries are found in the areas listed below they are mostly the perennial rivers originated from Chure and Mahabharat range. These quarry sites are approved by the local government and has been making tender for extraction of stone, gravel and sand from Arghakhanchi district. As much as possible contractor shall utilize these sources otherwise can also explore the new sites complying the legal requirements or can be purchased from approved sites. Some of the sources present along the project vicinity are presented in table 5.



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Table 6: Potential Sources of Aggregate Sources

S.N.	Location	Coordinates
1	Gadrunj Khola	83° 1'8.12"E, 27°44'28.57"N
2	Agewa Nala	82°57'18.95"E, 27°42'42.46"N
3	Surahi Khola	82°49'16.78"E, 27°41'48.83"N
4	Rapti River	82°45'5.29"E, 27°49'44.86"N
5	Banganga River	83°10'57.35"E, 27°42'44.78"N
6	Galaxy Crusher Chandrauta	Will be explored during IEE
7	Rapti Crusher (Bhalubhang)	Will be explored during IEE

Source: Design Report of GC Road Section 2024

c. Water Source for Construction

It is essential to have sufficient water for construction works, water browsing as well as drinking and sanitation works. There will be need of 0.2 - 0.5 L of water per m² area for curing and mixing purpose similarly 2-4 L water each square meter for browsing purpose. It is estimated that total 238 KL water for construction work and 24,300 KL for water browsing purpose will be required. For drinking water there is supply of deep water through pipelines in Buddhabhumi as well as Shivaraj Municipality that can be utilized and also many places have traditional practice of using shallow tube well for the drinking water supply that can be utilized after laboratory test. Water for construction and water browsing purpose will be sourced from the rivers listed Table 6;

Table 7: Location of Major Water Source

No.	Location	Water Source	Coordinates
1	Belgarduwa Khola	River	273928.95 N, 825949.43 E
2	Bel Nadi	River	27391.73 N, 825457.41 E
3	Jawal Nadi	River	273856.26 N, 825434.81 E

Source: Design Report of GC Road Section 2024

d. Fuel Requirements

There will be Petroleum products specially diesel, petrol and kerosene for the project. It is estimated that around 960 KL diesel, 182 KL petrol and 770 KL kerosene will be required for construction of the road and bridge.

e. Campsite and Stockpiling

The project required skilled manpower as well as unskilled worker for accomplishing the project. Required work force as per DPR will be managed during construction. Their proper accommodation will be managed on an appropriate campsite. The campsite and stockpiling yards will be established taking consideration with minimum environmental impact. Locations of the possible camp, stockpiling areas will be identified and presented in the IEE report.





f. Human resources requirements

The work force required for the proposed road upgrading works is based on the concept design report it is estimated that 26,61,700 md (unskilled) and 2,63,550 md (skilled) human resources will be required for the project. Semi-skilled and unskilled labor deployment priority will be given to locals, also considering the individuals from disadvantaged groups and women as per requirements.

g. Side Drain

The primary function of a roadside drain ditch is to collect and convey surface water along the road until it can be drained away from the road bed. The ditches are designed to carry the design runoff and to accommodate excessive storm water flows with minimal road flooding or damage. The catchment area includes the road surface area and the adjoining rooflop and footpath area if the houses are adjoining the footpath. The segment length of the drain is from cross drain to cross drain or from summit point to the next cross drain. The drain is proposed throughout the alignment. Almost all of the outfall of culverts are placed in a natural drain. If there is no possibility to drain out at natural drain, it is placed in private land where there is least impacted.

2.3 Brief Existing Environmental Conditions of Proposed Road

Buddhabhumi and Shivraj Municipality are the local governments that will be affected due to upgradation of the road. Demographic information of the project affected municipality has been provided below based on the census data of 2078.

2.3.1 Physical Environment

2.3.1.1 Topography and Geology

The project area lies in Terai, with elevation of 100 to 150 m msl (above mean sea level). Soils along the road section are mostly of recent alluvial deposits, represented by silt, clay, gravel also including boulder and cobble. Soils are mostly stable, but it is possible to occur erosion mostly along riverbanks. The project site is in plain areas and no slides and unstable areas can be found at this project site.



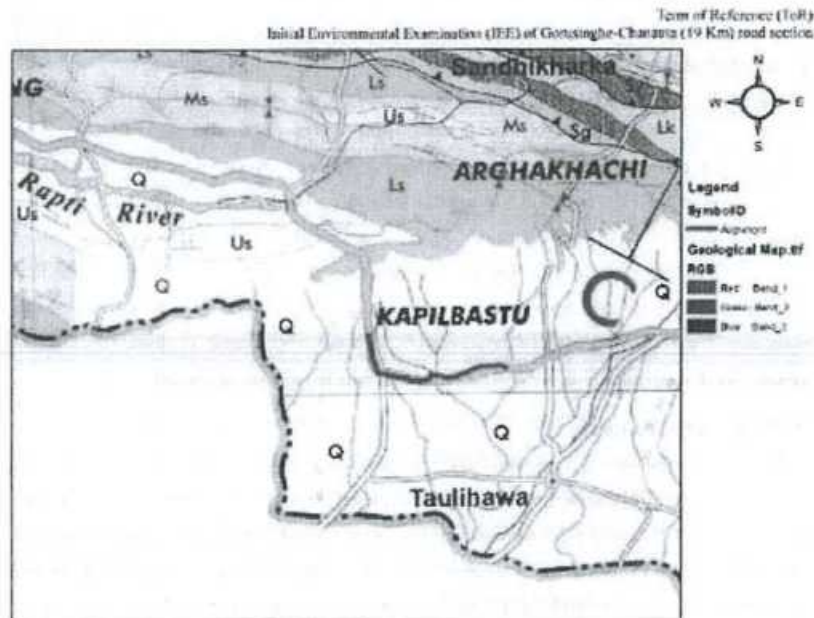
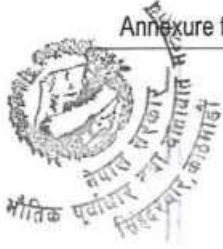


Figure 3: Recent Alluvial soil found in the project area.

2.3.1.2 Seismicity

Seismic hazard map of Nepal has shown that the proposed upgradation site has rare seismic events and is in safe area in terms of seismic events in comparison to other parts of Nepal. Figure 4 has presented the seismic events distributed in different parts of Nepal.

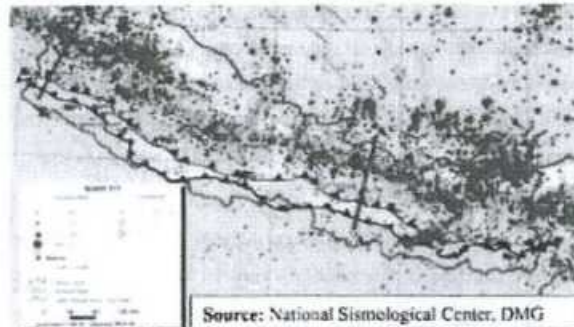


Figure 4: Seismic hazard map of Nepal





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2.3.1.3 Hydrology (flood prone area, stream, river, existing drain facilities)

There are four major bridges, eight minor bridges and 64 box culverts as well as 7 pipe culverts for draining water downstream i.e towards south. These rivers are of local origin i.e., are originated from Churiya hence have high discharge only during monsoon. Among them Bhargardawa river is the largest one and is reported that splash flooding occurs during intense rainfall. Apart from it, other bridges are sufficient to hold floods. Most of the section lie in high land area hence do not have water lodging issues. Furthermore, Champapur and Chandrauta section of the road are relatively at low land area hence have reported issues of water lodging in some locations during monsoon. There could be special requirements to make arrangement to drain the discharge completely downstream of the road so that the road remains safe for the project.

2.3.1.4 Land Use Pattern

The land use is predominantly agricultural, rural and forest section except few settlements. The entire road section lies within the RoW of DOR and there is mixed land use pattern along the both side of the road. Several Fuel Station exist in the entire project corridor. Along the project road, there is major parts of community managed forests. Several numbers of public utilities like electric poles, solar poles, cable, telephone and internet cable, water pipe line etc. either running parallel or crossing the project road at different locations. In addition, several crossings of electric cables including high-tension line are common in the road section. During reconnaissance, it has also observed that Optical Fiber Cable (OFC) lines of different telecom companies are running parallel on either left or right side of existing road.

There will be no need to acquire new land for upgrading the road as it already has its 50 m RoW. The land use is predominantly agricultural and rural except at forest area. There is mixed land use pattern along the both side of road. Most of the land around the existing road is barren land. Proposed formation will extend to 24 m at rural and forest area similarly will occupy entire RoW especially at urban areas with dense settlements at Imiliya and Chandrauta section.

2.3.1.5 Climate

The proposed project area lies in Terai region having tropical climate zone. Due to major difference in maximum and minimum temperature summer is very hot whereas winter is foggy and colder. Based on the climatic data from world weather atlas, average daily temperature ranges from 11.8°C (53.2°F) to 39.8°C (103.6°F) with the lowest temperatures occurring in January and peak





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temperatures in May in Kapilvastu district. Similarly, humidity varies from 25% in April to 68% in July and August. Average daily rainfall ranges from a paltry 1 mm (0.04") in November to a considerable 248 mm (9.76") in July. In the similar manner, about 80% of the total rainfall occurs in rainy season having average annual rain fall of 1699.6 mm. January proves to be the driest month with just 2.8 days of rainfall, while July has the maximum hazard of rain with 23.8 days. Details of the local climate will be done using local station data during IEE study of the project.

2.3.1.6 Unstable Areas

The proposed road section lies in flat terrain from Imiliya to Chandrauta where no issue of slope stability exists. However, embankment erosion will be occurred due to flood in the river and streams. The Bargadawa river basin is the largest one in the project alignment where frequent flash floods occur as the catchment response to high intensity and short duration precipitation shift, leading to flooding and waterlogging downstream.

2.3.2 Biological Environment

2.3.2.1 Flora (Trees, Shrubs and Herbs in the project area)

a. Trees

The Project area lies along the tropical region of western Terai. Sal is the dominant tree species in the project area with associated other tropical tree species. The detail of tree species found in the project site are in table 10.

Table 8: Tree species found in the project site.

S/N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
1.	Sal	<i>Shorea robusta</i>	Least Concern	-	Protected
2.	Asana/Saj	<i>Terminalia alata</i>	Least Concern	-	Non protected
3.	Simal	<i>Bombax ceiba</i>	Least Concern	-	Non protected
4.	Khair	<i>Acacia catechu</i>	Least Concern	-	Non protected
5.	Sindure	<i>Mallotus philipensis</i>	Least Concern	-	Non protected
6.	Bot Dhayero	<i>Lagerstroemia parviflora</i>	Least Concern	-	Non protected
7.	Karma	<i>Adina cordifolia</i>	Least Concern	-	Non protected
8.	Kusum	<i>Schleichera oleosa</i>	Least Concern	-	Non protected



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S.N.	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
9.	Jamun	<i>Syzygium cumini</i>	Least Concern	-	Non protected
10.	Mauwa	<i>Engelhardtia spicata</i>	Least Concern	-	Non protected
11.	Kutmero	<i>Litsea monopetala</i>	Least Concern	-	Non protected
12.	Bhalayo	<i>Semecarpus anacardium</i>	Least Concern	-	Non protected
13.	Peepal	<i>Ficus religiosa</i>	Least Concern	-	Non protected
14.	Bar	<i>Ficus benghalensis</i>	Least Concern	-	Non protected

Source: Field survey, 2024

b. Shrubs

Major shrub species found in the proposed project area are listed in the table 11 including their IUCN, CITES and GON protection status.

