Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division

Bangladesh-Bhutan-India-Nepal (BBIN) Multi-phase Programmatic Approach (MPA) Regional Transport and Trade Facilitation Program - Nepal Phase 1

Upgrading of Butwal-Gorusinghe Road Section of East-West Highway

Environmental and Social Impact Assessment

April 2022

The photograph on the cover page shows the existing Butwal-Gorusinghe Road Section near Saljundhi during rainy weather

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List of Acronyms

amsl	Above mean sea level
AP	Affected peoples
BBIN	Bangladesh-Bhutan-India Nepal
BCDP	Building Code Development Project
BOD	Biological Oxygen Demand
CBOs	Community Based Organizations
CDC	Compensation Determination Committee
CC	Construction Contractor
C-ESMP	Contractor's Environmental and Social Management Plan
CF	Community Forests
CITES	Convention on International Trade of Endangered Species
CoI	Corridor of Impact
CSC	Construction Supervision Consultant
cums	Cubic meters
DAO	District Administration Office
DBST	Double Bituminous Surface Treatment
DCC	District Coordination Committee
DCID	Development Cooperation Implementation Division
DFO	District Forest Office
DIA	Direct Impact Area
DLR	District Land Revenue Office
DNPWC	Departmentof National Parks and Wildlife Conservation
DO	Dissolved Oxygen
DoLOS	Department of Labour and Occupational Safety
DoMG	Department of Mines and Geology
DoR	Department of Roads
DoTM	Department of Transport Management
DPHO	District Public Health Office
DRO	Divisional Road Offices
EA	Environmental Assessment
EHS	Environment Health and Safety
EPA	Environmental Protection Act
EAAA	Ecologically Appropriate Area of Analysis
ESCP	Environmental and Social Commitment Plan
ESIA	Environment and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESF	Environment and Social Framework
IAS	Invasive Alien Species
IPDP	Indigenous Peoples Development Plan
IPPF	Indigenous Peoples Planning Framework
IFC	International Finance Corporation
IIA	Indirect Impact Area
IP	Indigenous People
KII	Key Informant Interviews
LHF	Leasehold Forest
LLR	Land and Land Resources
LMP	Labour Management Procedure
MBT	Main Boundary Thrust (MBT),
MCT	Main Central Thrust
MFT	Main Frontal Thrust (MFT).
MoFE	Ministry of Forest and Environment
MoPIT	Ministry of Physical Infrastructure and Transport
MT	Mahabharat Thrust
NDWQS	National Drinking Water Quality Standard
NEFIN	Nepal Federation of Indigenous Nationalities
NEIC	National Earthquake Information Centre
NGDC	National Geological Data Centre
NGO	Non-Government Organization
NNQSL	National Noise Quality Standard Limit
NOAA	National Oceanic and Atmospheric Administration
NTFP	Non-Timber Forest Products
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Association
PA	Project Area
PAF	Project Affected Families
PAP	Project Affected Persons
PCU	Project coordination Units
PGA	Peak Gravitational Acceleration
PCU	Project Coordination UnitProject Coordination Unit
RAP	Resettlement Action Plan
RM	Rural Municipality
RoW	Right of Way
SC	Supervision Consultant
SDGs	Sustainable Development Goals

ESS	Environmental and Social Standard
FB	Footbridges
FGD	Focus Group Discussions
FPIC	Free Prior Informed Consent
GBV	Gender Based Violence
GESU	Geo-Environment and Social Unit
GHG	Green House Gas
GoN	Government of Nepal
GPN	Good Practice Note
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
ha	Hectare
HHs	Households
SEP	Stakeholder Engagement Plan
SPAF	Severely Project Affected Families
SRCTIP	Strategic Road Connectivity and Trade Improvement Project
SRN	Strategic Road Network
STI	Sexually Transmitted Infections
TAL	Terai Arc Landscape
IPPF	Indigenous People's Planning Framework
IPDP	Indigenous People's Development Plan
WB	World Bank
ZOI	Zone of Influence

EXECUTIVE SUMMARY

Introduction

The Government of Nepal is preparing the Bangladesh-Bhutan-India-Nepal (BBIN) Multi-phase Programmatic Approach (MPA) Regional Transport and Trade Facilitation Program for World Bank financing, which is to be implemented in phases. The BBIN Nepal Phase 1 Project (the Project) is the first phase of the Program to support The main objective of the Project is to develop efficient and resilient trade and transport along selected regional corridors in the BBIN countries. The Project has three components:

- **Component 1:** Digital Systems for trade. This component may support the adoption and Implementation of Digital and Automated Systems for improvement of Nepal's cross-border clearances: (a) Development of electronic Automated Border Management including electronic cargo tracking system, (b) Business Intelligence and Data Analytics Package and Risk Engine (c) Development of web-based supply MIS for automation of registration processes and permits.
- **Component 2:** Green and Resilient Transport and Trade Infrastructure. This component will support (a)Upgrading of Butwal-Gorusinghe Road section and Gorusinghe-Chanauta Road section of East-West Highway from 2 to 4 lanes, (b) Construction of a green resilient urban bridge (including detailed design/urban design and construction), and (c) Support for development and implementation of green resilient highway concept, integrating transportation functionality and ecological sustainability.
- **Component 3:** This component will provide support in streamlining the policy environment for regional trade and cross-border movement of goods through (a) Bangladesh-India-Nepal Motor Vehicle Agreement related reforms, (b) Customs reforms, (c) Private sector support initiatives, (d) Capacity Strengthening, and (e) Project preparation studies.
- **Component 4**: Contingency Emergency Response will support unforeseen emergency needs. In case of a major natural or human made disaster, GoN may request the Bank to re-allocate project funds to this component to support its quick response and reconstruction

Environmental and Social Risk and Impact Assessment Approaches of the Project

The Project is adopting an Environmental and Social Management Framework (ESMF) and subproject-specific Environmental and Social Impact Assessment (ESIA) for the screening, assessment and management of environmental and social impacts and risks of the project and subprojects. The ESMF, which is developed and disclosed separately, will be used to guide the screening, impact assessment and development of the environmental and social management measures (ESMP) of the yet to be defined and designed Gorusinghe-Chanauta Road section of the East-West Highway, the Green resilient urban bridge and upgradation of facilities of land ports at important border crossings. During project implementation, the design details of these activities/subprojects are defined and prepared.

This ESIA is prepared for the Butwal-Gorusinghe Road section of the East-West Highway based on the conceptual design to assess the environmental and social risks and impacts before execution of the project following the Government of Nepal's (GoN) requirements and World Bank's Environmental and Social Framework (ESF).

Description of the Butwal-Gorusinghe Road Section of the East-West Highway

The Butwal-Gorusinghe (BG) road is located in the Rupandehi and Kapilbastu districts of Lumbini Province. The alignment begins at the Tinau bridge near Butwal. It passes through Batauli Bazar, Maina Bagar, Naya gaun, Belbas, Nayabasti, Bankatahawa, Murgiya, Rampur, Basgadi, Saljhandi, Pipra, Badgaun, Jitpur, Gorusinghe Baza., ending at Gorusinghe. The location of the road is shown in Figure E1.

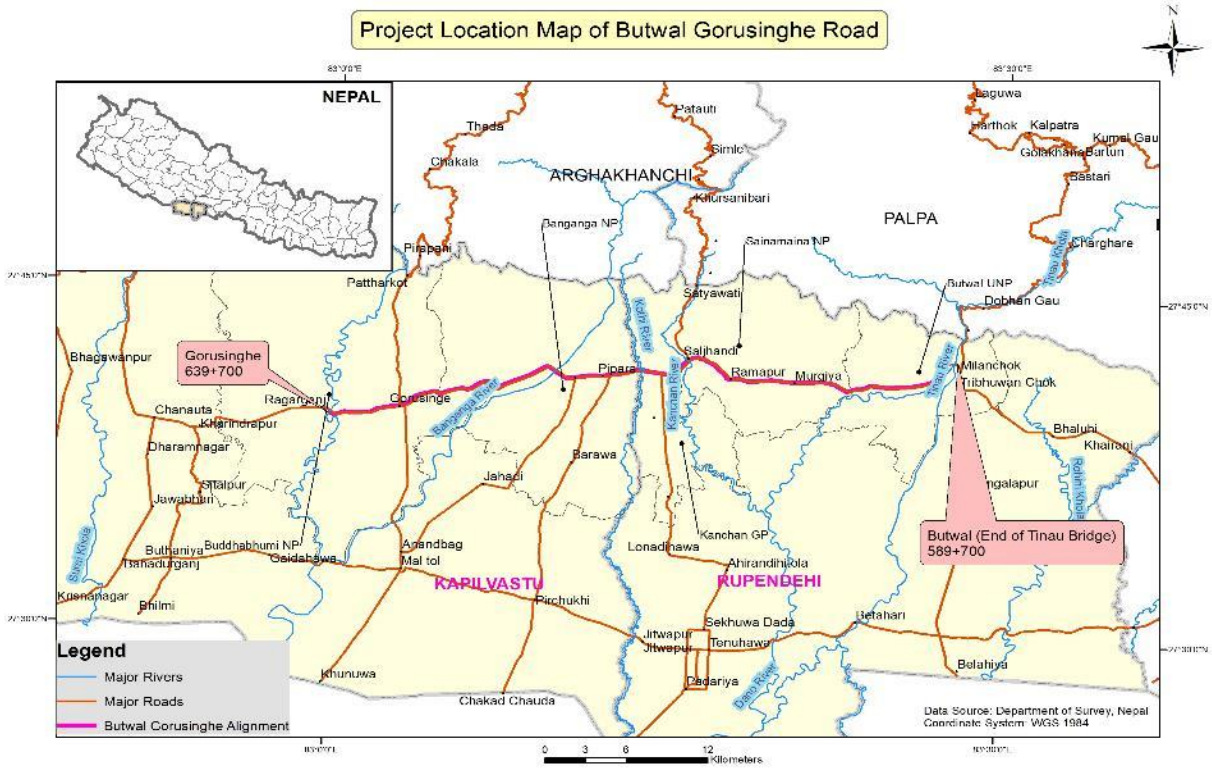


Figure E1: Location Map of Butwal Gorusinghe (BG) Road

The existing 50km long BG Road is a two-lane bituminous road with a 6 m carriage way and 1 m shoulder on both sides. The BG Road is one of the key sections of the East-West Highway, connecting many cross-border trade facilities with India. The current condition of the road is poor due to damages and cracks to the pavement with pot holes at many locations. The retaining walls in the initial section are also in poor condition. There are no road safety facilities, such as foot paths, pedestrian crossings, paved shoulders, road signs, crash barriers, etc.

Under the Project, BG Road will be upgraded from 2 lanes to 4 lanes with additional services roads (16.4 km in urban and 10.8 km in semi-urban areas), pedestrian sheds, footpaths and cycle lanes (in urban areas – 16.4 km). Thirty-one new bridges with lengths varying from 6-96 m (except one bridge on Banganga River, which is 289 m long) will also be constructed. Improving road safety will also be a key feature of BG Road improvement works and include installing signages and imposition of speed limits. The existing right of way (ROW) of the road is 50m, and the proposed works will be implemented within the available existing ROW. The salient features of the existing road and proposed road upgrading works are given in Table E1. A conceptual design of these upgrades is shown in Figure E2.