Table 9: Shrub species found in the project site.

S.N.	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
1.	Dhairo	<i>Woodwardia fruticosa</i>	Least Concern	-	Non protected
2.	Kera	<i>Musa paradisiac</i>	Least Concern	-	Non protected
3.	Aasuro	<i>Adhatoda vasica</i>	Least Concern	-	Non protected
4.	Tite Pati	<i>Artemisia vulgaris</i>	Least Concern	-	Non protected
5.	Nagbeli	<i>Lycopodium clavatum</i>	Not Evaluated	-	Non protected
6.	Kurilo	<i>Asparagus racemosus</i>	Least Concern	-	Non protected
7.	Karbir	<i>Nerium oleander</i>	Least Concern	-	Non protected
8.	Jhadibanmara	<i>Lantana camara</i>	Least Concern	-	Non protected
9.	Jhingani	<i>Eurya acuminata</i>	Least Concern	-	Non protected
10.	Bansuli	<i>Dichroa febrifuga</i>	Least Concern	-	Non protected
11.	Rudhilo	<i>Pogostemon benghalensis</i>	Least Concern	-	Non protected

Source: Field survey, 2024

c. Herb or Ground Vegetation

Major herb or ground vegetation in the proposed project area detail in table 12.



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Table 10: Major herbs species found around the project vicinity

S.N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
1.	Bannara	<i>Eupatorium adenophorum</i>	Least Concern	-	Non protected
2.	Bukiphoel	<i>Oxbeckia nepalensis</i>	Least Concern	-	Non protected
3.	Dasiwan	<i>Achyranthes aspera</i>	Least Concern	-	Non protected
4.	Gandhe	<i>Ageratum conyzoides</i>	Least Concern	-	Non protected
5.	Kuro	<i>Bidens pilosa</i>	Least Concern	-	Non-Protected
6.	Sisno	<i>Utricia dioica</i>	Least Concern	-	Non protected
7.	Cogongrass	<i>Imperata cylindrica</i>	Least Concern	-	Non protected
8.	Bermuda Grass	<i>Cynodon dactylon</i>	Least Concern	-	Non protected

Source: Field survey, 2024

2.3.2.2 Fauna found in the project area

a. Mammal

Table 11: Mammals found in the project area.

S.N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
1.	Common Leopard	<i>Panthera pardus</i>	Near Threatened	Appendix I	Non protected
2.	Blue Bull	<i>Boselaphus tragocamelus</i>	Least Concern	-	Non protected
3.	Spotted Deer	<i>Axis axis</i>	Least Concern	-	Non protected
4.	Golden Jackal	<i>Canis aureus</i>	Least Concern	-	Non protected
5.	Jungle Cat	<i>Felis chaus</i>	Least Concern	-	Non protected
6.	Wild Boar	<i>Sus scrofa</i>	Least Concern	-	Non protected
7.	Yellow-throated Marten	<i>Maries flavigula</i>	Least Concern	-	Non protected
8.	Rato Bandar	<i>Macaca mulatta</i>	Least Concern	-	Non protected
9.	Common Langur	<i>Semnopithecus entellus</i>	Least Concern	-	Non protected
10.	Northern Pal Squirrel	<i>Funambulus pennanti</i>	Least Concern	-	Non protected



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S.N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
11.	Porcupine	<i>Hystrix indica</i>	Least Concern	-	Non protected
12.	Gray Mongoose	<i>Herpestes edwardsii</i>	Least Concern	-	Non protected
13.	Barking Deer	<i>Muntiacus muntjak</i>	Least Concern	-	Non protected
14.	Bat	<i>Pteropus sps.</i>	-	-	Non protected

Source: Field survey, 2024

b. Avifauna

Table 12: Bird species found in the project area.

S.N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
1.	White-rumped Vulture	<i>Gyps benghalensis</i>	Critically Endangered	Appendix II	Non protected
2.	Indian Gray Hornbill	<i>Ocyrocus birostris</i>	Least Concern	-	Non protected
3.	Lesser Adjutant	<i>Leptoptilos javanicus</i>	Near Threatened	-	Non protected
4.	Common Myna	<i>Acridotheres tristis</i>	Least Concern	-	Non protected
5.	Little Cormorant	<i>Microcarbo niger</i>	Least Concern	-	Non protected
6.	Red-napped Ibis	<i>Pseudibis papillosa</i>	Least Concern	-	Non protected
7.	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	Least Concern	-	Non protected
8.	Asian Koel	<i>Eudynamis scolopacea</i>	Least Concern	-	Non protected
9.	Common Hawk Cuckoo	<i>Hierococcyx varius</i>	Least Concern	-	Non protected
10.	Coppermith Barbet	<i>Psilopogon haemacephalus</i>	Least Concern	-	Non protected
11.	Blue-throated Barbet	<i>Malacoptila asiatica</i>	Least Concern	-	Non protected
12.	House Crow	<i>Corvus splendens</i>	Least Concern	-	Non protected
13.	Jungle Crow	<i>Corvus macrorhynchos</i>	Least Concern	-	Non protected
14.	Rock Pigeon	<i>Columba livia</i>	Least Concern	-	Non protected
15.	House Sparrow	<i>Passer domesticus</i>	Least Concern	-	Non protected





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S.N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
16.	Black Kite	<i>Milvus migrans</i>	Least Concern	Appendix II	Non protected
17.	Spotted Dove	<i>Spilopelia chinensis</i>	Least Concern	-	Non protected
18.	Gray-hooded Warbler	<i>Seiurus anthracinus</i>	Least Concern	-	Non protected
19.	Red-vented Bulbul	<i>Phycenotus cafer</i>	Least Concern	-	Non protected
20.	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Least Concern	-	Non protected
21.	Oriental Magpie Robin	<i>Copsychus saularis</i>	Least Concern	-	Non protected
22.	Long-tailed Shrike	<i>Lanius schach</i>	Least Concern	-	Non protected
23.	Plumbeous Water Redstart	<i>Rhyacornis fuliginosus</i>	Least Concern	-	Non protected
24.	Black Drongo	<i>Dicrurus macrocerus</i>	Least Concern	-	Non protected
25.	White-bellied Drongo	<i>Dicrurus caeruleus</i>	Least Concern	-	Non protected
26.	Cattle Egret	<i>Bubulcus ibis</i>	Least Concern	-	Non protected

Source: Field survey, 2024

c. Herpetofauna

Table 13.: Herpetofauna found in the project site.

S.N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
1.	Common Rat Snake	<i>Pyas mucorus</i>	Least Concern	-	Non protected
2.	Buff-striped Keelback	<i>Amphispiza stolonum</i>	Least Concern	-	Non protected
3.	White Lipped Pit Viper	<i>Trimeresurus albolabris</i>	Least Concern	-	Non protected
4.	Bengal Monitor Lizard	<i>Varanus bengalensis</i>	Least Concern	-	Non protected
5.	Common Garden Lizard	<i>Calotes versicolor</i>	Least Concern	-	Non protected
6.	House Gecko	<i>Hemidactylus spp</i>	-	-	Non protected



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S.N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
7.	Asian Toad	<i>Hoplobatrachus rugulosus</i>	Least Concern	-	Non protected
8.	Palha	<i>Bufo</i> spp.	-	-	Non protected

Source: Field survey, 2024

d. Fish species

Table 14: Fish species found in the project site.

S.N	Common Name	Scientific Name	IUCN Status	CITES	GoN Protection status
1.	Gotyla	<i>Garra gotyla</i>	Least Concern	-	Non protected
2.	Asiatic Snakehead	<i>Channa gachua</i>	Least Concern	-	Non protected
3.	Stinging Catfish	<i>Heteropneustes fossilis</i>	Least Concern	-	Non protected
4.	Walking Catfish	<i>Clarias batrachus</i>	Least Concern	-	Non protected
5.	Spotfin Swamp barb	<i>Puntius sophore</i>	Least Concern	-	Non protected
6.	Barred Baril	<i>Barilius barila</i>	Least Concern	-	Non protected

Source: Field survey, 2024

2.3.3 Socio-economic and Cultural Environment

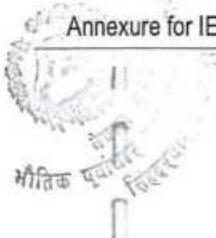
The study team has explored basic information about the socio-economic and cultural environment of project area which includes resources/income, likely impacts on structures and public utilities, services/facilities available in the project area, access to public transport and other parameters. Basic information about demography as well as religious sites and occupation, caste/ethnicity, workforce availability has been included based on preliminary review as well as field visit. Details will be included in IEE report after field survey for baseline information.

2.3.3.1 Basic Demographic Information.

i. Buddhabhumi Municipality:

According to the National Census 2078 (BS), the total population of Buddhabhumi Municipality is 76,507, of which 48.3% (36,951) are male and 51.7% (39,556) are female. Accordingly, the sex ratio is 93.41 male per 100 females. Similarly, there are 15,379 household in the municipality and the population density is 209 people per square kilometer. The literacy rate of the municipality is 71.5%.





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Only ward no 9 of Buddhabhumi Municipality lies in project construction section. Total population of the ward is 11,043, of which 5,222 are male and 5,821 are female. Accordingly, sex ratio is 89.80. Similarly, there are 2,441 household in the ward and the average household size is 4.52.

Table 15: Demographic information of Buddhabhumi Municipality

Local Government	Number of households	Population			Average household size	Sex ratio	Literacy
		Total	Male	Female			
Buddhabhumi Municipality	15,379	76,507	36,951	39,556	5.22	95.05	71.5
Ward no. 9	2441	11043	5222	5821	4.52	89.80	NA

Source: CBS 2021

II. Shivaraj Municipality

According to the National Census (2078 BS), the total population of Shivaraj Municipality is 84,810 of which 48.7% (41,328) are male and 51.3% (43,482) are female. Accordingly, the sex ratio is 95.05 male per 100 females. Similarly, there are 16,241 household in the municipality and the population density is 299 people per square kilometer. The literacy rate of the municipality is 72.7%. The demographic information for the proposed site of the project includes 1,3,4,5 and 6 ward is presented in table 9 below:

Table 16: Demographic information of Shivaraj Municipality

Local Government	Number of households	Population			Average household size	Sex ratio
		Total	Male	Female		
Shivaraj Municipality	16,241	84,810	41,328	43,482	5.22	95.05
Ward no. 1	2,183	9,712	4,645	5,067	4.45	91.67
Ward no. 3	1,914	9,320	4,488	4,832	4.87	92.88
Ward no. 4	1,347	8,141	4,074	4,067	6.04	100.17
Ward no. 5	3,367	15,566	7,514	8,052	4.62	93.32
Ward no. 6	1,216	7,400	3,745	3,655	6.09	102.46
Total (Affected Wards)	10,027	50,139	24,466	25,673	5.21	95.30

Source: CBS 2021

The proposed Road under ACCESS highway improvement project will upgrade 19 Km Road Section from Gorusinghe to Chandrauta in Kapilvastu district. The road passes through four settlements i.e. Imaliya, Kharendrapur, Bankatti and Chandrauta. Similarly, the proposed road covers two municipalities (Buddhabhumi and Shivaraj).

Resources/Income: The project affected people in the area are mostly relying on business activities.





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Structure and public utilities: There are four major settlements along the proposed road side. Water pipelines has been piled on either side of the highway in most of these settlements. In the similar manner, there are 11 kV low tension electric poles for distribution to the settlements in each side of the road and 33 kV transmission line too. They might be required to shift at safe locations while upgrading the road towards the edge.