Table E1. Salient Features of the Existing BG Road and Proposed Upgrades

Features	Existing Road	Proposed Upgrades
Length	50 Km	50 km
Terrain	Plain (47.3 km), Rolling (1.7 km)	Plain (47.3 km), Rolling (1.7 km)
Right of Way	50 m	50 m
Total width (Road + service lanes + shoulders)	7.50 m to 8.50m	• 24 m in non-urban (rural and forest) areas (total length: 22.68 km) • 33 m in semi-urban areas (10.76 km) • 50 m in urban areas (16.36 km)
Number of lanes	2	4 (each lane width 3.5 m)
Number of Additional Lanes for service roads	None	• None in non-urban areas • 2 (each width is 3.5m) in semi-urban areas (on both sides of shoulders) • 4 (each width is 3.25m) in urban areas
Foot paths	None	• None in rural and semi-urban areas. • 2 (each width 2 m) in urban areas (on both sides of service roads)
Cycle lanes	None	• None in rural and semi-urban areas • 2 (width 2.3 m) in urban areas (on both sides of foot paths) –
Length of median	None	3 m width of the median along 50 km
Existing shoulders widths	0.50 m to 1.00m	2.5 m Paved shoulders
Number of bridges	31	31
Number of culverts	153	160
Length of retaining walls	112m	1500 m, approximately
Length of side drains	25 Km	70.44 km
Road safety improvements		Number of major villages/bazaars: 19 Number of major junctions: 4 Number of minor junctions: 12

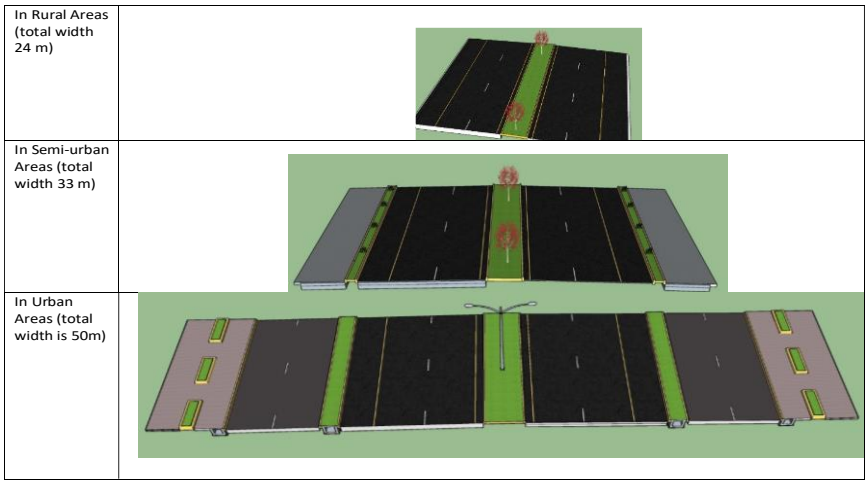


Figure E2: Conceptual Design of Proposed Improvements of BG Road

Scope of ESIA for the Butwal-Gorusinghe Road

This ESIA is for the BG Road to: i) establish the environment and social characteristics/baseline within the Direct Impact Area (a 300 m corridor, 150m on both sides of the center of the road, where there will be direct impacts) and Indirect Impact Area (covering the area between 150m from the centre of the road to 1 km, where there could be indirect impacts); ii) assess potential adverse and positive environmental and social (E&S) risks and impacts due to the planned improvements under the project during its entire cycle, that is, from preconstruction to construction, operation and maintenance; iii) consider all Environment, Social, Health and Safety (ESHS) risks and impacts likely in the BG road improvement works; and to propose measures to address all environmental an social impacts of the road improvement. The ESMP proposed in this ESIA study will be complemented by key social management plans such as the Resettlement Action Plan (RAP), Resettlement Policy Framework (RPF), Stakeholder Engagement Plan (SEP), Labour Management Procedure (LMP), Indigenous Peoples Planning Framework (IPPF), and Gender-Based Violence (GBV) Risk Mitigation Action Plan.

Legal and Institutional Framework

Nepal's national legislative framework, WB Environmental and Social Framework (ESF) and Environment Health and Safety Guidelines (EHSGs), form the legal and institutional framework for this ESIA. This section of the ESIA provides an overview of the applicable environmental and social policies, legislative and institutional frameworks, which the project must comply during its implementation. The national legal and institutional framework is based on the Constitution of Nepal (2015), which provides the right of everybody to live in a clean and healthy environment and conserve, promote and make sustainable use of natural resources. A detailed analysis of the existing legislative framework in Nepal was undertaken, which included a review of all relevant documents such as development plans, strategies, policies, acts and rules. The national directives, guidelines, manuals, and standards help fulfill the regulatory framework requirements, providing useful, practical tools applicable to project implementation.

The existing regulatory framework was analyzed and tabulated, highlighting relevant key provisions to the BG Road ESIA. Some of the important laws and regulations reviewed included (but were not limited to) the following: The Road Safety Action Plan (2013-2020), Nepal National Biodiversity Action Plan (2014-2020), Nepal National Environment Policy (2019), Forest Policy (2015), Labour Policy (2005), Land Acquisition, Resettlement and Rehabilitation Policy (2015), Environment Protection Act (2019), Forest Act (2019), Control of International Trade of Endangered Wild Fauna and Flora Act (2017), Labour Act (2017), Child Labour (Prohibition and Regulation) Act (2000), and Land Acquisition Act (1977) with amendments, Labour Rules (2018), Water Resources Regulation (1993), Industrial Policy (2010). Being a signatory party for many international conventions and other treaties, Nepal is bound to address the vital environmental and social issues transboundary or global in nature, such as pollution, climate change, and biodiversity conservation. The provisions of the national regulatory framework have been taken into account during the ESIA process, in addition to the World Bank ESF and EHSGs.

Baseline Environmental and Social Conditions

The baseline data was collected from August 2020 to January 2021 for key environmental attributes like physiography, drainage, geology, soil, hydrogeology, land use, flora, fauna, forest/vegetation cover, climate, ambient air quality, water quality, ambient noise levels, hazards and vulnerability. It also collected social attributes such as socio-economic characteristics of affected households, cultural heritage, public utilities, Indigenous People (IPs), vulnerable groups, and gender.

Physical Environment:

The BG Road mainly lies within the Terai region, with an elevation of 117 to 158m amsl (above mean sea level). The first 1.7 km of the alignment lies close to the foothills of Siwalik hills. The existing land use patterns along the BG road alignment are predominantly built-up areas (61%), followed by forests (21%), farmlands (16%), and remaining are water bodies. The land use map of the BG Road is shown in Figure E2. The road lies in a tropical and sub-tropical climate with humid and hot characteristics. In general, the rainy season (monsoon) starts in June and ends in September. About 80% of the rainfall occurs in this season. The average minimum temperature of Kapilbastu is 18.79^{0}C, and the maximum temperature is 30.93^{0}C. Most of the major rivers in the subproject area originate from Siwalik and Mahabharat hills. Some of these rivers are prone to flash floods during the monsoon but dry during the remaining seasons. The road alignment falls on the sediments of the Gangetic Plain (Upper Terai) and rocks of the Siwalik Group of western Nepal. The first 1.7 km of the alignment falls foothills of Siwalik, and the remaining covers the sediments of the Gangetic Plain. Landslide, gully erosion and old slide scarp are observed in the initial one-kilometre section of the BG Road.

The air quality, monitored in nine locations, showed that the $PM_{2.5}$ exceeds the National Ambient Air Quality Standard (NAAQS) except in the forest area. The average 24 hours noise level varies from 30dB(A) to 129 dB(A). The maximum noise level is recorded in Butwal, and a minimum is in Forest Area. The noise levels at Butwal exceeded National Noise Quality Standard Limit (NNQSL) and World Bank EHSGs. In terms of drinking water quality, all the parameters are within the Nepal Drinking Water Quality Standard(NDWQS).

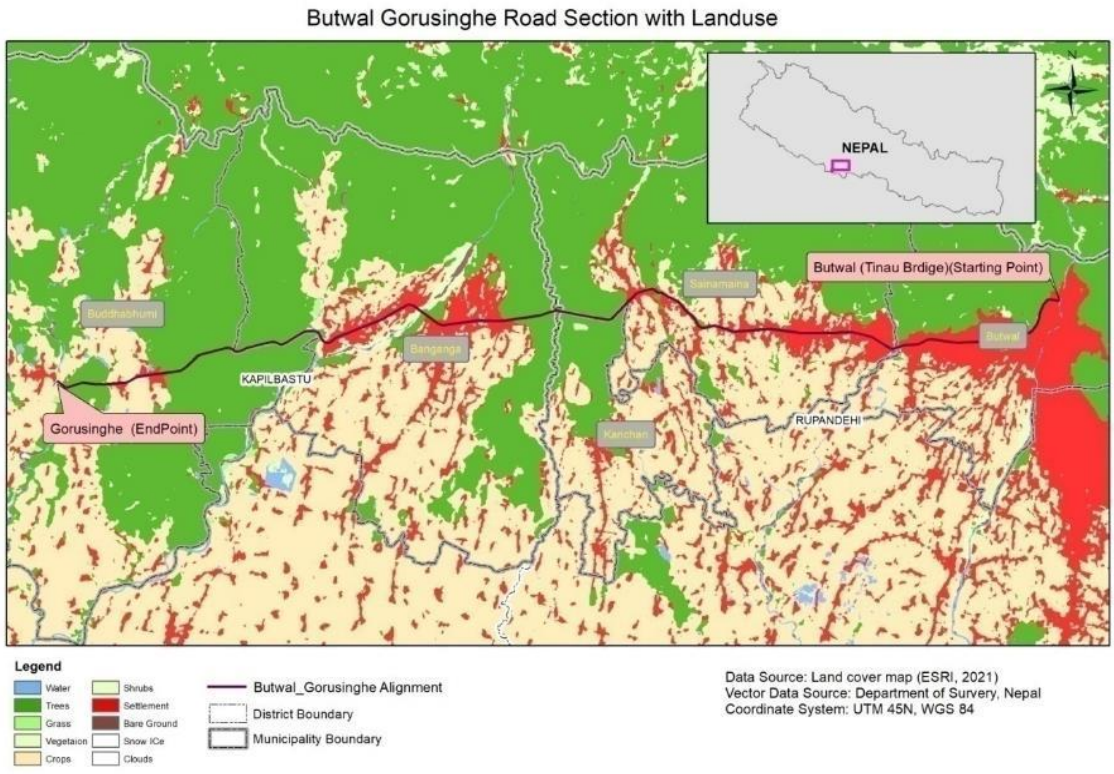


Figure E2: Landuse Map along BG Road

Biological environment:

The East-West Highway is largely located in the Terai Arc Landscape (TAL). The TAL extends for over 900 km from the Bagmati River, Nepal, in the east to the Yamuna River in Uttaranchal, India, in the west, with an area of 51,002 km². The TAL harbors globally important biodiversity and conserves several of Asia's large mammals, birds, reptiles, and freshwater fishes; sustain environmental flows in important rivers; and provides ecosystem services that support the socio-economic well-being of people and development in the Terai and Churia region of Nepal. The BG road section covered under this ESIA is located centrally within the TAL which is within a densely populated part of the TAL. The BG road does not overlap with any protected areas or wildlife corridors and does not fragment any significant natural habitats identified within the TAL. About 15.4 km of the BG road alignment passes through the community forests dominated by *Shorea robusta (Sal)* forest and patches of *Dalbergia-Acacia* (Rosewood) forest near the riverine sections. There are three major forest areas crossing the BG Road (see Figure E2), and they are (i) from the chainage[1] KM 611+870 to KM 617+730 (Saljhandi-Pipara Forest block and the length of the road section in this forest is 5860m) (ii) KM 626+970 to KM 635+200 (Gorusinghe Forest block and length of the road section is 8230m), and (iii) KM 637+720 to KM 639+000 (Badhare/Budhi Forest block and length of the road in this section is 1280m. These forests are predominantly (more than 80%) community forests used for multiple purposes, including community use and production of timber, firewood and fodder. The forests located within 50m RoW (25m from the center of the existing road to both sides) are owned by DoR and are already disturbed and degraded. There are no nationally or internationally designated protected areas, including identified wildlife migration corridors within the corridor of impact and project zone of influence.

Socio-economic and Cultural environment:

The subproject area covers Rupandehi and Kapilbastu districts and lies in Butwal metropolitan, Sainamaina, Banganga and Buddhabhumi municipalities, and Kanchan rural municipality. The caste and ethnic groups found in the subproject area are Brahmin, Chhetri, Dalit, Muslims, Madheshi and Janajatis. In the subproject area, there are three IP groups, namely Newar, Magar and Rai, but they live as part of the mainstream local communities and have no collective attachment to the land in the project area. The total population of the influence area, covering 22 wards, is 144,914. Out of this population, males and females are 68232 and 76652, respectively. Some sections of the right of way are encroached by (follow RAP) 120 households, including households of 22 indigenous peoples (IPs), for the setting-up of businesses and building houses. These IPs have moved into the RoW to set up businesses and do not have an affiliation to the land within the ROW. The total population of the project-affected households is 660, and the average family size is 5.5.

Environmental and Social Risks and Impacts

Beneficial impacts from the BG Road improvement include facilitated economic development, covering the generation of employment and arising opportunities for businesses, access to services and markets, improved road infrastructure contributing to safety issues and better transportation. Beneficial impacts are related to the improvement of road infrastructure and its technical efficiency, economic development and positive impacts on the livelihoods of the local people.

All impacts were categorized in terms of their magnitude and significance. The following sections summarize the environmental and social risks and impacts of the BG road improvement works by each relevant environmental and social standard.

[1] The starting chainage of the road is KM 589+700 (this chainage is referenced to the East West Highway) and ends at KM 639+700.

Assessment and Management of Environmental and Social Risks and Impacts (ESS1): The Environmental and Social Risk Classification of the subproject is 'substantial.' The widening and improvements of BG Road from 2 lanes to 4 lanes will be carried out within the existing RoW. However, some sections of the ROW have been encroached by residential and commercial structures, and they will be partially affected by the widening works. Further, the widening will require clearing 28 hectares of community forest land within ROW, which is already owned by DoR. The proposed works will partially affect122 private residential and commercial structures (from 120 households), mainly their front porches (*verandas*). Among these affected households, 22 households belong to IPs due to their encroachment into the ROW, however, the impacts of project activities on these IP HHs do not meet the ESS7 criteria for obtaining free, prior and informed consent (FPIC) as these IPs are living as part of mainstream communities without collective attachment to the land and governed by local municipal administrative systems. The resettlement impacts are further discussed under ESS5. . The environmental impacts during construction mainly relate to dust and noise pollution, increased risk to health and safety of workers and communities, increased traffic flow and traffic-related accidents and social issues related to resettlement and livelihood impacts, labor influx impacts such as sexual exploitation and abuse, sexual harassment (SEA/SH), communicable diseases and child/forced labor, all anticipated during construction. The improvements of BG Road are also assessed to have no significant induced or cumulative impacts as works are mainly confined within the existing ROW and in an area that has already been altered, fragmented and highly disturbed for many decades as a result of human population growth, encroachment and establishment of new settlements along the highway, land transformation, agriculture development and other associated development as seen in the landuse map presented in Figure E2. With or without improvement works in BG Road, land-use change and land transformation have already taken place and will continue to take place as a result of other factors such as urbanization and development of rural areas resulting from increased federalization and decentralization of development in the provinces. Increased density of the road networks and lack of protective measures have aggravated the adverse impacts on the environment that have already taken place, such as siltation and sedimentation of rivers, the threat of poor water drainage and community health and safety. The impacts might be exacerbated by climate change and the uncoordinated development of local communities, which may cause significant economic losses.

To address cumulative impacts and enhance the overall performance associated with East West Highway and improve the capacity of DOR for better planning, management and improved transport efficiency of the country's Strategic Road Network, a Strategic Environmental and Social Assessment (SESA) study and Cumulative Impact Assessment (CIA) study were initiated under Strategic Road Connectivity and Trade Improvement Project (SRCTIP) and are ongoing. The results of the SESA and CIA may inform further project design and help to generate collaborative engagements with other actors towards implementing the recommendations of those studies

Labour and Working Conditions (ESS2): The BG Road project is expected to involve direct (i.e. Specialised consultants and technical specialists engaged by the DoR to perform direct responsibilities on the project), contracted (i.e. workers engaged by civil works contractors and other third parties to perform core functions of the project) and primary supply workers (i.e. workers of construction material suppliers such as sand and gravel and loading/construction material transport services). The subproject will employ about 500 direct and contracted workers (about 40% of workers will be hired from local communities), who may be exposed to risks such as poor conditions in labor camps, non-payment of wages or other benefits, discrimination in employment, child labour or forced labour, occupational health and safety (OHS) issues including workplace accidents, exposure to communicable diseases, grievances related to workers and SEA/SH. The contracted workers are more susceptible to such risks. To ensure the health and safety of workers during construction, the contractors will be required to prepare, obtain approval of, and implement an Occupational Health and Safety Plan (OHSP) following the WBG EHS Guidelines (for

construction activities), GIIP and relevant OHS standards (e.g., US OSHA). A labor grievance mechanism will be established for the workers as part of the LMP.

Resource Efficiency and Pollution Prevention Management (ESS3): ESS3 refers to several risks and impacts, including air and noise pollution, potential hazards and solid waste management, and pollution of water sources. The subproject's impacts and risks would be of significance to sensitive receptors due to waste disposal; slope stability and erosion; blocking of seasonal streams during cross drainage construction; stressing water sources used by the community; emission from construction vehicles, equipment and plants; dust from earthworks, cutting, stack yard, transportation of materials, noise pollution and settlements along road; damage to structure vibration from movement of machine and equipment; handling of hazardous and non-hazardous wastes, quarry and borrow area. All these impacts are more prominent during the construction stage and can be managed through the implementation of the waste management plan (onsite composting for organic waste, reuse of spoils and excess construction waste, and use of existing local municipal waste disposal sites for garbage), pollution prevention plan (sedimentation ponds and septic tanks for treatment of wastewater), and emission control measures (for air and noise quality) according to national standards for air, noise and water quality as well as through best practices applicable to road construction projects. Annual Green House Gas (GHG) emission as the result of upgrading BG road was estimated, although the net GHG emission reduction is expected due to increased travel speed and fuel reduction for the motorized vehicles, and the estimated annual GHG emission is 471,363 tonnes.

Community Health and Safety (ESS4): During construction, transporting construction materials may cause nuisances and health and safety risks to the local communities. Construction activities such as cutting of hill slopes (about 1 km length), road excavation, and the use of vibration equipment might result in landslides and dust pollution. The stockpiling of construction materials debris generated during construction may disturb the landscape and cultivated lands and contaminate the water bodies. Impacts on existing traffic are likely with the construction activities, plying of construction vehicles, and storage of construction materials in proximity to the existing highway. The presence of an outside labour force in the project area may cause negative impacts on the environment and local communities and should be managed to prevent conflict situations, including SEA/SH. The project area lacks a well-defined and coordinated response mechanism. SEA/SH risks associated with labour influx indicate a 'moderate' level of SEA/SH risk. Furthermore, a lack of institutional and infrastructural capacity of the GBV service providers may result in inadequate support to GBV survivors. Further, risks associated with labour influx and the increased presence of outsiders may aggravate the spreading of infectious diseases, including COVID 19, HIV/AIDS and STIs. A stand-along SEA/SH Action Plan is being prepared to manage risks related to SEA/SH associated with the project.

Land Acquisition, Restrictions of Land Use and Involuntary Resettlement (ESS5): In total, 122 residential and commercial structures belonging to 120 households (HHs) will be affected due to encroachment within the existing right of way. No new land acquisition is required for the project. Among the 122 affected structures, 50 are residential structures, 45 are residential cum commercial structures, 15 are commercial structures and 12 are secondary structures associated with the residences are businesses, such as store rooms, wash rooms, and cattle sheds. Among the total affected households, 22 are IPs (due to encroachment into the ROW), 6 are Muslims, and 3 are Dalit. In addition, five private structures belonging to private institutions, such as school boundary walls, will be affected. Further, the project will affect 206 public structures (105 *chautaro,* 14 temples, 65 passenger waiting sheds, 2 public toilets, 4 public water taps, 3 pubic statues, 3 schools, and 10 police check posts or gates), and all these structures will be relocated to the nearby public land in consultation with the respective communities along the right of way. Further, 1646 electric poles and 46 drinking water taps will require relocation. Construction-

related impacts will be avoided through design to avoid and minimize impacts; and to compensate for residual impacts before the commencement of construction works as per the measures outlined in the Resettlement Action Plan (RAP).

Biodiversity Conservation and Sustainable Management of Living Natural Resources (ESS6): The habitats in the existing ROW and surrounding areas of the BG Road are largely modified, and patches of natural habitats, which are already fragmented, and anthropogenic pressure on the area is very prevalent due to its long history of development and human settlements. Critical Habitat Assessment carried out as part of the ESIA for the BG road identified two endangered mammal species and one globally critically endangered reptile species, namely Fishing Cat (*Prionailurus viverrinus*), Striped Hyaena (*Hyaena hyaena*) and Elongated Tortoise (*Indotestudo elongata*), that would qualify under ESS6 critical habitat Criterion (a) and are potentially impacted by the subproject. Data is not available to quantify impacts on these species, however, potential impacts are expected to be minimal as these species are uncommon in the project area and impacts are expected to be low. The ESIA proposes comprehensive mitigation measures such as construction/reinstallation of predator and reptile proof fencing and wildlife crossing in the forest areas, compensatory afforestation, regular recording of roadkill and usage of wildlife crossing, speed limits and installation of warning signboard, awareness raising for workers and communities. The ESIA further indicated that the improvement of the existing BG road would affect a total of 28 hectares of forest within RoW along 15.2 km of its length. The direct impact involves the cutting of 9386 trees, including 2255 saplings, 1691 poles, and 5517 matured trees. Among them, 7,109 are forest trees, and none of these trees are threatened species. The physical work within the ROW will not adversely impact critical habitats. In addition, there are also no protected areas, wildlife reserves or migratory wildlife corridors along the BG road. Nevertheless, for every tree that will be cut, the project will replant 10 trees in an area designated by the Forest Department to meet the requirement of the GoN. A budget of 0.6 million is proposed in the ESMP for compensatory tree plantation.