Services/facilities (Communication, education, health, electricity, energy used, water supply, banking): Most of the basic facilities such as Health post, Hospital, School (primary/secondary), Market center, Veterinary center, Maternal facility, Electricity office, Water supply system as well as banking facilities are available in the project area. Electricity as well as LPG are common source of energy for cooking and lighting in the area.

Public transport: The proposed upgradation works will be held in a section of the national highway. There are several market centers holding high population density. The population has been getting land transportation access through this highway for short and long route public vehicles.

Trade/business, industries: Chandrauta is trade junction as there exists Krishnangar custom bordering with India. It has several wholesalers as well as retailers of grocery, liquor, textiles as well as other business. There are crushers, sand refinery industries within indirect impact zone, however no production/manufacturing industries are located there. Some brick kilns are also available in the ZoI but not exist in IIZ and DIZ of the project. Details of the industries in the area will be mentioned in the IEE report.

Labour and Workforce: As the road passes through settlement and populated areas, it is expected to have skilled/unskilled workforce available for construction works for the project. As per the consultations during ToR preparation with the stakeholders and community representatives, there is availability of work force as well as skilled and unskilled persons from the adjacent areas. However, the exact figure of labour (skill and unskilled) and their willingness to work in road construction will be obtained during detailed baseline survey.

Indigenous and vulnerable groups: The areas along the road alignment have been rapidly urbanizing and has been converting into urban area. Most of the community are migrated from hilly regions and the community is diverse in terms of cast and ethnicity. As per the preliminary





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filed survey for the ToR, Brahmin/Chhetri is the dominant caste followed by Muslim and Madhesi. As per consultations it was found that there are Dalit as well as IP's in the project area however no detail record was observed. Details will be explored in IEE study.

2.3.4 Cultural (physical and social)/religious/historical) Environment

Temple, Church, Bihar, Mosque: There are Shiva temple, Devi mandir, as well as other religious structure of Hindu at different locations along the road. Similarly, a Masjid/Madarasa in Chandrauta exists along the roadsides.

Historical Aesthetic Valuable Place: During field survey for the ToR preparation none of aesthetically valuable places were observed along the road corridor, however there are lakes, pond, and cremation sites have found during field study. There is a cremation site as well as graveyard upstream of the existing Bel Nadi out of RoW. Sufficient precaution has to be taken while constructing the bridge over Bel Nadi. Ponds and lakes are common land use in the project area. One Khairi Pond found at ward number 5 of Shivraj Municipality, Khairi close to the RoW along the road and four major lakes (*Hariharpur Lake, Biraja Lake, Buddi Lake and Ram Laxman Lake*) are located in ZOI of the project though none of the lakes found within the RoW. There is a hathazar area near Chandrauta Bazaar which is used for small trade and transaction of mostly consumable goods. Details of the archeological sites will be considered in the IEE study.

2.3.5 Chemical Environment: Along the project alignment there is no tangible source of that has been contributing significantly for chemical pollution along the road except some workshops, crusher industries, small cottage industries and sand refineries. Details of such sources will be identified during IEE study.





3. DATA REQUIREMENTS AND PROCEDURE TO BE ADOPTED WHILE PREPARING THE REPORT

The initial environmental examination (IEE) report will be prepared according to the National Environmental Impact Assessment Guidelines, 2050, Sub-rule (1) of rule 5 of schedule 9, Sub-rule (5) of rule 7 of schedule 11 and Sub-rule (6) of rule 7 of schedule 13 as mentioned in Environment Protection Rules, 2077 and GESU template for IEE and BES of road and Bridge 2077 will also be followed for the IEE study. In the similar manner the World Bank's ESF will also be considered while conducting IEE of the project. Following data will be ensured in the IEE report of the project;

The IEE approach, methodology and procedure shall generally follow the provisions of the EPA, 2076 and EPR, 2077. Following approach and methodology will be adopted during the IEE report preparation.

3.1 Data Requirement for Preparation of the IEE Report

The following data related to physical and chemical environment, biological environment, socio-economic and cultural environment of the project area will be collected.

3.1.1. Physical and Chemical Environment

- Land Use pattern
- Topography and geomorphology
- Climate, Meteorology, hydrology and drainage
- Geology, soil, erosion and land instability, flood
- Seismological data
- Air quality
- Water quality
- Noise Level

3.1.2. Biological Environment

- Local flora and fauna of the project area
- Loss of Forest and vegetation status and types
- Fish and other aquatic life
- Non-timber forest products found in the project area.
- Vegetation biodiversity and significance
- Wildlife, wildlife habitat, Movement/migration corridor of wildlife affected by the project
- Habitat in terms of Degradation/Fragmentation/Human encroachments.
- Rare/Endangered/ Protected flora and fauna species of the area





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3.1.3. Socio-economic and Cultural Environment

- Land/ property acquisition
- Damage to structures
- Loss of production
- Population, caste/ ethnicity and employment facilities,
- Agriculture, income expenditure, and occupation,
- Education, Health and Sanitation condition in the area,
- Migration trend
- Services and facilities in the project area,
- Trade/ business
- Historical and cultural sites of the area (major temples, religious area)
- Indigenous and vulnerable groups in project area
- Settlement

The basic methodology as per provisions of EPR, 2077 and National EIA guidelines 1993 will also be followed while preparing the IEE Report specially for evaluation of impacts. Similarly, provisions of Land Acquisition Act 1977 will be adapted for the acquisition of property. The data required for the preparation of report, the procedures and methods to be adopted while preparing the report are mentioned below.

3.2 Methods to be Adopted for Data Collection

3.2.1. Desk Study/Literature Review

Available secondary data and literatures from different sources in the form of reports like detail engineering design of proposed road section, hydrological and geological report of proposed road, similar road project report, affected rural municipality profile, Central Bureau of Statistics (CBS) data 2078 and maps like; topographic maps, land use maps, land capability maps, land system maps, aerial photographs, cadastral survey maps etc. will be collected and reviewed. Similarly, published and unpublished reports pertaining to environmental standards, Acts, Regulations etc. will also be collected and reviewed. In the similar manner WB reports of the projects viz. ESF, ESMF, GBV, RAP, PSA etc. will be reviewed. However, the focus of the literature review will concentrate on proposal's specific issues and related baseline environments.

3.2.2. Field Study and Site Inspection

The multidisciplinary study team including environment expert, biodiversity expert, social expert etc. will be mobilized to field assessment soon after the completion of the desk study and receiving approval on Terms of Reference from Ministry of Physical Infrastructure and Transport (MoPIT).



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An extensive review of the secondary information, the analysis and interpretation of field observation made during the field visit will be the main bases utilized to gather baseline information and assess the potential impacts on the local environment. Primary levels of information will be acquired using questionnaire, checklists, datasheets and site observation. The consultant will collect and analyze existing environment to anticipate adverse impacts by incorporating suitable mitigation measures with implementation of Environment Management Action Plan for both construction and operational stages of the project. The following methodology will be adopted to carry out for assessing local environment during field study:

Physical Environment: The Study Team will carry out the data collection and assessment in the proposed project area by using approved checklists and questionnaires (Annex 2). The survey will be performed within the aerial distance of 300 m, affected ward of the Municipality to collect information regarding existing land use to know about land use practice, planting niche, cropping pattern and yield of the agricultural crops, potential quarry sites, disposal area, camp area etc. and soil conservation measures practiced in the area.

Air quality in the area will be explored using Medium Volume sampler. Air quality monitoring parameters like particulate matters $PM_{2.5}$ and PM_{10} similarly oxides of sulphur, nitrogen and carbon will be developed as base line information. In the similar manner, average sound level in the area (representing settlements, market places, schools' and public places) will be accessed using sound level meter. All the baseline will be measured based on the related national guidelines as presented in table 17. Air pollution along with sound level measurement will be done at least once for baseline information. Most probable locations will be Imliya, and Chandrauta representing settlements/sensitive receptors similarly pollution level near Bel River will be measured to represent the natural habitat for wildlife.

Water sample from the proposed Belgardawa and Bel River, well/tube well/ponds near the RoW will be taken to the lab and routine parameters as well as ecoli iron, arsenic and level of oil & grease will be studied (as presented in table 17). At least once the baseline will be taken for the IER report, those baselines will also be repeated prior to construction works performed by the contractor.

The geological investigation includes study of relevant maps with 1:10,000 scale, reports and walkover survey to verify the physical characteristics, embankment stability, erosion, seismicity and land inundation and other threats to the proposed road alignment. The field observation will





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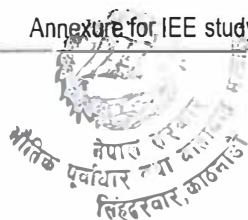
produce geological map, morphological structure, flood hazard maps. The tools we propose to use to collect the information will be Focus Group Discussion (FUG), direct observations, measurements of physical parameters, interview with key informants and collection of recorded information at field level offices.

Biological Environment: Vegetation and forest type in the adjoining forest, their distribution as well as occurrence of protected species, ethno-botanical and cultural value will be recorded. The study will also calculate the number of trees to be cleared for the upgradation works. The empirical and scientific formulas used for wood volume as well as timber volume will be as per Appendix 9 of Forest Rule 2079. All the factors as well as measurement units will also be followed as provided in the rule. In the similar manner, data recording for trees, poles and saplings will be done as provisioned in Appendix 50 of the Forest Rule. Similarly, the baseline of the existing forest will be reported based on standard sampling as well as review of the management plan of the community forests as well as collaborative forest that exists along the road. The richness of the species and bio-diversity will be noted down in the suitable sheet for Birds, Mammals, Fishes and flora. Listing of interviews of key informants, assessment of various flora and fauna found in the area will also be collected through questionnaire survey and focus group discussions related with the impact of road construction and its impact on biological resources as well as the river basin, watershed condition.

Chemical Environment: Apart from the other pollution effects, petro-chemical pollutants are more possible to spill due to improper utilization, handling and leakage during construction of the proposed bridge. There may have adverse effect especially on the aquatic environment of the major rivers (Belgardwa River and Bel River) through leakage of fuel, lubricants, oil, and cement during the road construction and other different chemical products like acid and dry cell battery during construction phase. Once discharged into water bodies and soil, petro-chemicals may have the effects of micro-organisms and other creatures in the surrounding. Thus, these aspects will be addressed by documenting existing sensitive areas where such chemical impact can affect.

Socio-Economic and Cultural Environment: Information related to socio-economic and cultural aspect of the project influence area including population distribution, ethnicity, employment facilities, education status, health and hygiene and sanitary, settlement pattern, market centers, migration patterns, land value, Household Income, accessibility condition, vulnerability, service





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centers, availability of labor, religion and religious events and other infrastructures (schools, government offices and banks) etc. conditions will be collected. During the course of data collection, the sample of households in the influence area will be selected. Project affected families who will lose their land and property will be identified through census survey. Colour mark along with numbering will be placed at the area from which the structure has to be demolished for the upgradation. Valuation for compensation will be done through CDC that has been extracted in the RAP will also use for the IEE study. Furthermore, status of Gender equity and social inclusion in the area will be identified.

3.3 Community Participation/Consultation

The consultant will prepare the Community Participation Plan (CPP) to ensure appropriate participation of community members so that the development work can be harmonized with the local environment. It will be prepared during IEE based on the transect walk survey and meaningful consultations with the concerned stakeholders. It will be supportive for exploration of impacts and finding appropriate mitigation measures. The relevant information from CPP will be described in the IEE report.