Indigenous People (ESS7): There are three indigenous peoples (IP) groups in the subproject area, namely Newar, Magar and Rai, living as part of the mainstream local communities with no collective attachment to the land that concerns project activities. A total of 22 IPs households will lose parts of their structures and are affected due to encroaching the RoW. These IP community will not lose their private land because their structures are constructed within the RoW, and these structures will be and partially affected. The subproject will not cause any direct impact on their land, will not need complete relocation of any of the IP communities, and will not cause impacts on the cultural heritage of the IP communities. These IP communities' potential impacts and risks are related to labour influx, GBV, traffic safety, air and water quality deterioration during construction, etc. Therefore, according to the requirements of free, prior and informed consent (FPIC) under ESS7, FPIC is not required under this subproject. Resettlement-related IP issues will be addressed as part of the RAP.

Cultural Heritage (ESS8): ESS8 sets out general provisions on risks and impacts to tangible and intangible cultural heritage. During the ESIA, no archeologically and historically tangible heritages such as monasteries or ancient monuments were found along the road alignment, and there will be no impacts on other tangible or intangible cultural heritage. There are 14 small temples/shrines within the ROW, as advised during stakeholder consultations, which are not of historical importance or significance. They will be relocated to the nearby public land in consultation with the respective families along the right of way. A Chance-finds procedure has been included in the Environmental and Social Management Plan (ESMP), which will be followed if, during construction, any chance finds are encountered. The chance find procedures will also be included in the bidding documents, in the contractor contract and in the contractor's ESMP (C-ESMP). The stakeholder engagement activities under the subproject will be

leveraged to further identify and manage other cultural heritage sites and artifacts throughout the project life.

Financial Intermediaries (ESS 9): Since no financial intermediary is involved in this project, ESS9 is not applicable.

Stakeholder Engagement and Information Disclosure (ESS 10): Stakeholder engagement is an inclusive process to engage stakeholders throughout the project lifecycle. Stakeholder consultations carried out during ESIA preparation focused on issues and concerns of subproject affected persons, other and interested parties and vulnerable and marginalized groups. The project affected parties who would be directly affected by the project activities and located within the impact area, include households that have encroached into the ROW, local population, public service providers, and local health facilities. The interested parties are local governments (1 Sub-metropolitan City, 3 Municipalities and 1 Rural Municipality), local non-governmental organizations (NGOs), civil society, teachers, political leaders, women groups, local entrepreneurs, local user groups (forest, water, irrigation etc.), security personnel (traffic police and army), drivers and road users (including travellers); and vulnerable and marginalized groups, including those who are differently-abled.

Consultations were held with a cross-section of the above stakeholders to share the project information and to document and incorporate their initial feedback on the project concept and the environmental and social concerns related to the concept. Initial walkover surveys were carried out, followed by individual interviews with local government officials. The tools such as Focus Group Discussions (FGD) and Key Informant Interviews were used to conduct discussions. During the preparation of ESIA, 27 Consultation meetings at different municipalities' offices of Rupandehi and Kapilbastu districts were held during December 2021 and January 2022. Of the 442 participants that took part in these consultations, 332 were male and 110 female. Additional consultations with the specific groups such as the department of forest, forest users group, women, affected people, and other interested parties were also carried out. The key issues raised by the stakeholders during consultations are: compensation for affected private and public structures and utilities; air pollution, construction of foot over bridges in the settlement area, skill development and employment opportunities for local people, protection from landslide areas, need for additional side drain and cross drainage facilities, ownership of harvested trees should be granted to respective forest user groups, roadside plantation, fence in community forest area along roadside should be reconstructed; and stakeholder engagement during road upgrading works.

Further, two consultation workshops, one with the national-level stakeholders and another with the local-level stakeholders, were held on 9th and 20th of February, respectively, to obtain their feedback on the draft ESIA. The draft ESIA was disclosed on the DOR's website on January 23, 2022. At the national-level workshop, 29 participants (14 physically and 13 virtually participated) from the various government departments (including officials from the Ministry of Forest and Environment, Department of Forest and Soil Conservation, Department of National Park and Wildlife Conservation, Department of Environment, and Department of Labour and Occupational Safety) participated. At the local-level workshop, 26 participants (virtually) from the local communities and municipalities participated. The feedback from both local communities and government agencies was overall positive, with strong support for the upgrading Butwal-Gorusinghe Road. All participants unanimously agreed that the draft environmental and social reports were comprehensive and covered all environmental and social aspects, including measures for the protection of wildlife, conservation of natural resources, and entitlements for resettlement and rehabilitation assistance.

Environmental and Social Management Measures

The major management measures in line with ESSs have been given below.

Cooperation and information dissemination about the project amongst project affected, other interested stakeholders and vulnerable and marginalized groups will help to execute all mitigation measures. The project will coordinate with local bodies and concerned stakeholders for the planning of local development.

An Environmental and Social Management Plan (ESMP) applying the mitigation hierarchy has been prepared to manage the project's environmental and social risks and impacts. It includes generic and site-specific mitigation measures, a monitoring plan, capacity building, responsibilities and reporting system and environmental and social costs. In addition, the ESMP provides measures to address SEA/SH issues at the project level. These measures will be further elaborated in a standalone SEA/SH action plan. The key issues regarding labour will be managed in compliance with National Labour Act, 2017 and Labour Rules, 2018 and WB ESF, 2018 through a comprehensive LMP prepared and adopted for the project. A GRM will be provided for project workers to help workers to lodge grievances and to manage the resolution of worker-related grievances. A Worker Camp Operation Plan and Worker's Code of Conduct will be prepared, which will also help prevent or minimize SEA/SH.

A separate RAP has been prepared to address physical and economic displacement resulting from project activities. All losses (private and public assets) will be compensated with replacement costs as per the Entitlement Matrix. For any additional impacts occurring during project implementation, a resettlement framework has been prepared and will be applied for the additional losses. The ESMP obligates the contractor, upon mobilization, to prepare the Contractor's ESMP (C-ESMP), which shall be prepared prior to the commencement of construction activities. The C-ESMP shall include an OHS plan, Water and Waste Management Plan, Labor Influx Management Plan, Workers camp management plan, Traffic management and road safety management plans, Quarry/borrow area management plan, and Site Restoration Plan, among others in accordance with the GoN and IFC&WB workers' accommodation guidelines.

A Stakeholder Engagement Plan (SEP) has been developed for the project to identify stakeholders and to provide a plan for engaging with stakeholders throughout the project lifecycle. The SEP provides materials for community awareness and sensitization with emphasis on women and young girls, promoting health-seeking behaviour. The SEP includes details of a project level GRM, including SEA/SH n Workers GRMfor stakeholders to raise any questions and grievances.

Mitigation measures for general risks and impacts: Mitigation measures for general risks and impacts include: an erosion control plan with bioengineering and reinforcement structures; restoration of affected landscapes; development of a stockpiling and excavation management plan; recommendations for fuel-efficient machinery and carbon offset by compensatory plantation; proper relocation and restoration of all affected utilities taking the community into confidence with meaningful consultation; enforcement and control of anti-poaching regulations; establishing speed limit signs in appropriate locations; providing awareness to drivers; establishing a grievance redress mechanisms (GRM) for complaints; providing workers transportation to and from the project sites; preparation and implementation of Occupational Health and Safety Management Plans by the contractors, adopting safety measures for workers such as shinning jackets (aprons), boots, gloves, and helmets; compliance with the labour laws; establishment of Worker Camp Operations Guidelines; development of a Hazardous Materials Management Plan to manage hazardous material use, storage, transport, and disposal; development a Water Quality Management Plan; community awareness and sensitization with an emphasis on women and young girls; chemical management plan prior to construction including handling and disposal of hazardous chemical and waste. No tangible or intangible or archaeologically important cultural heritage will be impacted.

Site-specific mitigation measures: Site-specific mitigation measures include traffic management provisions for construction sites and slope protection work (Civil engineering and Bio-engineering works). Air and Noise Quality monitoring, water quality monitoring and water sprinkling will be done in dust-prone

areas to reduce dust. Cross drainage structures (such as box culverts, new bridges, and side drains) will be provided to reduce water logging flooding in the project area. Installation of traffic signs, road safety signs, crash barriers, and pedestrian crossings/overhead for road safety. For flood protection, river training works will be implemented. Compensatory tree plantation, sign board, speed limit, display boards in forest areas will be placed in required locations for wildlife crossings. Installation of fencing and culvert/underpass at specific locations for wildlife protection and prevention of road kills in the forest areas are also proposed. Relocation of public utilities (Drinking water supply lines, electric poles, irrigation canals etc.), restoration of damaged community infrastructures, Safety Equipment (PPEs) and activities for additional Pandemic (COVID-19) safety measures are provided in the mitigation cost. Cost for Insurance of labours, reinstate of quarry borrow pit, batching plants, camp etc., are provided in the mitigation costs.

Key Measures and Actions for the Environmental and Social Commitment Plan (ESCP)

The ESCP identifies measures and actions to meet ESS requirements. These include the development of a SEP, LMP, IPPF, and RAP identified to be required for the BG Road project. The Ministry of Physical Infrastructure and Transport (MoPIT) is responsible for compliance with all requirements of the ESCP during the implementation of specific measures and actions conducted and implemented by the DoR-Development Cooperation Implementation Division (DCID).

Implementation of the material measures and actions set out in the ESCP, will be monitored and reported to the Bank by DoR as specified in the ESCP. The World Bank will monitor and assess the progress and completion of the material measures and actions throughout the implementation of the project. If required, the ESCP may be revised and updated during project implementation to reflect adaptive management of project changes and unforeseen circumstances or in response to the assessment of project performance conducted under the ESCP itself.

Institutional Arrangements

DoR under MoPIT is the key implementing agency for the development and implementation of strategic road projects (Government/Donor funded). DoR has five deputy directorates/branches that develop and implement projects. To facilitate field implementation, DoR maintains 30 Divisional Road Offices (DROs). The DCID is one of the key directorates undertaking all donor-funded projects. Project Coordination UnitProject Coordination Unit (PCU) under DCID will procure contractors and supervision consultants for implementation of the project and will be responsible for E&S risk management. The DCID has an existing Environmental Expert, a Social Development Expert, a Gender Specialist and an OHS Specialist. Additionally, the proposed PCU will hire an environmental specialist, a social specialist and an occupational health and safety specialist exclusively for the Project.

DoR's Geo-Environment and Social Unit (GESU) is the focal point for the E&S risk management and monitoring unit at DoR. GESU undertakes compliance monitoring and review of IEEs, ESIAs, RAPs and IPDPs for government/donor-funded projects. MoPIT is the governing agency mandated by the Environmental Protection Act (EPA) to review and approve IEEs for projects in the transport sector. It also reviews and endorses ESIA reports for review and approval by the Ministry of Forest and Environment (MoFE). The EIA Unit under MoFE undertakes the review and approves EIAs.

Other institutions such as the Department of Forestry and Soil Conservation (DoFSC)/Divisional Forest Office, the Department of Labour and Occupational Safety (DoLOS), and project-affected M/RM also support the project implementation.

Contractors and sub-contractors will be required to comply with the ESMP and related plans, which will be spelled out in bidding documents, work contracts and in the ESCP of DoR.

Training and capacity building of DoR and agencies involved in project implementation to manage environmental and social risks and impacts will be supported by the project under the institutional strengthening component.