Several consultation meetings were also conducted while preparing the ToR to identify the environmental issues/concerns to be addressed during IEE (Annex 6). Major environmental issues and concerns observed through consultation are listed below;

Table 17: Methodological approach for field study and site inspection

Data Required	Method/Tools
Physical Environment	
Topography, Land use type and classification	Topographical survey, remote sensing and GIS analysis on the topographical maps, RTK/dGPS/LiDAR for all topographic survey works. Digital Terrain Modeling using AutoCAD Civil 3D
Hydrological-Drainage network and drainage density	Stream location survey, hydrological studies.
Geology-Rock types, seismicity and stability	Field investigation/Direct observation, Analysis of geological map published by Department of Mine and Geology.
Soil type and classification	Field observation, literature review and laboratory tests.



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Data Required	Method/Tools
Soil Erosion	Field Observation, soil quality measurement using routine parameters will be done, further secondary data will be analyzed and report in IEE Report.
Sound/Noise condition	Field observation, sound level measurement and modeling will be done as per National Sound Standard 2012.
Weather and climate condition, temperature, precipitation	Secondary information from Department of Hydrology and Meteorology (DHM) and other published literature.
Type, Volume and Source of Construction materials required	Secondary information from project engineers, feasibility/concept design report.
Information on borrow sites/tipping sites/stockpiling and camp sites	Direct field observation/interaction with project engineers, local stakeholders and locals
Traffic condition	Traffic survey, Average Daily Traffic (ADT) computation, Mode-wise Hourly Variations and Peak-hour Factor Determination (using results of volume count survey), Estimation of Commodity Distribution Factors for goods vehicles (using results of O-D survey), Estimation of Seasonal Correction Factor (SCF) etc.
Types of forest	Vegetation survey, direct field observation with the help of CFUGs.
Tree loss during site clearance	Census/Enumeration of trees in close coordination with the District Forest Offices for clearance. Calculation of timber/wood volume will be done as instructed in Appendix- 50 of the Forest Rule 2079.
NTEPs	Field study, Checklist Survey, Consultations with the CFUGs, Key Informant Interview (KII)
Information on different Physical Infrastructure (Poles, Houses, Temples etc.)	Field Study (Transect Walk) and consultation with project affected families as well as local government.
Chemical Environment	
Air Quality	Direct field observation will be done, primary data will be collected using medium volume sampler following the NAAQS, 2012.
Water Quality	Water Quality Test and available secondary information.
Biological Environment	
Vegetation analysis	Field enumeration (Using Transect Plot/ census survey for the trees to be cleared. Similarly plot sampling will be done for keeping baseline



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Data Required	Method/Tools
	information about the adjacent forest status. Calculation of stem volume of the tree will be done as provisioned in appendix 9 of the Forest Rule 2079 given as: $Ln(v) = a + b \cdot Ln(d) + c \cdot Ln(h)$ or $V = Exp [a + b \cdot Ln(d) + c \cdot Ln(h)]$ Where, V= timber volume, a,b,c are the coefficient values and d=diameter at breast height and h= height of the tree Value of coefficient will be used as instructed in appendix 9 of the Forest Rule 2079.
Fauna Environment	Direct observation, sign survey, Key Informant Interview, critical habitat screening will be carried.
Aquatic animals	Visual observation/Key Informant Interview/ Past literature for fish.
Socio-economic and Cultural Environment	
Demographic, Economic and social services and facilities	Secondary Information from CBS, District Co-ordination Committee and Primary information of the direct impact and indirect impact area will be collected. Further, structured questionnaire survey of each direct project affected family and sampling of 20% HUs within IIZ will be done questionnaire survey will be done with them. Furthermore, Checklist survey with the women groups, stakeholders and user groups in the affected area will be done. Specific information will also be extracted using KII.

3.4 Public Hearing

According to Rule 3 (5) of the EPA 2076, and Rule 6 of EPR 2077, a public hearing regarding to the project development and operation will be accomplished in each municipality, after approval of the ToR. The date, time and place about public hearing in project area will be announced by advertising it on radio, local newspaper. The notice will be pasted in public places, as well as notice board of Buddhabhumi municipality, Shivraj municipality as well as affected ward offices. Representative of local stakeholder will be gathered to inform about project activities. The CFUG's and local representative will also be invited for the discussion about the project. The issues and suggestions received during public hearing will be documented, analyzed and included in the IEE study.





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3.5 Public Notice

As per the Schedule 9 of EPR, 2077, a 7 days Public Notice will be published in a National Daily Newspaper after conducting public hearing. A public notice in format provided in Annex 5 issued by DCID will be pasted in the project area and public places such as schools, health post and Municipality offices as well as affected ward offices and public deeds of affixing notice will be prepared. After accomplishing the deeds, the public notice will be published in local newspaper and provided to the stakeholders. The suggestions and feedbacks from stakeholders, locals etc. will be collected, recorded, analyzed and will be included in IEE report. Feedbacks and comments from Municipality and other institutions will also be collected through recommendation letters (in the template provided in Annex 4) and will be included in the IEE report.

3.6 Recommendation

According to the format given in Schedule 14 related to sub-rule 8 of rule 8 of Environment Protection Regulations, 2077, recommendation letters will be collected from the relevant local level in the template mentioned in Annex 4 and will be included in the IEE report.

3.7 Risk/Impact Assessment

The potential effects of this proposed project will be collected from various sources and analyzed based on the physical, biological, social and economic and cultural aspects. A matrix will be used for environmental impact categorization based on the National EIA guideline and also considering the World Bank's EHS impact rating.

3.8 Impact Evaluation and Prioritization

a. Evaluation of Impacts

The impacts are broadly categorized in two categories identified impacts and predicted impacts. In general, direct impacts are identified and indirect impacts are predicted. These identified and predicted impacts will be evaluated to know their environmental significance, taking into consideration of *Magnitude, Extent and Duration*.

The environmental impacts will be ranked High, Medium or Low Magnitude on the basis of judgmental evaluation of the impact in comparison with the nature and size of the project. Similarly, the impacts will be categorized into Long-term, Medium-term and Short-term according to the impact's likeliness for lasting due to the operation of the project.





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Magnitude of Impact

The magnitude of impact will be determined on the basis of each potential impact's severity. It will also indicate whether or not the impact is reversible. If the impacts are reversible, it indicates the potential rate of recovery.

- **High (H):** If the adverse impacts cannot be mitigated then the magnitude of impact is considered as high.
- **Medium (M):** If the impacts make the resources still usable but at some inconvenient to the public then magnitude of impact would be considered as medium
- **Low (L):** If the impacts are reversible, it indicates the potential rate of recovery. Then the magnitude of impact would be considered as low

Extent of Impact:

The spatial extent or the zone of influence of the impact should always be determined. The extent of an impact may be confined to the project site or area.

- **Regional (R):** An impact area considered to be of regional level, if it extends beyond the direct impact area to a larger region.
- **Local (L):** Impacts are limited to indirect impact area of the project it is will be taken as local impact.
- **Site Specific (SS):** If the impact is confined within direct impact area will be considered as Site-Specific impact.

Duration of Impact:

As environmental impacts have a temporal dimension, they should be discovered through an IEE. The impacts arising at different phases of the project cycle need to be appropriately considered. The types of impact produced during different phases of construction of a project are generally of temporary nature.

- **Long-Term (LT):** An impact that lasts beyond 20 years is considered to be long term
- **Medium Term (MT):** An impact that continues for more than 3 years but less than 20 years may be considered as medium term
- **Short-Term (ST):** An impact that lasts for only 3 years after project initiation may be classified as short term.

The allocation of scores for the Magnitude (High, Medium & Low), Extent (Regional, Local & Site-specific) and Duration (Long-term, Medium-term & Short-term) for each impact will be done as per the National EIA Guidelines, 1993.

Magnitude		Extent		Duration	
Category	Scores	Category	Scores	Category	Scores
High (H)	60	Regional	60	Long Term (LT)	20
Medium (M)	20	Local	20	Mid Term (MT)	10
Low (L)	10	Site Specific	10	Short Term (ST)	05

Source: National EIA Guideline 1993





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On the basis of expert judgment following scores will be used for the prioritization of the impacts where the impacts will be categorized in to 3 categories i.e. significant, moderately significant and insignificant based on the degree of score obtained by each impact.

Impact Level	Category	Scores
Significant	Significant (S)	>75
	Moderately Significant	45-75
Insignificant	Insignificant	<45

Impacts scoring above 45 will be considered as significant impact during IEE report mitigation measures will be provided for each. However, impacts scoring less than 45 will be considered as insignificant which might not be necessarily seek mitigations hence may not be essentially covered with mitigations.

3.9 Report preparation

The required IEE report will be prepared as per the format and content outlined in schedule 11 of the EPR, 2077 and the approved ToR. Brief report of IEE and executive summary of the IEE report will be also prepared in the Nepali language for the use of local stakeholders, DCC/ Municipalities and GoN agencies. The format of the report is attached in **Annex 1**.





4. RELEVANT PLANS / POLICIES, ACTS / RULES, GUIDELINES / STANDARDS AND CONVENTIONS TO BE TAKEN INTO ACCOUNT WHILE PREPARING THE REPORT

While implementing the project, it is the responsibility of the proponent to follow the standards specified in the existing policies, laws, regulations, standards and guidelines related to environmental protection. During the study of this project, IEE will be guided by the requirements and provisions of the following acts, rules and guidelines as applicable.

4.1. Constitution

- Constitution of Nepal

4.2. Plan and Policies

- Sixteenth Five-Year Plan, (FY 2081/82-2085/86)
- 20 Year Road Plan, 2059/60- 2079/80 BS
- National Biodiversity Strategy and Action Plan, 2071-2077
- National Environment Policy, 2076
- National Climate Change Policy, 2076 BS
- National Forest Policy 2075
- World Bank's Environmental and Social Framework (ESF), 2016 AD
- Social Security Plan, 2075 BS
- Land Use Policy, 2075 BS
- Policy on Land Acquisition, Resettlement, and Rehabilitation for Infrastructure Development Projects, 2071
- National Wetland Policy, 2059 BS
- National Transport Policy, 2058 BS
- National Transport Policy, 2058 BS
- Policy document of DoR on Environmental Assessment in the strategic road network, 2000 AD
- Environmental Assessment in the Road Sector of Nepal: A Policy Document, GESU/DoR, 2056 BS

4.3. Act

- Environment Protection Act, 2076 BS
- Control of International Trade of Endangered Wild Fauna and Flora Act, 2076
- Forest Act, 2076 BS
- Labour Act, 2074 BS





Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section
Term of Reference (ToR)

- Local Government Operation Act, 2074 BS
- Solid Waste Management Act, 2068
- Aquatic Animal Protection Act, 2017 (1960)
- Road Board Act, 2058
- Child Labour (Prohibition and Regularization) Act, 2056
- Motor Vehicles and Transport Management Act, 2049
- Mines and Minerals Act, 2042
- Soil and Watershed Conservation Act, 2039 BS
- Land Acquisition Act, 2034
- Public Road Act, 2031 BS
- Ancient Monument Preservation Act, 2013 BS

4.4. Rules/Regulations

- Forest Rule, 2079
- Environmental Protection Rule, 2077
- Labour Regulation, 2075
- Control of International Trade of Endangered Wild Fauna and Flora Regulation, 2074
- Solid Waste Management Rule, 2070
- Plant Protection Rules, 2066
- Vehicle and Transportation Management Rules, 2054
- Water Resources Regulations, 2050
- Soil and Watershed Conservation Rules, 2042
- Child Labour (Prohibition and Regulation) Rules, 2062 Public Roads Regulations, 2033

4.5. Manuals, Guidelines, and Work Plans

- Working Procedure to Use National Forest area for National Priority Projects, 2076
- CITES Convention and related laws in Nepal 2075
- Working Procedure to Use National Forest area for National Priority Projects, 2074 B.S.
- Government trees removal Guideline 2071
- ADB Environmental Assessment Guidelines, 2003 (2060)
- Public Road Management and Land Acquisition Guidelines, 2059
- Handbook on Road Bioengineering, 2056
- Environment Management Guidelines (Road), 2054
- Environmental Impact Assessment Guidelines for Forest Area, 2051
- National Environmental Impact Assessment Guidelines, 2050
- Environmental and Social Management Framework, DOR, 2007 (Amendment 2013)





Annexure for IEE study of Goringhe-Chandrauta Road section

Term of Reference (ToR)
Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

4.6. Standards

- National Road Standard, 2070
- National Ambient Air Quality Standards for Nepal, 2069
- Nepal Vehicular Mass Emission Standards, 2069
- Nepal Noise Standards, 2069
- National Bridge Standard, 2067
- National Drinking Water Quality Standards, 2062

4.7. International Conventions

- Convention on Biodiversity, 1992
- United Nations Framework Convention on Climate Change, 1992
- Convention (No 169) Concerning Indigenous and Tribal People in Independent Countries, 1989
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973





Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section
Term of Reference (ToR)

5. REPORT PREPARATION TIME AND TEAM COMPOSITION AND BUDGET FOR THE STUDY

5.1 Time Schedule

The IEE report will be prepared according to the format given in schedule 11 of the Environmental Protection Regulations, 2077. Details of the physical, biological, socio-economic and cultural environment related to the proposed project will be collected and include in the IEE report. The time required for the completion of this study is presented in the Table 18.

Table 18: Proposed schedule for IEE report preparation and approval

S.N.	Activities	Time (Weeks in the year 2024)															
		May				June				July				August			
		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1.	Desk Study: Mobilization of Study Team, Literature Review																
2.	Preparation and Approval of TOR																
3.	Publication of Public notice Field Study and Investigation																
4.	Public Hearing and Meeting with Stakeholder																
4.1	Interaction with Stakeholders and Collection of Suggestions and Comments																
4.2	Baseline Survey																
5.	Analysis and Prediction of Impacts																
6.	Identification of Mitigation/Enhancement Measures and Preparation of EMP and EMoP																
7.	Draft Report Preparation and Presentation																
8.	Submission of Draft Report																
9.	Revision and Submission of Final Report																
10.	Submission of Final IEE Report, and Approval of the IEE Report																

5.2 Study Team and Budget of the study

A multi-disciplinary team of subject matter specialists with proper orientation on environmental assessment has been engaged for the preparation of ToR for IEE study. This team will also be engaged for the IEE Study of the project. The composition will be as follows and the declarations of the experts along with consultant office has attached in Annex 10 of the report. The CV of the expert is also attached along with the self-declarations sheet in the annex. This IEE study has been awarded to the consultant along with the design package for where the supervision consultant for the Butwal-Goringhe-Chandrauta section will also design this upgradation package. There is sufficient financial resource for the study but not clearly indicated the specific cost for the environmental study as the report is a part of Detailed Designed Report where total cost is equivalent to Nrs. 38,50,000.00.





Annexure for IEE study of Gorusinghe-Chandrauta Road section

Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section
Term of Reference (ToR)

Table 19: Team composition for the IEE study

Name	Position in IEE study Team	Qualification	Number of Environmental Studies	Area (s) of study in IEE
Mr. Yub Raj Dhakal	Team Leader for Safeguard Documentation	MSc. in Environment Science	>40 EA reports	Overall, IEE Formulation
Mr. Krishna Prasad Bhushal	Biologist	MSc. in Zoology	>10 EA reports	Biological Environment
Mr. Krishna Khadka	Sociologist/Resettlement Expert	MA in Sociology	> 8 EA reports	Socioeconomic Environment
Mr. Rupam Kumar Singh	Highway Engineer	MSc. Transportation Engineering Ongoing	> 5 EA reports	Roadway
Mr. Bhabuk Raj Aryal	Bridge Engineer	MSc. Structural Engineer	None	Bridge-Structure
Mr. Suman Manandhar	Geologist/Geo-tech Engineer	MSc. Civil Engineer	>4 EA reports	Physical Environment
Mr. Rupak Bastola	Hydrologist	MSc. Water Resource Engineer	>7 EA reports	Hydrology





Term of Reference (ToR)
Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

6. SPECIFIC IMPACTS OF THE IMPLEMENTATION OF PROJECT ON THE ENVIRONMENT

IEE Report will not be limited to the issues or impacts mentioned in the ToR. The issues, which are not included in the ToR, if raised during IEE Study, will also be included. Based on the review of the project document, secondary information as well as site observation, checklist survey and consultations with the stakeholders of the project, following environmental impacts/issues have been identified for consideration for IEE Study.

6.1. Beneficial Impacts

General beneficial impacts include, but are not necessarily limited to the following

Pre-Construction Stage

No any issues related with enhancement observed during pre-construction stage

A. Construction Phase

- Generation of huge Employment opportunities
- Opportunities of new income sources
- Enhancement in technical skills

B. Operation Phase

- Improved transport facilities and international connectivity
- Reduced travel time and cost
- Enhancement in economic activities, trade and business
- Increase potential of industrial development
- Improve traffic facilities and resting places

6.2. Adverse Impacts

The likely adverse impacts during construction and subsequent operation and maintenance in terms of physical, chemical, biological, socioeconomic, cultural during implementation. Based on the identified impacts, appropriate mitigation measures will be recommended.

6.2.1. Socio-Economic Environment

Pre-Construction Phase

- Property Acquisition (Private, Public and Community).



Construction Phase

- Land acquisition and property/assets and their management issues
- Loss of agricultural land/production and productivity
- Impact on existing social and cultural practices
- Health and sanitation of workers as well as community health
- Potential increase in road safety concerns as well as road accident
- Pressure on social services (drinking water, health, school, bank, electricity etc.)
- Issues on infrastructures such as irrigation channel, transmission lines, telephone lines etc.
- Issues related with creation of dead traps on quarry/burrow area
- Conflict on or with nearby host community for relocating pipelines and other utilities/structures
- Issues of business disruption and disturbance to adjacent community
- Issues on community resources and utilization.

Cultural (Physical, Aesthetic and Religious/Historical) Aspect

- Impact on religious, cultural, and historical assets
- Issues related with Gau Samrakshan Kshetra near Bel River.

Operation and Maintenance Phase

- Issues related with maintaining the RoW and prevention from encroachment
- Change in social behavior of the community
- Creation of barrier effect for the community and cattle
- Risk associated with road safety

6.2.2. Physical and Chemical Environment

Preconstruction Phase

- Issues of permission for concern authorities/parties/persons for quarry and borrow pit crosser plant operation, labor camps, stock piling spoil disposal site and use of water source etc.
- Temporary disruption and relocation of existing services and public utilities.

Construction Phase

- Impact/issues due to quarry/burrow site operation
- Impact/issues associated with land use change
- Loss of productive soil (topsoil along the road and bed soil from lakes)
- Impact/issues associated with construction camps establishment and operation.



Annexure for IEE study of Goringhe-Chandrauta Road section

Term of Reference (ToR)
Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

- Impact/issues associated with operation of project components eg. Crusher plant, batching plant, workshop, asphalt concrete plant etc.
- Transportation of construction materials (Stock piling and muck/ spoil/waste disposal)
- Issues of compaction and turfing during embank stabilization.
- Drainage, soil erosion and sedimentation problem in the river & nearby settlement
- Impact/issues due to solid waste generation in camp as well as construction site
- Impact/issues associated with spoil from construction work as well as demolition waste
- Impact/issues on air quality, construction noise and vibration
- Impact/issues on surface and ground water contamination
- Impact/issues associated with disruption of water flow, drain clogging and inundation in U/S of the cross-drain structure.
- Impact/issues of occupational safety and health implements and its use
- Issues on occupational health and safety of workers as well as community
- Accidents regarding excavation and filling specially foundation of bridge as well as burrow and quarry operation areas.
- Impact/issues associated with loss of productive top soil as well as its contamination
- Increased carbon emission due to use of excessive fuel in construction works.
- Impact/issues associated with barrier effect and aesthetics
- Issues related with burrow operation for managing existing lakes.

Chemical Environmental Aspect

- Impacts/causes of construction materials (bitumens, paints, oil, grease and fuel), use of bitumen and their storage, heating and spreading
- Impacts/issues of construction wastes (Chemically hazardous liquid wastes and solid wastes, sanitary wastes, and other organic and inorganic wastes etc.) on the receiving water bodies and land units.

Operation and Maintenance Phase

- Impact/issues due to air, water pollution and noise
- Impact/issues due to obstruction on drainage/ water logging
- Reinstatement of work camp, labor camp, stockpiling yard, crusher plant, hot mix plant
- Impact/issues due to glare effect of high-speed vehicles and road accidents



6.2.3. Biological Environment

Pre-construction Phase

- Permission for clearance of trees area (with DFO, CFUGs, collaborative forest etc.) and fruit trees)
- Risk of damaging habitat/nest/roosting area of birds and corridor of wild animals.

Construction Phase

- Loss of forest (forest type and available plant species)
- Obstruction on mobility and potential risk of accident/fatality of wildlife due to construction ignorance
- Obstruction of wildlife movement corridors and risk of barrier effect.
- Possible impact on flora and fauna (biodiversity)
- Issues on aquatic ecosystem (flora and fauna)
- Issues related with creation of traps on quarry/burrow area
- Issues related with tree cutting and management of logs
- Risk of increasing forest fire

Operation and Maintenance Phase

- Depletion of forest resources
- Disturbance to the roadside vegetation
- Disturbance to wildlife due to light and noise during vehicular movement and barrier effect.

6.3. Any other seen/arisen issues during study

6.4. Measures to Enhance/ Control the Impact of the Implementation of the Proposal on the Environment

The impact from the proposed road can be beneficial as well as adverse. An effective implementing measure will maximize the beneficial impacts and mitigates the adverse one. Consideration will be given to the positive and negative effects of the construction, operation and implementation of project in terms of nature, magnitude, extent, duration.



7. ALTERNATIVES OF THE PROPOSALS

Alternative analysis is considered as an integral part of an IEE study, which involves an examination of alternative ways of achieving the objectives of a proposed project. The alternative analysis for a road project constitutes the development of an alternative transportation network for the enhancement of safe and faster connectivity of the rural area to market centers and thereby improve the economic conditions of the people living in the zone of influence. The alternatives, in this regard, could be alternative road alignment and alternative design. The study team will conduct alternative analysis considering the following issues keeping these as an option:

7.1. Project Site

Different alternative routes for the design will be assessed to avoid some significant environmental impacts like acquisition of land and property, trees felling, minimal forest loss, etc.

7.2. Technology, Implementation Procedure, Time-schedule and Raw materials

Technology-Assessment of the proposal implementation technology (mechanized, labor based) and its process of implementation (contractors, local labor groups etc.).

Procedure of Operation- Procedure of operation will be assessed in terms of round a year operation, seasonal operation. Types of vehicles and their specifications that are allowed to operate on the road will also be assessed in terms of need as well as demand in the area.

Time Schedule- Schedule of implementation of the proposal works will be assessed, including agriculture off-season, monsoon season, day and night time, etc.

Raw Materials to be Used- Assessment of alternative resources required for the proposal works will be assessed including cement, steel, gabion, boulders, gravel, sand, plants from local nurseries, etc.

7.3. Alternative Alignment:

This is an upgrading road project therefore; alignment has been fixed already.