कार्यकारी सारांश (बुटवल-गोरुसिंघे सडक)

परिचय

नेपाल सरकारले विश्व बैंकको ऋण सहयोग बाट बंगलादेश भुटान भारत नेपाल, बहुचरणीय कार्यक्रमात्मक दृष्टिकोण क्षेत्रीय सडक तथा व्यापार सहजीकरण अन्तर्गत पहिलो चरणको (आयोजना) कार्यान्वयन गर्नका लागि तयारी गरिराखेको छ। यस आयोजनाको मुख्य उद्देश्य आयोजनामा समावेश भएका देशमा छनौट गरिएका मुख्य कोरिडोरहरुमा पारवाहन र जलवायु अनुकुल व्यापार तथा पारवाहन विकास गर्नु रहेको छ।

यस आयोजनाका ३ घटकहरु रहेका छन्।

घटक १: व्यापार का लागि डिजिटल प्रणाली: यस घटकले नेपालको सिमापार क्लियरेन्समा सुधारका लागि डिजिटल र स्वचालित प्रणालीहरु अपनाउन र कार्यान्वयन गर्न सहयोग गर्नेछ (क) एकिकृत स्वचालित सीमा व्यवस्थापन लगायत इलेक्ट्रोनिक कार्गो ट्रायाकिङ्ग प्रणालीको विकास र (ख) दर्ता प्रक्रिया र अनुमति स्वचालनको लागि वेब मा आधारित आपूर्ती व्यवस्थापन सूचना प्रणाली (MIS) को विकास गर्नेछ।

घटक २: हरित र जलवायु अनुकुल यातायात र व्यापार पूर्वाधार: (क) पूर्व-पश्चिम राजमार्ग अन्तर्गतको बुटवल-गोरुसिंघे-चनौटा खण्डलाई हालको २ लेनबाट ४ लेनमा स्तरोन्नती गरिने (ख) तिनाउ पुलको निर्माण (विस्तृत डिजाइन/शहरी डिजाइन तथा निर्माण) र (ग) यातायात कार्यक्षमता र पारिस्थिक दिगोपन (ecological sustainability) लाई मध्यनजर गरि हरित मैत्री राजमार्ग निर्माण गर्ने अवधारणाको कार्यान्वयनको लागि सहयोग गरिने।

घटक ३: यातायात र व्यापारको लागि संस्थागत र नीतिहरुको सुदृधिकरण: यस घटक अन्तर्गत क्षेत्रीय तथा सीमा पारवाहन सम्बन्धी नितीहरुलाई सुव्यवस्थित गर्दै (क) बंगलादेश भारत नेपाल मोटर बाहन सम्भौता सम्बन्धी सुधारहरु (ख) निजी क्षेत्रको पहलहरुको सहयोगार्थ सुधारहरु (ग) तालिम तथा क्षमता अभिबृद्धि (घ) आयोजना तयारीका लागि अध्ययन।

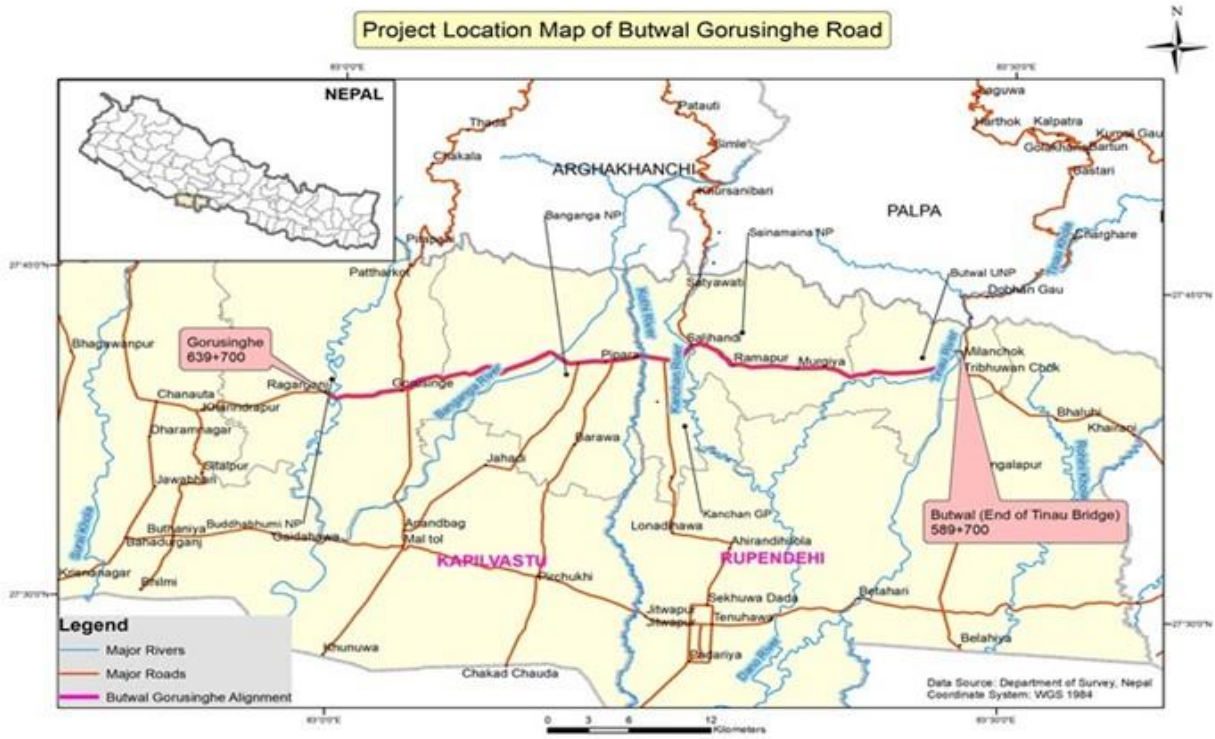
घटक ४: यातायात र व्यापारको लागि संस्थागत र नीतिहरुको सुदृधिकरण: आकस्मिक आपतकालिन प्रतिक्रियाले अप्रत्यासित आपतकालिन आवश्यक्ताहरुलाई सहयोग पुऱ्याउने छ। कुनै ठूलो प्राकृतिक अथवा मानव निर्मित प्रकोपको अवस्थामा सरकारले बैंक लाई द्रुत प्रक्रिया र पुन: निर्माणमा सहयोग गर्न यस घटक मार्फत परियोजना कोष पुन: बिनियोजन गर्न अनुरोध गर्न सक्नेछ।**आयोजनाको वातावरणीय र सामाजिक जोखिम र प्रभाव मुल्याङ्कन दृष्टिकोण**

यस आयोजनाले, आयोजना र उपआयोजनाहरुको लागि वातावरणीय र सामाजिक प्रभावहरु र जोखिमहरुको प्रारम्भिक मुल्याङ्कन (screening), बातावरणीय र सामाजिक व्यवस्थापन रुपरेखा (ESMF) र आयोजना विशेष बातावरणीय र सामाजिक प्रभाव मुल्याङ्कन (ESIA) प्रतिवेदनहरु अनुसरण गरेको छ। आयोजनाले ESMF छुटै तयार गरि खुलासा गरिसकिएको छ र उक्त ESMF ले गरुसिंघे-चनौटा सडक खण्ड अन्तर्गत परिभाषित र डिजाइन हुन बाँकी रहेका घटकहरु जस्तै: तिनाउ खोलाको पुल (Tinau signature bridge) र महत्वपूर्ण सीमा नाकाहरुमा स्थल बन्दरगाहाहरुको सुविधाको स्तरोन्नति इत्यादि परिभाषित भई डिजाइन विवरणहरु तयार भए पश्च्यात उक्त गतिविधीहरुको प्रारम्भिक वातावरणीय तथा समाजिक मुल्याङ्कन (screening) तथा वातावरण तथा सामाजिक प्रभाव मुल्याङ्कन (ESIA) लगायत प्रभाव व्यवस्थापन (ESMP) प्रतिवेदन तयारीको लागि मार्गदर्शन गर्न प्रयोग गरिने छ।

यो ESIA बुटवल-गोरुसिंघे सडक खण्डको बिस्तृत आयोजना डिजाइन तथा अध्ययन चरणमा अपनाईएको अवधारणात्मक डिजाइनमा आधारित रहि नेपाल सरकार, र विश्व बैंकको वातावरणीय र सामाजिक रुपरेखा (ESF) मा उल्लेखित प्रावधानहरुलाई अनुसरण गरि तयार गरिएको छ।

पूर्व-पश्चिम राजमार्गको बुटवल-गोरुसिंघे सडक खण्डको विवरण

यो सडक आयोजना लुम्बिनी प्रदेशको रुपन्देहि र कपिलबस्तु जिल्लामा अवस्थित रहेको छ। आयोजना बुटवल नजिकैको तिनाउ पूलबाट शुरु भई बटौली बजार, मैना बजार, नयाँ गाउँ, बेलबास, नयाँ बस्ती, बंकटहवा, मुर्गीया, रामपुर वासगढी, सालझण्डी, पिपरा, बडगाउँ, जितपुर, गोरुसिंघे बजार हुदै गोरुसिंघेमा समाप्त हुनेछ। सडक आयोजना स्थललाई तल चित्रमा देखाईएको छ।



बिद्यमान ५० कि.मी. लम्बाई रहेको बी.जी. सडक २ लेनको बिटुमिनस सडक हो र जसमा ६ मिटर चौडाइको carriage way र दुवैतिर १ मिटर चौडाइको shoulder रहेको छ। यो सडक पूर्व-पश्चिम राजमार्गको प्रमुख खण्हहरु मध्ये एक हो, जसले भारत संग धेरै सिमापार व्यापारिक सुविधाहरुलाई जोडेको छ। यो सडक खण्ड धेरै ठाउँमा खाल्डाखुल्डि, कालोपत्रमा चिरा परेका कारण र फुटपाथ भत्किएकोले हालको अवस्था नाजुक रहेको छ। यो सडक खण्डमा रहेका रिटेनिङ्ग वालहरु जिर्ण अवस्थामा रहेका छन् र पैदल मार्ग, पैदल यात्री क्रसिङ्ग, फुटपाथ, ट्रफिक सुरक्षा चिन्हहरु, दुर्घटना अवरोध (crash barrier) आदि जस्ता सडक सुरक्षा सम्बन्धी सुविधाहरु रहेका छैनन्।

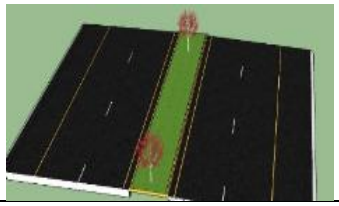
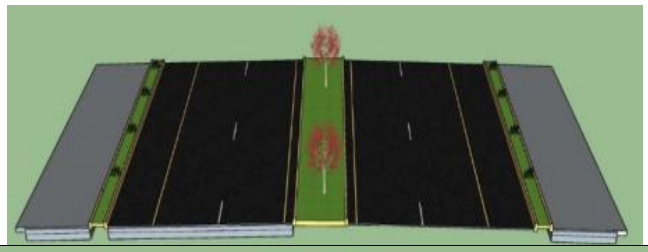
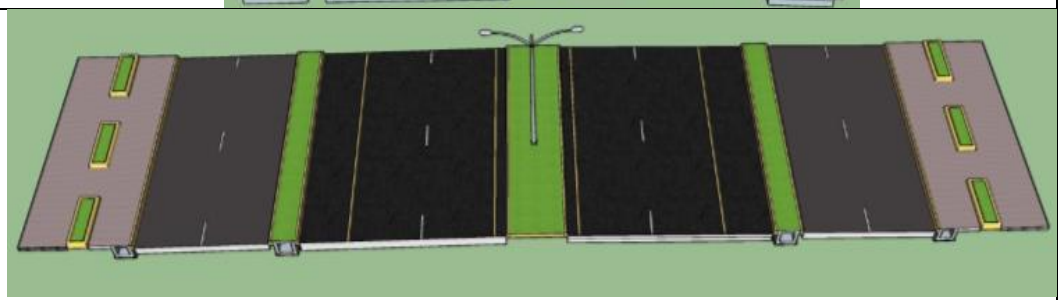
बी.जी. सडकमा थप सेवा सडकहरु (१६.५ कि.मी सहरी र १०.८ कि.मी. अर्ध शहरी क्षेत्रमा) र फुटपाथ र साईकल लेनहरु (शहरी क्षेत्रमा १६.४ कि.मी) सहित २ लेनबाट ४ लेनमा स्तरोन्नती गरिने छ। पुराना पुलहरुलाई बिस्थापित गरि १० देखि १०० मिटर लम्बाईका ३१ वटा नयाँ पुलहरु पनि निर्माण गरिने छ। सडकको बिद्यमान राइट अफ वे (ROW) ५० मिटर रहेको छ र यस सडकका प्रस्तावित कार्यहरु उलब्ध ROW भित्रनै सिमित रहने गरि कार्यान्वयन गरिने छ। यस आयोजनामा थप जग्गा अधिग्रहण गर्न नपर्ने तर १२० घरधुरीहरुबाट १२२ आवासिय र व्यवसायिक संरचनाहरु ROW अतिक्रमण गरि बनाईएका संरचानाहरुलाई स्थानान्तरण गर्नुपर्ने हुन्छ। ट्राफिक चिन्ह स्थापना सहित गती सीमाको प्रावधान समावेश लगायत सडक सुरक्षामा सुधार गर्ने बी.जी. सडक सुधारका मुख्य बिशेषता हुनेछन्। यस बी.जी. सडकका प्रस्तावित सडक स्तरोन्नती कार्यका विशेषताहरु तालिका E1 र स्तरोन्नतीको अवधारणत्मक डिजाईन चित्र E2 मा समावेश गरिएको छ।

तालिका E1. विद्यमान बी.जी. सडक र प्रस्तावित स्तरोन्नति कार्यक्रमका मुख्य विशेषताहरु

विशेषताहरु	विद्यमान सडको अवस्था	प्रस्तावित स्तरोन्नतिका कार्यक्रमहरु
लम्बाई	५० कि.मी.	५० कि.मी.
भूगोल	समथल (४८.३ कि.मी.), रोलिङ्ग (२.६ कि.मी.)	समथल (४७.४ कि.मी., रोलिङ्ग (१.७ कि.मी.)
राइट अफ ब्ये (ROW)	५० मिटर	५० मिटर
कूल चौडाई (सडक + सेवा लेन + सोल्डर)	७.५० मिटर देखि ८.५० मिटर	- २४ मिटर ग्रामिण (ग्रामिण र वन) क्षेत्रहरु (जम्मा लम्बाई: २२.६८ कि.मी.) - ३३ मिटर अर्ध शहरी क्षेत्रहरु (१०.७६ कि.मी.) - ५० मिटर शहरी क्षेत्रहरु (१६.३६ कि.मी.)

विशेषताहरु	विद्यमान सडको अवस्था	प्रस्तावित स्तरोन्नतिका कार्यक्रमहरु
लेनहरुको संख्या	२	४ (प्रत्येक लेनको चौडाइ ३.५ मिटर)
सेवा लेनहरुको लागि अतिरिक्त लेनहरुको संख्या	हाल नभएको	- गैर शहरी क्षेत्रमा नहुने - २ (प्रत्येकको चौडाई ३.५ मिटर) शहरी र अर्ध शहरी क्षेत्रहरुमा (सोल्डरको दुवै किनारामा)
फुटपाथ	हाल नभएको	- ग्रामिण र अर्ध शहरी क्षेत्रमा नहुने - २ (प्रत्येकको चौडाई २ मिटर) शहरी क्षेत्रमा (सर्भिस रोडको दुवैतिर)
साइकल लेनहरु	हाल नभएको	- ग्रामिण र अर्ध शहरी क्षेत्रहरुमा नहुने - २ (चौडाई २.३ मिटर) शहरी क्षेत्रहरुमा (फुटपाथहरुको दुवैतिर)
मिडियनको लम्बाई	हाल नभएको	सडकको पुरै ५० कि.मी लम्बाईमा ३ मिटर चौडाई को मिडियन
सोल्डरको विद्यमान चौडाइ	०.५० मिटर देखि १.०० मिटर	२.५ मिटर चौडाईको कालोपत्रे सोल्डरहरु
पुलहरुको संख्या	३१	३१
कल्भर्टहरुको संख्या	१५३	१५३
रिटेनिङ्ग वालहरुको लम्बाई	११२ मिटर	सालाखाला १५०० मिटर
साइड ड्रेनहरुको लम्बाई	२५ कि.मी.	७०.४४ कि.मी.
सडक सुरक्षामा स्तरोन्नतिहरु	हाल नभएको	प्रमुख गाउँहरु/बजारहरु: १९ प्रमुख संगम स्थलहरु (junctions): ४ सामान्य संगम स्थलहरु (junctions): १२

चित्र E2: बी.जी. सडकको प्रस्तावित सुधारको अवधारणात्मक डिजाइन

In Rural Areas (total width 24 m)	
In Semi-urban Areas (total width 33 m)	
In Urban Areas (total width is 50m)	

बुटवल-गोरुसिंघे सडकको ESIA को दायरा (Scope)

ESIA अध्ययनको दायरा निम्न बमोजिम रहेको छ ।

१. आयोजनाको प्रस्तावित सीमाक्षेत्र (३०० मिटर कोरिडोर, सडकको मध्य भागबाट दुवैतर्फ १५० मिटर दुरी, प्रत्यक्ष प्रभाव पर्ने क्षेत्र) र आयोजनाले असर पुऱ्याउने क्षेत्र (२ कि.मी. कोरिडोरमा अप्रत्स्क्ष असर पर्ने क्षेत्र) को अधिनमा रहि वातावरणीय तथा सामाजिक आधारभूत स्थितीको स्थापना गर्ने ।

२. आयोजनाको पूर्व निर्माण देखि, निर्माण, संचालन र मर्मत सम्भारको सम्पूर्ण चक्रको अवधिमा आयोजनाका कारणले हुने अतिरिक्त सम्भावित प्रतिकुल र सकारात्मक वातावरणीय र सामाजिक (E&S) जोखिम र प्रवाहहरु पहिचान गर्ने ।

३. आयोजना संग सम्बन्धित सरोकारवालाहरुको संलग्नताको लागि सरोकार संलग्नता योजना (Stakehoder Engagement Plan), श्रम व्यवस्थापन प्रक्रिया (LMP), आदिवासी जनजाति योजना फ्रेमवर्क (IPPF) र लैंगिक हिंसा (GBV) साथै सम्भावित सबै जोखिमहरु लगायत वातावरणीय स्वास्थ्य सुरक्षा (EHS) जोखिम र प्रवाहहरु सम्बोधन हुने गरि प्रवाह न्यूनीकरण कार्यहरुको तयारी गर्ने ।

कानूनी तथा साहायता रुपरेखा

नेपालको कानूनी रुपरेखा विश्व बैंकको वातावरणीय तथा सामाजिक रुपरेखा, वातावरणीय स्वास्थ्य तथा सुरक्षा सम्बन्धी निर्देशीका अनुरुप वातावरण तथा सामाजिक प्रभाव मुल्याङ्कन प्रतिवेदन (ESIA) तयार पारिएको छ । ESIA को यो खण्डले आयोजना कार्यान्वयनको क्रममा लागू हुने वातावरणीय र सामाजिक नीतिहरु लगायत विधान र संस्थागत रुपरेखाहरुको सिंहावलोकन गरेको छ । नेपाल राष्ट्रको कानूनी र संस्थागत रुपरेखा नेपालको संविधान (२०१२) मा आधारित रहेको छ, जसले सबैलाई स्वच्छ र स्वास्थ्य वातावरणमा बाँच्न र प्राकृतिक श्रोतको संरक्षण, प्रवर्द्धध र दीगो उपयोग गर्ने अधिकार प्रदान गरेको छ । यसमा नेपालको विद्यमान कानूनी संरचनाहरुको विस्तृत विश्लेषण गरि विकास आयोजना रणनीति, नीति, ऐन र नियमहरु जस्ता सबै सान्दर्भिक दस्तावेजहरुको समिक्षा समेत समावेश गरिएको छ । राष्ट्रिय निर्देशन तथा निर्देशीका साथै मापदण्डहरुले नियामक रुपरेखाको आवश्यक्ताहरु पुरा गर्न सहयोग पुऱ्याई आयोजना कार्यान्वयनको स्तरमा लागु गरिने/हुने उपयोगी व्यवहारिक उपकरणहरु प्रदान गर्न मद्दत पुऱ्याउछ ।

विद्यमान रुपरेखाको विश्लेषण तालिका बनाई बुटवल-गोरुसिंघे सडकको वातावरणीय र सामाजिक मुल्याङ्कनको सन्दर्भमा निम्न लिखित प्रावधानहरु समेत जोड दिएको छ ।

यस संग सम्बन्धित केहि महत्वपूर्ण कानून तथा नियमावलीहरु (तर सिमित नभएको) यसप्रकार रहेका छन्: सडक सुरक्षा कार्यजोना (२०१३-२०२०), नेपाल राष्ट्रिय जैविक विविधता कार्ययोजना (२०१४-२०२०), वातावरण संरक्षण ऐन/नियमावली (२०१९/२०२०), बन ऐन र नीति (२०७२), श्रम नीति (२०६३), जग्गा प्राप्ती, पुनर्वास तथा पुनः स्थापना नीति (२०७२), लुप्त प्राय वन्य जीव तथा वनस्पतिको अन्तराष्ट्रिय ब्यापारमा नियन्त्रणका लागि ऐन (२०१७), बाल श्रम निशेधाज्ञा तथा नियमावली (२०५७), जग्गा प्राप्ति ऐन (२०५४ संशोधन सहित), जलश्रोत नियमावली (१९९३), औद्योगीक नीति/नेपालले विभिन्न अन्तराष्ट्रिय सम्मेलन र सन्धिहरुमा हस्ताक्षर गरेका बुंदा, सिमावर्तीय वा विश्वव्यापि प्रकृतिक प्रदुषण, मौसम परिवर्तन र जैविक विविधता संरक्षण जस्ता महत्वपूर्ण वातावरणीय र सामाजिक मुद्दाहरु सम्बोधन गर्न बाध्य छ । यस ESIA को प्रक्रियामा अन्तराष्ट्रिय सन्धि/सम्झौताको प्रावधानहरुलाई समेत ध्यानमा राखि समावेश गरिएको छ ।

आधरभूत वातावरण तथा सामाजिक स्थिति

आधारभूत तथ्याङ्क जस्तै भौतिक विज्ञान, जल विकास तथा प्रवाह, भूबिज्ञान, भूउपयोग, बनस्पती, जिवजन्तु, वन बनस्पतीको स्थिती, जलवायु परिवेश तथा वायुको गुणस्तर, परिवेशको ध्वनी स्तर लगायत जोखिमको अवस्था इत्यादिको स्थिती मुल्याङ्कन अगस्त २०२० देखि जनवरी २०२१ सम्म गरेको थियो ।

यसले प्रस्तावित आयोजना संग सम्बन्धित निजी सम्पत्ति, सांस्कृतिक सम्पदा, सार्वजनिक उपयोगिताहरु, आदिवाशी जनजाति (IP), जोखिममा परेका समूहहरु, आयोजना प्रभावित समूहहरु, लैंगिक हिंसा (GBV), ब्यवसाय जन्य स्वास्थ्य र सुरक्षा (OHS) जस्ता सामाजिक विशेषताहरुको पनि मुल्याङ्कन गरेको थियो ।

भौतिक वातावरण

बी.जी. सडक क्षेत्र मुख्यतया तराई क्षेत्र भित्र पर्दछ जसको उचाई ११७ देखि १५८ मीटर (समुद्र सतह भन्दा माथि) रहेको छ । यस सडकको प्रारम्भिक बिन्दू करिब १.७ कि.मी.खण्ड चुरे पहाड श्रृखलाको फेदमा पर्दछ । यस बी.जी.