7.4. No Action Option:

The No-project alternative prevents the implementation of the project. If the project not implemented in the proposed area that will be analyzed during the IEE study.





Form of Reference (No. 1)
Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section

8. PREVENTION AND MITIGATION OF ENVIRONMENTAL IMPACTS ASSOCIATED WITH PROJECT IMPLEMENTATION

The IEE team will recommend specific, pragmatic, feasible and cost-effective mitigation measures to address the potential adverse impact of the road construction works to acceptable levels. The mitigation measures and recommendations will be prepared with in-depth discussion with the local stakeholders and based on the expert judgment, will be presented as an Environment Management Plan. The adverse impacts mitigation measures will be categorized as avoidance, reduction and compensation measures. The EMPs will be included for both construction and operational stages. The cost of mitigation measures, organizational requirement and human resources will be finalized following discussion with responsible agencies and local stakeholders to implement the mitigation measures.

To overcome any adverse impact by the project, the proposed mitigation measures shall be categorized as

- Avoidance/ Preventive
- Minimize
- Mitigate
- Compensatory Measures/offset

Summary of cost for IEE which will include the following

- Cost for environmental mitigation measures
- Cost for enhancement measures
- Cost for other social support programs
- Cost for environmental monitoring

Environmental Management Action Plan (EMAP)

The environmental management action plan will be prepared to ensure proper implementation of measures to maximize the beneficial impacts and minimize adverse environmental impacts and to make the proposed project environmentally friendly and sustainable. EMAP systematically outlines mitigation measures and assigns roles and responsibilities of management, and provides a framework for monitoring the implementation of mitigation measures for all identified impacts. It highlights about the mitigation measures to be implemented, the location and time of implementation, method of implementation and the body responsible for implementation during the pre-construction, construction and operation phase of the project.



Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section

Term of Reference (ToR)

Environmental Management Plan of Road and bridges will be separately prepared. Format for the tabular presentation of the EMP will be as given in the format provided in Table 20, Table 21 and environmental cost will be summarized as provided in Table 22.

Table 20: Beneficial Impact Augmentation and Enhancement measures

Activities/Issues	Impacts	Augmentation, Enhancement Measures	Cost	Responsible agency
Construction Phase (Physical, Biological, Socioeconomic and Cultural Environment)				
Operation and Maintenance Phase (Physical, Biological, Socioeconomic and Cultural Environment)				

Table 21: Adverse Impact Mitigation Measures

Activities/Issues	Impacts	Mitigation Measures	Cost	Responsible agency
Pre-Construction Phase (Physical, Biological, Socioeconomic and Cultural Environment)				
Construction Phase (Physical, Biological, Socioeconomic and Cultural Environment)				
Operation and Maintenance Phase (Physical, Biological, Socioeconomic and Cultural Environment)				

Table 22: Summary of Enhancement and mitigation measures cost

SN	Description	Cost	Remarks





Annexure for IEE study of Gorusinghe-Chandrauta Road section

Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section
Term of Reference (ToR)

9. MATTERS TO BE MONITORED WHILE IMPLEMENTING THE PROPOSAL

An environmental monitoring plan will be developed for the baseline, compliance and impact monitoring of the project during construction and operation periods. Baseline, compliance and impact monitoring plan will include monitoring parameters/indicators, monitoring location, frequency, monitoring method and monitoring schedule along with the estimated item wise budget required for the monitoring as presented in Table 23. Following Environmental Monitoring will be provisioned in IEE report for assuring the EMP implementation of the project.

- A. Baseline Monitoring
- B. Compliance Monitoring
- C. Impact Monitoring

Table 23: Environmental monitoring Format

Parameter/ Impact	Verifiable Indicators	Means of Verification	Implementing agency	Monitoring agency	Cost
Baseline/pre-construction phase (Physical, Biological, Socioeconomic and Cultural Environment)					
Compliance/construction phase (Physical, Biological, Socioeconomic and Cultural Environment)					
Impact/Operation and maintenance phase (Physical, Biological, Socioeconomic and Cultural Environment)					





10. Other Necessary Matters

The IEE report must include various essential components, including relevant information, a reference list, annexes, maps, photographs, tables, charts, and questionnaires used during the baseline survey. Additionally, it should provide detail information about the proceedings of public hearings, including audio-video recordings, minutes, public notices, and the Muchulka. Recommendation letters from concerned municipalities will also be incorporated. Furthermore, the report will integrate inputs and suggestions gathered from public consultations with locals, stakeholders as well as rural municipalities.

The IEE report format will be produced in template of Schedule 11 of EPR, 2077 (pertaining) and will also be ensuring compliance with all its requirements. Conclusions and recommendations drawn from the study will be presented at the end of the report.





REFERENCES

- Characterization of Landslide Hazard and Design of Mitigation Works of High-Risk Landslides in Chure Area of Nepal (12 Districts)
- GoN, Ministry of Forests and Environment, (2077). Environmental Protection Rules, Nepal.
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- DoR, GESU, (2007). Environmental and Social Management Framework, Geo-Environment and Social Unit, Department of Roads, Ministry of Physical Planning and Works.
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- DoR, (2013). Nepal Road Standard 2070. Department of Roads, Ministry of Physical Infrastructure and Transport, Kathmandu.
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- MoFS, (2012). Plants of Nepal: Fact Sheet, Department of Plant Resources, Ministry of Forest and Soil Conservation, Kathmandu.
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- Grimmett, R. et al, (2016) Birds of Nepal-Revised Edition, Bloomsbury Publishing India Pvt. Ltd, VasantKunj, New Delhi 110070
- IUCN, (2021). The IUCN Red List of Threatened Species.
- Ministry of Environment, Science and Technology, (2012). National Ambient Air Quality Standards (NAAQS), Nepal Gazette, Section 62, Number 19, Nepal Gazette, Volume 5, Published date 2069/04/29.





Annexure for IEE study of Gorusinghe-Chandrauta Road section

Term of Reference (ToR)
Initial Environmental Examination (IEE) of Gorusinghe-Chandrauta (19 Km) road section

ANNEXES

- ANNEX 1: FORMAT OF IEE
- ANNEX 2: DESIGN OF THE ROAD
- ANNEX 3: FORMATS, CHECKLIST AND QUESTIONNAIRE
- ANNEX 4: RECOMMENDATION LETTER
- ANNEX 5: TEMPLATE OF PUBLIC NOTICE AND MUCHULKA
- ANNEX 6: MEETING MINUTES OF CONSULTATION
- ANNEX 7: MENTIONING DONOR FUNDED PROJECT (TOR FOR DETAIL STUDY OF
GORUSINGHE - CHANAUTA (19 KM) HIGHWAY IMPROVEMENT
PROJECT FUNDED BY WORLD BANK)
- ANNEX 8: RAJPATRA NEPAL GAZETTE MENTIONING ROW OF THE EXISTING
HIGHWAY 25 METER BOTH SIDES
- ANNEX 9: PHOTOGRAPHS
- ANNEX 10: SELF DECLARATION OF THE STUDY TEAM AND THEIR
CURRICULUM VITAE





Annexure for IEE study of Goringhe-Chandrauta Road section

Initial Environmental Examination (IEE) of Goringhe-Chandrauta (19 Km) road section
Term of Reference (ToR)

ANNEX I: FORMAT OF IEE

Abbreviation and Acronyms

Executive Summary (Nepali)

Executive Summary (English)

Table of contents

1. Name and address of Individuals or Institution preparing the report

2. Summary of the Report

- a. Objectives of the proposal
- b. Impact on Land Use
- c. Adverse impact on the environment, human life and population
- d. Damage on local infrastructures
- e. Other necessary matters

3. The following matters must be explicitly mentioned in the respect to the proposal

- a. Type of Proposal
- b. If related to delivery, the nature and type of goods to be delivered
- c. Materials to be used (Quantity and year to be mentioned).
- d. Emission resulting from the implementation of the proposal (the time of operation and the consequence volume of emission to be specified)
- e. Energy to be used
- f. Human resources requirement
- g. Resources required for the implementation of the proposal
- h. Total Gross Capital
- i. Detailed particulars of the area where the project is to be implemented
- j. Manufacturing Process
- k. Details of the Technology
- l. Other necessary matters

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

- a. Impact on the social, economic and cultural spheres
- b. Biological Impact
- c. Physical Impacts

5. Alternatives for the Implementation of the Proposal



ANNEXES

- ANNEX 1: FORMAT OF IEE
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Annexure for IEE study of Gorusinghe-Chandrauta Road section

ANNEX II: LAB REPORT OF AIR, WATER & NOISE



Lumbini Agro Environment Lab Pvt. Ltd.

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Helping the land to help the people
Sunsal-12, Nawalparasi, Estd: 2020

Regd No.: 239602/077/078
Vat No.: 609773466

Ref No: ३७१०८१/०८२

Issue Date: 2024-05-14

Quality Test Report

Entry No.: LAEL-382-2081

Client: Geocom International Pvt. Ltd.

Address: Kapilvastu

Contact no. of Client: 9843950840



Sample Type: Ambient Air

Sampling Start Date: 2024-08-15

Sampling End Date: 2024-08-16

Sampled By: Laboratory

Test Results

S.N.	Parameters	Unit	Observed Value			Tolerance Limit (National Air Quality Standard, Ministry of Forests and Environment, 2012) ($\mu\text{g}/\text{m}^3$)	Remarks
			M1	M2	M3		
1.	TSP	($\mu\text{g}/\text{m}^3$)	110	75	85	230	Within the limit
2.	PM10	($\mu\text{g}/\text{m}^3$)	70	55	65	120	Within the limit
3.	PM2.5	($\mu\text{g}/\text{m}^3$)	25	15	20	40	Within the limit
4.	SO ₂	($\mu\text{g}/\text{m}^3$)	N.D.	N.D.	N.D.	70	
5.	NO ₂	($\mu\text{g}/\text{m}^3$)	N.D.	N.D.	N.D.	80	

Note: N.D.: Not Detected

M1- Imiliya, GPS Location: N27°39.593' E082°59.607'

M2- Jwai Khola, GPS Location: N27°38.900' E082°54.609'

M3 - Chandrauta, GPS Location: N27°38.959' E082°51.859'

[Signature]
Analyzed By

[Signature]
Checked By

[Signature]
Authorized By

The laboratory report is not subjected to any kind of advertisement and publication purpose. The report is not subjected to any legal actions or court evidences. The results of parameters refer only to the tested samples.