सडक खण्डमा अवस्थित भूमी प्रयोगको अवस्था मुख्य रुपमा निर्मित क्षेत्र (६१%), वनहरु (२१%), खेतीवारी (१६%) र बाँकी जलक्षेत्र रहेको छ। यो सडकको भूमी प्रयोग नक्सा चित्र E2 मा देखाईएको छ। यो सडक खण्डको मौसम आर्द्र र उष्ण प्रकृतिको रहि उष्ण कटिबंधिय र उप-उष्ण कटिबंधिय जलवायुमा अवस्थित छ। सामान्यतया बर्षाको मौसम जून महिनामा सुरु भई सेप्टेम्बर महिनामा समाप्त हुने गरेको छ। बर्षातको मौसममा करिब ८०% बर्षा हुन्छ। कपिलवस्तुको औसत न्यूनतम तापक्रम १८.७९ डिग्री सेल्सियस र अधिकतम तापक्रम ३०.९३ डिग्री सेल्सियस रहन्छ। उपआयोजना क्षेत्रका अधिकांश ठूला नदीहरु महाभारत पहाड श्रृखलाबाट निस्किएका छन्। कतिपय नदीहरुमा बर्षातको समयमा बाढी आउने सम्भावना हुन्छ भने बाँकी मौसममा सुख्खा रहन्छ।

प्रस्तावित सडक खण्ड गंगाको समतल भूभाग (माथिल्लो तराई) र पश्चिम नेपालको चुरे श्रृखला समूहको चट्टानमा अवस्थित रहेको छ। यो सडक खण्डको प्रारम्भिक बिन्दू करिब १.७ कि.मी. खण्ड चुरे पहाड श्रृखलाको फेदमा पर्दछ भने बाँकीले गंगाको समतल भूभाग ओगटेको छ। बी.जी. सडकको प्रारम्भिक १ कि.मी. खण्डमा पहिरो लगायत पुराना पहिरोहरुको अवशेष तथा बाढीबाट कटान भएका क्षेत्रहरु बिद्यमान रहेको छ।

नौ स्थानमा अनुगमन गरिएको वायुको गुणस्तर मापनले बन क्षेत्र बाहेकको क्षेत्रमा पि.एम. National Ambient Air Quality Standards (NAAQS) भन्दा बढी रहेको देखिएको छ। औसत २४ घण्टामा ध्वनीको स्तर ३१.१ dB(A) देखि १२९.१ dB(A) सम्म फरक पाईयो। सबैभन्दा बढी ध्वनीको स्तर बुटवलमा र न्यून बन क्षेत्रमा पाईएको थियो। बुटवलमा मापन गरेको ध्वनीको स्तरले राष्ट्रिय मापन सीमा (NNQSL) र विश्व बैंकको EHS को मापदण्ड नाघेको पाईयो। पिउने पानीको गुणस्तरको सम्बन्धमा सबै मापदण्डहरु नेपाल खानेपानीको गुणस्तर मानक (NDWQS) सीमा भित्रनै रहेको पाईयो।

<u>जैविक वातावरण</u>

आयोजनाको प्रायजसो भाग उष्णकटिबर्धीय (tropical zone) क्षेत्रमा पर्दछ र यस सडक खण्डमा साल रुखको अधिपत्य रहेको पाईएको छ भने नदी किनारको तटीय क्षेत्रमा सिसौ-खयरको मिश्रित वन क्षेत्रहरु रहेका छन्। रुपन्देहि जिल्लाका प्रमुख वन क्षेत्रका ब्लकहरु चेनेज[2] कि.मी. ६११+८७० देखि ६१७+७३० (सालझण्डी-पिपरा फरेष्ट ब्लक, जसको लम्बाई यस सडक अन्तर्गत ५८६० मी. र यसलाई चित्र E2 को बक्स A मा दर्साइएको छ) सम्म फैलिएको छ।

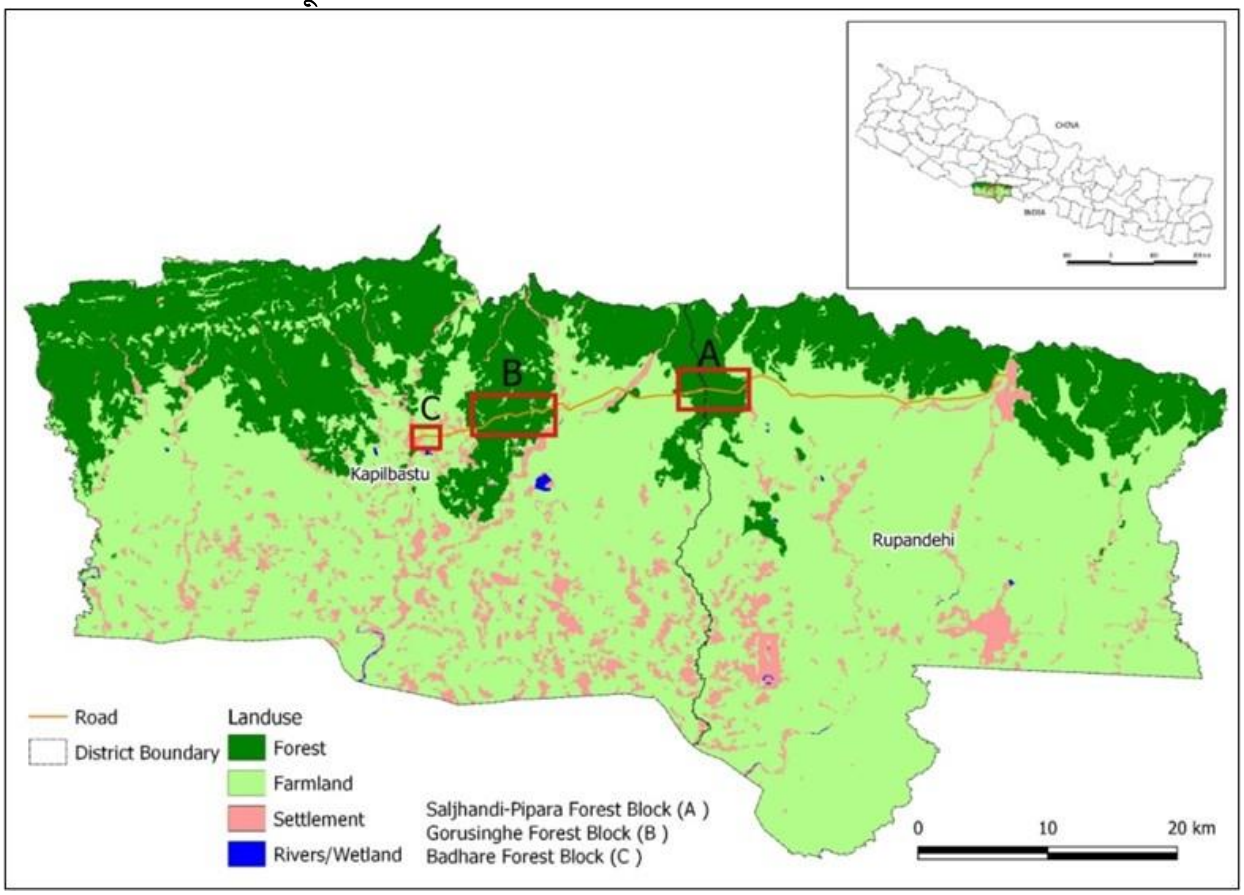
कपिलवस्तु जिल्लाका अन्य प्रमुख वन क्षेत्रहरु कि.मी. ६२६+९७० देखि कि.मी. ६३५+२०० (गोरुसिंघे फरेष्ट ब्लक, जसको लम्बाई ८१३० मी. रहेका छ, चित्र E-2 बक्स B) र कि.मी. ६३७+७२० देखि कि.मी. ६३९+००० (भदारे/बुढि फरेष्ट ब्लक, लम्बाई १२८० मी., चित्र E-2 बक्स B) सम्म फैलिएको छ।

यि बनहरु मुख्यताया: (> ८०%) सामुदायिक बनहरु हुन् र काठ दाउरा चिरानका लागि समुदायले प्रयोग गर्दै आईरहेका छन्। यो सडकको दुवैतिरको ५० मिटर ROW (सडको केन्द्रबाट दुवै छेउ २५ मिटर) पहिलेनै बिखण्डित भईसकेको र सडक विभागको स्वामित्वमा रहेको पाईएको छ।

यो आयोजनाको प्रत्यक्ष र अप्रत्यक्ष प्रभाव क्षेत्रमा पहिचान गरिएका वन्यजन्तुको आवस क्षेत्र लगायत migration corridor हरु नरहेको र राष्ट्रिय वा अन्तराष्ट्रिय रुपमा तोकिएको संरक्षित क्षेत्र र अन्य महत्वपूर्ण वासस्थान (critical habitat) हरु समेत आयोजना क्षेत्रमा छैनन्।

[2] यो सडकको सुरुवाती चेनेज पूर्व पश्चि राजमार्गमा कि.मी. ६८९+७०० सुरु भई कि.मी. ६३९+७०० मा समाप्त भएको छ।

चित्र E2: बी.जी. सडकको भूउपयोग नक्सा



यस आयोजनाको प्रारम्भिक चरणको महत्वपूर्ण वासस्थान मुल्याङ्कन (critical habitat screening) ले ३ गम्भिर रुपमा लोपोन्मुख चरा प्रजातीहरु, १ लोपोन्मुख चरा प्रजाती, १ गम्भिर खतरामा परेको उभयचर र ३ लोपोन्मुख उभयचर प्रजातीहरु उपस्थिति रहेको देखाएको छ। यद्यपि IFC-PS6 को प्रावधान लागू गर्दा यी CR र EN प्रजातीहरु दक्षिण पूर्व एशीया, दक्षिण एशीया (हिमालय क्षेत्र र नेपाल) मा व्यापक रुपमा छरिएर रहेकोले आयोजनाको बुटवल-गोरुसिंगे सडकको दायाँबायाँ दुवैतिर १ कि.मी. क्षेत्र बिश्लेषणको पारिस्थितिक रुपमा उपयुक्त क्षेत्र (ecologically appropriate area of analysis) धेरै सानो रहेकोले यस आयोजनाको सुधारले यी प्रजातीहरुको विश्वव्यापि जनसंख्यालाई असर नगर्ने अपेक्षा गरिएको छ। तसर्थ यस आयोजनाको ROW र DIA मा महत्वपूर्ण वासस्थानको उपस्थिति नरहेको निश्कर्ष निकालिएको छ।