Annexure for IEE study of Goringhe-Chandrauta Road section



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Ref No: 86/081/082



Helping the land to help the people
B-12, Nawalparasi, Estd: 2020

Regd No.: 239602/077/078
Vat No.: 609773466

Issue Date: 2081-09-01

Quality Test Report

Entry No.: LAEL-381-2081	Type of sample: Sound Level
Client: Geomac International Pvt. Ltd	Sampling Date: 2024-11-26
Address: M3 - Chandrauta, N27°38.959' E082°51.859'	Date completed: 2024-11-27
Contact No.: 9843950840	Location: Chandrauta road Premises
Contact Person: Sachin Jha	Sampled By: LAEL-field person
Device: SL-1352	Run Time: 24 hrs
Basic Functions	Range
Accuracy	±1.4dB
Resolution	0.1dB
Frequency Range	3.5-8KHz
Dynamic Range	50dB
Level Range	Low:30-80dB Medium:50-100dB
	High:80-130dB Auto:30-130dB
Time Weighing	FAST (125ms) SLOW(1s)

Test Results

Start Time: 2024-11-24	10:30:00	
End Time: 2024-11-25	10:30:00	
	Max: 75 dB(A)	
	Min: 45 dB(A)	

Description	Sound Level dB(A)
<i>L_{eq}(day)</i>	70
<i>L_{eq}(night)</i>	55

Day denotes 7:00 to 22:00 hours
Night denotes 22:00 to 7:00 hours

Analysed By:

Checked By:

Authorized By:

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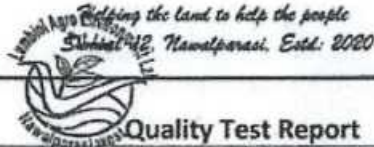


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Ref No: 85/084/082



Regd No.: 239682/077/078
Vat No.: 609773466

Issue Date: 2081-09-01

Quality Test Report

Entry No.: LAEL-380-2081	Type of sample: Sound Level
Client: Geomac International Pvt. Ltd	Sampling Date: 2024-11-26
Address: M2- Jwai Khola, N27°38.900' E082°54.609'	Date completed: 2024-11-27
Contact No.: 9843950840	Location: Jwai Khola road Premises
Contact Person: Sachin Jha	Sampled By: LAEL-field person
Device: SL-1352	Run Time: 24 hrs
Basic Functions	Range
Accuracy	±1.4dB
Resolution	0.1dB
Frequency Range	3.5-8KHz
Dynamic Range	50dB
Level Range	Low:30-80dB Medium:50-100dB
	High:80-130dB Auto:30-130dB
Time Weighing	FAST (125ms) SLOW(1s)

Test Results

Start Time: 2024-11-26	10:30:00
End Time: 2024-11-27	10:30:00
Max: 55 dB(A)	
Min: 35 dB(A)	

Description	Sound Level dB(A)
<i>L_{eq(day)}</i>	52
<i>L_{eq(night)}</i>	40

Day denotes 7:00 to 22:00 hours
Night denotes 22:00 to 7:00 hours

[Signature]
Analyzed By

[Signature]
Checked By

[Signature]
Authorized By

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Annexure for IEE study of Gorusinghe-Chandrauta Road section



Lumbini Agro Environment Lab Pvt. Ltd.

लुम्बिनी एग्रो इन्भाएरमेन्ट ल्याब प्रा. लि.



Ref No: 84/2081/092

Helping the land to help the people
Sunsat-12, Nawalparasi, Estd: 2072

Regd No.: 239602/077/078
Tax No.: 609773466



Issue Date: 2081-09-01

Quality Test Report

Entry No.: LAEL-379-2081	Type of sample: Sound Level
Client: Geomac International Pvt. Ltd	Sampling Date: 2024-11-24
Address: m-1 Imiliya, N27°39.593' E082°59.607'	Date completed: 2024-11-25
Contact No.: 9843950840	Location: Imiliya road Premises
Contact Person: Sachin Jha	Sampled By: LAEL-field person
Device: SL-1352	Run Time: 24 hrs
Basic Functions	Range
Accuracy	±1.4dB
Resolution	0.1dB
Frequency Range	3.5-8KHz
Dynamic Range	50dB
Level Range	Low:30-80dB Medium:50-100dB High:80-130dB Auto:30-130dB
Time Weighing	FAST (125ms) SLOW(1s)

Test Results

Start Time: 2024-11-25	10:30:00
End Time: 2024-11-26	10:30:00
Max: 72 dB(A)	
Min: 43 dB(A)	

Description	Sound Level dB(A)
Leisidant	66
Leisidant	53

Day denotes 7:00 to 22:00 hours
Night denotes 22:00 to 7:00 hours

[Signature]
Analyzed By

[Signature]
Checked By

[Signature]
Authorized By

The laboratory report is not subjected to any kind of advertisement and publication purpose. The report is not subjected to any legal actions or court evidences. The results of parameters refer only to the tested samples.



Lumbini Agro Environment Lab Pvt. Ltd.

लुम्बिनी एगो एन्वायरनमेन्ट ल्याब प्रा. लि.

Helping the land to be green
Sawal-12, Nawalpur, Nepal-2020
Nawalpur
Est. 2008

Regd No.: 239602/077/078
Vat No.: 609773466



Ref No: 82/084/082

Issued Date: 2081-09-01

Quality Test Report

Name of Client:	Goringhe Khola	Lab Code:	LAL-378-2081
Collector:	Parendra Gupta	Location:	Kapilvastu, N27°39.480' E082°59.814'
Source:	Surface water	Sampled By:	Laboratory
Sampling Date:	2081-08-15	Test Performance Date:	2081-08-16 to 2081-08-21
Receipt Date:	2081-08-16		

S.N.	Category	Parameters	Method	Observed value	Wastewater Discharge Guidelines, Nepal (MOE 2010)
1.	Physical	pH	4500-H ⁺ B, APHA, AWWA, WEF, 24 th Edition	7.4	5.5-9.0
2.		Temp. °C	Thermometric	21.7	-
3.		TDS (mg/L)	2540 C, APHA, AWWA, WEF, 24 th Edition	266	
4.		Electrical Conductivity (µS/cm)	2510 B, APHA, AWWA, WEF, 24 th Edition	491	
5.	Chemical	Total Suspended Solids, TSS (mg/L)	2540 D, APHA, AWWA, WEF, 24 th Edition	20	50
6.		Chemical Oxygen Demand (mg/L)	5220 B, APHA, AWWA, WEF, 24 th Edition	68	250
7.		Dissolved Oxygen (mg/L)	4500-O C, APHA, AWWA, WEF, 24 th Edition	7.86	

Note:

1. This report is based on the sample submitted to this laboratory by the client
2. The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

Analysed By
Dipendra Shrestha
B.Sc. Ag

Checked By
Dipendra Shrestha
B.Sc. Ag

Authorized By
Sudip Paudel
M.Sc. Env. Sci

The laboratory report is not subjected to any kind of advertisement and publication purpose. The report is not subjected to any legal actions or court evidences. The results of parameters refer only to the tested samples.



Annexure for IEE study of Gorusinghe-Chandrauta Road section



Lumbini Agro Environment Lab Pvt. Ltd.

लुम्बिनी एग्रो इन्भाएरमेन्ट ल्याब प्रा. लि.

Helping the land, serving the people
Summit-12, Nepal, Kathmandu, Sept. 2020

Regd No.: 239602/077/078
Vat No.: 609773466



Ref: 052/061/082

Issued Date: 2081-09-01

Quality Test Report

Name of Client:	Balla Khola	Lab Code:	LAEL-377-2081
Collector:	Parendra Gupta	Location:	Kapilvastu, N27°39.051' E082°54.965'
Source:	Surface water	Sampled By:	Laboratory
Sampling Date:	2081-08-15	Test Performance Date:	2081-08-16 to 2081-08-21
Receipt Date:	2081-08-16		

S.N.	Category	Parameters	Method	Observed value	Wastewater Discharge Guidelines, Nepal (MOE 2010)
1.	Physical	pH	4500-H ⁺ B, APHA, AWWA, WEF, 24 th Edition	7.6	5.5-9.0
2.		Temp. °C	Thermometric	21.7	-
3.		TDS (mg/L)	2540 C, APHA, AWWA, WEF, 24 th Edition	286	
4.		Electrical Conductivity (µS/cm)	2510 B, APHA, AWWA, WEF, 24 th Edition	528	
5.	Chemical	Total Suspended Solids, TSS (mg/L)	2540 D, APHA, AWWA, WEF, 24 th Edition	25	50
6.		Chemical Oxygen Demand (mg/L)	5220 B, APHA, AWWA, WEF, 24 th Edition	65	250
7.		Dissolved Oxygen (mg/L)	4500-O C, APHA, AWWA, WEF, 24 th Edition	7.88	

Note:

1. This report is based on the sample submitted to this laboratory by the client
2. The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

Analysed By
Dipesh Sahani
BSc. Ag

Checked By
Dipesh Sahani
BSc. Ag

Authorized By
Sudip Paudel
MSc. Env. Sci

The laboratory report is not subjected to any kind of advertisement and publication purpose. The report is not subjected to any legal actions or court evidences. The results of parameters refer only to the tested samples.



Annexure for IEE study of Gorusinghe-Chandrauta Road section

Regd. No. 53875/064/065



AASTHA SCIENTIFIC RESEARCH SERVICE PVT. LTD.

Maitidevi, Kathmandu, Nepal, Tel: +977-1-4533748

E-mail: aasthalab2079@gmail.com

(Center for complete scientific solution)



Report No. : 405C
Entry No. : AASTHA-491-2081/82
Sample : Water
Client : Lumbini Agro Environment Lab
Source : Goru Singhe Khola

Date received : 21/08/2081
Date completed : 22-23/08/2081
Sampled By : Client
Issue Date : 24/08/2081

S. N.	Parameter	Test Method	Observed Values
1.	Iron (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.51
2.	Manganese (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.13
3.	Lead (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.01
4.	Cadmium (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.003
5.	Nickel (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.01
6.	Chromium (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.05
7.	Copper (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.01
8.	Zinc (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.02
9.	Arsenic (mg/l)	3114 C, APHA, AWWA, WEF, 24 th Edition.	<0.01

Analyzed By

Checked By

Authorized By
(Chairperson)

- Note : 1. The issued report refers only to the tested sample and applicable parameters. Endorsement of products is neither inferred nor implied.
2. Liability of our institute is limited to the invoiced determinands and amount only.
3. Even in the case of stable samples such as limestone, minerals, soil etc. they will not be stored more than two months unless specially requested by the client.
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Annexure for IEE study of Gorusinghe-Chandrauta Road section

Regd. No. 53875/064/065



AASTHA SCIENTIFIC RESEARCH SERVICE PVT. LTD.

Maltidevi, Kathmandu, Nepal, Tel: +977-1-4533748
E-mail: aasthalab2079@gmail.com

(Center for complete scientific solution)



Report No. : 405A
Entry No. : AASTHA - 491 - 2081/82
Sample : Water
Client : Lumbini Agro Environment Lab
Source : Balia Khola

Date received : 21/08/2081
Date completed : 22-23/08/2081
Sampled By : Client
Issue Date : 24/08/2081

S. N.	Parameter	Test Method	Observed Values
1.	Iron (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.15
2.	Manganese (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.13
3.	Lead (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.01
4.	Cadmium (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.003
5.	Nickel (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.01
6.	Chromium (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.05
7.	Copper (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.01
8.	Zinc (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.02
9.	Arsenic (mg/l)	3114 C, APHA, AWWA, WEF, 24 th Edition.	<0.01

Analyzed By

Checked By

Authorized By
(Chairperson)

Note : 1. The issued report refers only to the tested sample and applicable parameters. Endorsement of products is neither inferred nor implied.
2. Liability of our Institute is limited to the invoiced deliverables and amount only.
3. Even in the case of stable samples such as limestone, minerals, soil etc, they will not be stored more than two months unless specially requested by the client.
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**AASTHA SCIENTIFIC RESEARCH SERVICE PVT. LTD.**

Maitidevi, Kathmandu, Nepal, Tel: +977-1-4533748
E-mail: aasthalab2079@gmail.com

(Center for complete scientific solution)



Report No. : 405B
Entry No. : AASTHA - 491 - 2081/82
Sample : Water
Client : Lumbini Agro Environment Lab
Source : Jwai Khola

Date received : 21/08/2081
Date completed : 22-23/08/2081
Sampled By : Client
Issue Date : 24/08/2081

S. N.	Parameter	Test Method	Observed Values
1.	pH	4500-H ⁺ , B, APHA, AWWA, WEF, 24 th Edition.	7.5
2.	Temperature (°C)	Thermometer	21.6
3.	TDS (mg/l)	2540 C, APHA, AWWA, WEF, 24 th Edition	395
4.	Electrical Conductivity (µmhos/cm)	2510 B, APHA, AWWA, WEF, 24 th Edition.	730
5.	Total Suspended Solids (mg/l)	2540 D, APHA, AWWA, WEF, 24 th Edition	18
6.	COD (mg/l)	5220 B, APHA, AWWA, WEF, 24 th Edition	75
7.	DO (mg/l)	4500-O C, APHA, AWWA, WEF, 24 th Edition	7.82
8.	Iron (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.27
9.	Manganese (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.08
10.	Lead (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.01
11.	Cadmium (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.003
12.	Nickel (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.01
13.	Chromium (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	<0.05
14.	Copper (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.01
15.	Zinc (mg/l)	3111 B, APHA, AWWA, WEF, 24 th Edition.	0.02
16.	Arsenic (mg/l)	3114 C, APHA, AWWA, WEF, 24 th Edition.	<0.01

Analyzed By

Checked By

Authorized By
(Chairperson)

Notes: 1. The issued report refers only to the tested sample and applicable parameters. Endorsement of products is neither inferred nor implied.
2. Liability of our institute is limited to the invoiced detriments and amount only.
3. Even in the case of stable samples such as limestone, minerals, soil etc. they will not be stored more than two months unless specially requested by the client.
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Annexure for IEE study of Gorusinghe-Chandrauta Road section

ANNEX III: SELF-DECLARATION OF EXPERTS WITH CV

DECLARATION OF CONSULTANT

Title of the Report: IEE Study of Gorusinghe-Chandrauta Road section of EWH (19.838 km)

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID), Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Subject: Declaration for IEE Study

It is to be informed that Development Cooperation Implementation Division, (DCID), Department of Roads has entrusted Joint venture of LEA, Geocom & Material Test (P) Dhobighat, Lalitpur for the Initial Environmental Examination (IEE) study of the Gorusinghe-Chandrauta Road section of EWH (19.838 km), Kapilvastu, Lumbini Province, Nepal. As consultant Project Team Leader / Sr. Highway Engineer we declare the following regarding the submitted ToR for the IEE study of the Project report.

1. We have provided correct and relevant information to the study team.
2. We have allowed the study team to conduct the study professionally and independently.
3. We have read and understood the content of the IEE Report.

Signature:

Name: V. Chandra Sekharam

Date: 25th June, 2024

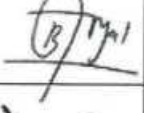
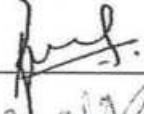
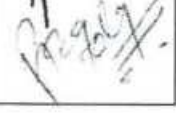


Official Stamp

Study Team

Title of the Report: IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km)

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID),
Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Name	Position in IEE study Team	Qualification	Years of experience	Number of Environmental Studies	Area (s) of study in IEE	Signature
Mr. Yub Raj Dhakal	Team Leader for Safeguard Documentation	MSc. in Environment Science	20 yrs	>40 EA reports	Overall, IEE Formulation	
Mr. Krishna Prasad Bhusal	Biologist	MSc. in Zoology	15 yrs	>10 EA reports	Biological Environment	
Mr. Krishna Khadka	Sociologist/Resettlement Expert	MA in Sociology	12 yrs	>8 EA reports	Socioeconomic Environment	
Mr. Rupam Kumar Singh	Highway Engineer	MSc. Transportation Engineering Ongoing	16 yrs	>5 EA reports	Roadway	
Mr. Bhabuk Raj Aryal	Bridge Engineer	MSc. Structural Engineer	11 yrs	None	Bridge-Structure	
Mr. Suman Manandhar	Geologist/Geo-tech Engineer	MSc. Civil Engineer	13 yrs	>4 EA reports	Physical Environment	
Mr. Rupak Bastola	Hydrologist	MSc. Water Resource Engineer	17 yrs	>7 EA reports	Hydrology	



Annexure for IEE study of Gorusinghe-Chandrauta Road section

DECLARATION OF IEE STUDY TEAM LEADER

Title of the Report: IEE Study of Gorusinghe-Chanauta Road section of EWH (19.838 km), Kapilvastu district, Lumbini Province, Nepal

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID), Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Subject: Declaration for IEE Study

I would like to inform you that me **Yub Raj Dhakal** have worked as **Team Leader** to prepare this Terms of Reference and will engage for the **IEE Study of Gorusinghe-Chanauta Road section of EWH (19.838 km)**, Kapilvastu, Lumbini Province, Nepal. Being team leader of the study, I declared the following:

1. I have read and check the content of this report properly;
2. My team members have conducted the study professionally using acceptable methodologies;
3. The study findings are correct to the best of my knowledge and have not been altered in any manners;
4. The methodology used in the study are, to the best of my knowledge, reliable, practical and adequate to comply with the relevant legal requirements;
5. Myself and my team shall be accountable for any misleading information's in any part of this report.

Signature:

Name: **Yub Raj Dhakal**

Team Leader for Safeguard Documentation

Consultant office: LEA Associates South Asia Pvt Ltd in association with Geocom Int. Pvt Ltd. & Material Test Pvt. Ltd.

Dhobighat, Lalitpur

Date: 25th June, 2024

Official Stamp

DECLARATION OF IEE STUDY TEAM MEMBER

Title of the Report: IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km), Kapilvastu district, Lumbini Province, Nepal

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID), Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Subject: Declaration for IEE Study

I would like to inform you that me **Krishna Prasad Bhushal** have worked as **Team Member** to prepare this document for **IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km Kapilvastu district, Lumbini Province, Nepal.** Being team member of the study, I declared the following:

1. I have conducted the study professionally using acceptable methodologies;
2. The study findings are correct to the best of my knowledge and have not been altered in any manner;

I shall be accountable for any misleading information's in any part of this report related to my area of study.

Signature:

Name: **Krishna Prasad Bhushal**

Official Stamp

Biologist

Consultant office: LEA Associates South Asia Pvt Ltd in association with Geocom Int. Pvt Ltd. & Material Test Pvt. Ltd.

Dhobighat, Lalitpur

Date: 25th June, 2024



Annexure for IEE study of Gorusinghe-Chandrauta Road section

DECLARATION OF IEE STUDY TEAM MEMBER

Title of the Report: IEE Study of Gorusinghe-Chanauta Road section of EWH (19.838 km), Kapilvastu district, Lumbini Province, Nepal

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID), Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Subject: Declaration for IEE Study

I would like to inform you that me **Krishna Khadka** have worked as **Team Member** to prepare this document for **IEE Study of Gorusinghe-Chanauta Road section of EWH (19.838 km)** in Kapilvastu district, Lumbini Province, Nepal. Being team member of the study, I declared the following:

1. I have conducted the study professionally using acceptable methodologies;
2. The study findings are correct to the best of my knowledge and have not been altered in any manner;
3. I shall be accountable for any misleading information's in any part of this report related to my area of study.

Signature:

Name: **Krishna Khadka**

Official Stamp

Sociologist/Resettlement Expert

Consultant office: LEA Associates South Asia Pvt Ltd in association with Geocom Int. Pvt Ltd. & Material Test Pvt. Ltd.

Dhobighat, Lalitpur

Date: 25th June, 2024



Annexure for IEE study of Gorusinghe-Chandrauta Road section

DECLARATION OF IEE STUDY TEAM MEMBER

Title of the Report: IEE Study of Gorusinghe-Chanauta Road section of EWH (19.838 km), Kapilvastu district, Lumbini Province, Nepal

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID), Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Subject: Declaration for IEE Study

I would like to inform you that me **Rupam Kumar Singh** have worked as **Team Member** to prepare this document for **IEE Study of Gorusinghe-Chanauta Road section of EWH (19.838 km Kapilvastu district, Lumbini Province, Nepal**. Being team member of the study, I declared the following:

1. I have conducted the study professionally using acceptable methodologies;
2. The study findings are correct to the best of my knowledge and have not been altered in any manner;
3. I shall be accountable for any misleading information's in any part of this report related to my area of study.

Signature:

Official Stamp

Name: **Rupam Kumar Singh**

Highway Engineer

Consultant office: LEA Associates South Asia Pvt Ltd in association with Geocom Int. Pvt Ltd. & Material Test Pvt. Ltd.

Dhobighat, Lalitpur

Date: 25th June, 2024



Annexure for IEE study of Goringhe-Chandrauta Road section

DECLARATION OF IEE STUDY TEAM MEMBER

Title of the Report: IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km), Kapilvastu district, Lumbini Province, Nepal

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID), Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Subject: Declaration for IEE Study

I would like to inform you that me **Bhabuk Raj Aryal** have worked as **Team Member** to prepare this document for **IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km)** in Kapilvastu district, Lumbini Province, Nepal. Being team member of the study, I declared the following:

1. I have conducted the study professionally using acceptable methodologies;
2. The study findings are correct to the best of my knowledge and have not been altered in any manner;
3. I shall be accountable for any misleading information's in any part of this report related to my area of study.

Signature:

Official Stamp

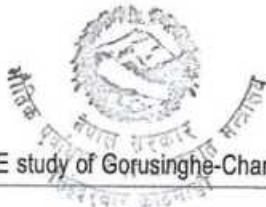
Name: **Bhabuk Raj Aryal**

Bridge Engineer

Consultant office: LEA Associates South Asia Pvt Ltd in association with Geocom Int. Pvt Ltd. & Material Test Pvt. Ltd.

Dhobighat, Lalitpur

Date: 25th June, 2024



Annexure for IEE study of Goringhe-Chandrauta Road section

DECLARATION OF IEE STUDY TEAM MEMBER

Title of the Report: IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km), Kapilvastu district, Lumbini Province, Nepal

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID), Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Subject: Declaration for IEE Study

I would like to inform you that me **Suman Manandhar** have worked as **Team Member** to prepare this document for **IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km)** in Kapilvastu district, Lumbini Province, Nepal. Being team member of the study, I declared the following:

1. I have conducted the study professionally using acceptable methodologies;
2. The study findings are correct to the best of my knowledge and have not been altered in any manner;
3. I shall be accountable for any misleading information's in any part of this report related to my area of study.

Signature:

Official Stamp

Name: **Suman Manandhar**

Geologist/Geo-tech Engineer

Consultant office: LEA Associates South Asia Pvt Ltd in association with Geocom Int. Pvt Ltd. & Material Test Pvt. Ltd.

Dhobighat, Lalitpur

Date: 25th June, 2024



Annexure for IEE study of Goringhe-Chandrauta Road section

DECLARATION OF IEE STUDY TEAM MEMBER

Title of the Report: IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km), Kapilvastu district, Lumbini Province, Nepal

Name and Address of the Project Proponent: Development Cooperation Implementation Division, (DCID), Department of Roads, Government of Nepal, Babarmahal, Kathmandu, Nepal.

Subject: Declaration for IEE Study

I would like to inform you that me **Rupak Bastola** have worked as **Team Member** to prepare this document for **IEE Study of Goringhe-Chandrauta Road section of EWH (19.838 km)** in Kapilvastu district, Lumbini Province, Nepal. Being team member of the study, I declared the following:

1. I have conducted the study professionally using acceptable methodologies;
2. The study findings are correct to the best of my knowledge and have not been altered in any manner;
3. I shall be accountable for any misleading information's in any part of this report related to my area of study.

Signature:

Official Stamp

Name: **Rupak Bastola**

Hydrologist

Consultant office: LEA Associates South Asia Pvt Ltd in association with Geocom Int. Pvt Ltd. & Material Test Pvt. Ltd.

Dhobighat, Lalitpur

Date: 25th June, 2024