सामाजिक-आर्थिक र सांस्कृतिक वातावरण

उपआयोजना स्थल रुपन्देही र कपिलवस्तु जिल्लामा पर्दछ र आयोजनाले बुटवल महानगरपालिका लगायत सैनामैना, वाणगंगा, बुद्धभूमी नगरपालिका कञ्चन गाउँपालिका भागहरु चर्चेको छ। उपआयोजना क्षेत्रमा ब्राम्हण, क्षेत्री, दलित, मुस्लिम, मधेसी जनजातीहरुको बसोबास रहेको छ। उपआयोजना क्षेत्रमा नेवार, मगर र राई गरि तिन वटा जनजाती समुदाय रहेका छन्। उनीहरु स्थानिय समुदायमा एकिकृत छन् र आयोजना क्षेत्रको जग्गामा सामुहिक संग्लन्ता नभएको पाईएको छ। २२ वटा वडामा समेटिएको प्रभाव क्षेत्रको कूल जनसंख्या १,४४,९१४ रहेको छ। यो जनसंख्यामा पुरुष र महिला क्रमशः ६८,२३२ र ७६,६५२ छन्। यस सडको केहि खण्डहरुको ROW भित्र व्यवसायी स्थापनार्थ आदिवासी जनजातीका २२ वटा घर संरचना सहित १२० घरपरिवारले ROW अतिक्रमण गरिएको पाईयो र सामुदायिक छलफल गर्ने क्रममा यिनीहरुको ROW सित कुनै सांस्कृत सम्बन्धता समेत नरहेको पाईयो। यो आयोजनामा कूल प्रभावित जनसंख्या ६६० र औसत परिवार संख्या ५.५ रहेको छ।

सरोकारवालाको संलग्नता र सार्वजनिक परामर्श/सुनुवाई

यो आयोजनाको जिवन चक्रमा सरोकारवालाहरुलाई संलग्न गराउने समावेशी प्रक्रिया हो । यो प्रक्रियाले विश्व बैंकको ESS10 को भावना अनुरुप विभिन्न सरोकारवालाहरुको राय सुझाव/आवाजहरु पहिचान गरि समेटेको हुन्छ । ESIA तयारि क्रममा सरोकारवालाहरु संग परामर्श गरिन्छ र यसले स्थानिय गाउँपालिका, नगरपालिकाहरु लगायत प्रत्यक्ष र अप्रत्यक्ष रुपमा प्रभावित समूहका समस्याहरु सम्बोधन गर्ने गर्दछ । आयोजनाबाट प्रभावित पक्षहरु भन्नाले आयोजनाको गतिविधीहरु बाट प्रत्यक्ष रुपमा प्रभावित र प्रभावको कोरिडोर भित्र रहेको समुदायलाई जनाउँदछ र उक्त समूहमा स्थानिय जनसंख्या, सर्वजनिक सेवा प्रदायकहरु र स्थानिय स्वास्थ्य सुविधामा अतिक्रमण भएका घरपरिवारहरु समावेश हुन्छन् ।

आयोजना प्रभावित समूहका अतिरिक्त पहिचान भएका अन्य सरोकारवालाहरु स्थानिय सरकारहरु (१ उपमहानगरपालिका, ३ नगरपालिका र १ गाउँपालिका) लगायत स्थानिय गैर सरकारी संस्थाहरु (NGO), नागरिक समाज, शिक्षक, राजनितिक नेता, महिला समूह, स्थानिय उद्यमीहरु, जोखिममा परेका र अपाङ्गता भएका व्यक्तिहरु, सिमान्तकृत वर्ग/समूह, स्थानिय प्रयोगकर्ता समूह (वन, पानी, सिंचाई आदि), सुरक्षाकर्मी (ट्राफिक, प्रहरी, सेना), चालक र सडक प्रयोगकर्ता (यात्रु समेत) रहेका छन् । आयोजना सम्बन्धी जानकारी माथि उल्लेखित सबै वर्गहरु, सरोकारवालाहरु सित साझा गरिएको थियो । प्रारम्भमा पैदल हिंडेर सर्वेक्षण गरियो भने त्यसपछि स्थानिय सरकारी अधिकारिहरुसंग व्यक्तिगत अन्तरवार्ताहरु लिईएको थियो । प्रत्यक्ष समूह सित छलफल (FGD) र प्रमुख सुचानादाता अन्तरवार्ता (KII) जस्ता उपकराणहरु छलफल सन्चालन गर्न प्रयोग गरिएको थियो । डिसेम्बर २०२१ देखि जनवरी २०२२ को समयमा कपिलवस्तु जिल्लाका विभिन्न नगरपालिका/गाउँपालिकाहरुमा २७ वटा परामर्श बैठकहरु आयोजना गरिएको थियो । यो परामर्शहरुमा ३३२ पुरुष र ११० महिला गरि जम्मा ४४२ सहभागिहरुले भाग लिएका थिए । वन विभाग, वन उपभोक्ता समूह, महिला, प्रभावित व्यक्ति, अन्य सरोकारवाला पक्षहरु जस्ता विशिष्ट र इच्छुक समूहहरु संग थप परामर्श गरिएको थियो ।

परामर्शका क्रममा सरोकारवालाहरुले उठाएका मुख्य बुँदाहरु यसप्रकार रहेका छन्: प्रभावित क्षेत्र/जग्गा लगायत प्रभावित निजी तथा सार्वजनिक संरचनाहरुको मुवाब्जा, वायु प्रदुषण, वस्ती क्षेत्रमा आकासे पूल, स्थानिय जनतालाई सीप विकास र रोजगारिको अवसर, पहिरो संरक्षण, अतिरिक्त साईड ड्रेन, पूल/पूलेसा र कर्भट निर्माण, कटान भएका रुखको स्वामित्व सम्बन्धित वन उपभोक्ता समूहलाई दिनुपर्ने, सडक छेउमा बृक्षारोपण, सडक किनारामा रहेका सामुदायिक वन क्षेत्रमा तारबार र सडक स्तरोन्नती कार्यक्रममा सरोकारवालाहरुको संलग्नता इत्यादि ।

वातावरणीय तथा सामाजिक जोखिम र प्रभावहरु

बी.जी. सडक सुधारबाट लाभकारि प्रवाहहरुमा आर्थिक विकासमा सहजिकरण, रोजगारी श्रृजना, व्यवसायहरुका लागि अवसर श्रृजना हुने, सेवा र बजारहरुमा पहुँच, सुधारिएको सडक पूर्वाधारले सुरक्षा समस्याहरुलाई न्यूनीकरण गरि सुरक्षित यातायातको सुनिश्चितता ईत्यादि परेका छन् । लाभकारि प्रभावहरु सडक पूर्वाधारको सुधार र यसको प्राविधिक दक्षता, आर्थिक विकास र स्थानिय जनताको जिविकोपार्जनमा सकारात्मक प्रभाव संग सम्बन्धित छन् ।

सबै प्रभावहरुलाई तिनीहरुको परिणाम र महत्वको आधारमा वर्गिकृत गरिएको छ । निम्न खण्डहरुले प्रत्येक सान्दर्भिक वातावरणीय र सामाजिक जोखिमहरु र प्रवाहहरुलाई संक्षेपमा प्रस्तुत गरेको छ ।

वातावरणीय र सामाजिक जोखिम र प्रभावहरुको मुल्याङ्कन र व्यवस्थापन (ESS1): यस सडकलाई २ लेन बाट ४ लेनमा विस्तार गर्ने कार्य सडक विभागले तोकेको ROW भित्र नै सिमित रहनेछ । विस्तारको क्रममा आवासिय तथा व्यापारिक संरचनाहरु हटाउने र करिब २८ हेक्टर बन क्षेत्र फडानि गर्न आवश्यक रहेको पाईएको छ । प्रस्तावित कार्यले जम्मा १२२ निजी आवासिय र व्यवसायिम संरचनाहरुलाई (१२० घरधुरीहरुबाट) असर गरि मुख्यतया यी संरचनाहरुको अगाडीको भाग (बरण्डा) लाई आंशीक रुपमा क्षती पुग्ने देखिन्छ । यी प्रभावित घरपरिवाहरु मध्ये २२ घरधूरीहरु जनजातिका रहेका छन् र तिनीहरुले ROW मा अतिक्रमण गरेका कारणले FPIC गर्न बाध्यकारी अवस्था नरहेको समेत निक्यौल गरिएको छ । १२२ प्रभावित निजी आवासिय तथा ब्यापारिक संरचनाहरु मध्ये ८८ संरचनाहरुमा आंशीक र ३५ संरचनाहरु पूर्ण रुपमा प्रभावित हुनेछन् ।

निर्माणको क्रममा प्रवाहहरु मुख्यतया धुलो र ध्वनी प्रदुषण, श्रमिक र समुदायको स्वास्थ्य र सुरक्षामा बढेको जोखिम, बढेको ट्राफिक प्रवाह र ट्राफिक सम्बन्धी दुर्घटनाहरु, लैंगिक हिंसा (GBV) र बालश्रम जस्ता श्रमको बढ्दो प्रवाहहरु संग सम्बन्धित सामाजिक समस्याहरु छन् । यि सबै प्रवाहहरु निर्माणको क्रममा हुने अपेक्षा समेत गरिएको छ ।

बी.जी. सडकको स्तरोन्नतिमा कुनै महत्वपूर्ण संचयी (cumulative) प्रवाहहरु पर्ने देखिंदैन । किनभने आयोजनाका कार्यहरु सडक विभागले छुट्याएको ROW भित्र नै सिमित रहने छन् र सडक दाँयाबाँयाको क्षेत्र जनसंख्या बृद्धिले मानव बस्ती विकास, अतिक्रमण, भूमी रुपान्तरण, कृषि विकास र अन्य सम्बन्ध विकास भैरहेको उक्त क्षेत्र खण्डित भई रुपान्तरण भईरहेको छ (चित्र E2 मा प्रस्तुत भूउपयोग नक्सामा देखिए जस्तै) । यो सडकको सुधार कार्यहरु गरे वा नगरे तापनि विकेन्द्रिकरण उन्मुख विकासका कारण सहरी विकास, ग्रामिण क्षेत्रको विकास जस्ता क्रियाकलापहरुको परिणाम स्वरुप भू-उपयोग परिवर्तन र भूमी परिवर्तन भईसकेको छ र आगामि दिनमा पनि जारी रहने छ । यसको अतिरिक्त हालका बर्षहरुमा वरिपरिका ग्रामिण सडकहरु प्राय कुनैपनि वातावरणीय तथा सामाजिक अध्ययन/मुल्याङ्कन र जोखिम न्यूनिकरणका उपायहरु नअपनाई निर्माण गरिएका छन् । सडक सन्जालको बढ्दो घनत्व र सुरक्षात्मक उपायहरुको अभावले वातावरणमा प्रतिकूल असरहरु पहिले देखिनै बढेको देखिएको छ । स्थलगत अध्ययनका क्रममा देखिएका असरहरु जस्तै नदीको बहाव र अवसादनमा बढोत्तरी, ढल निकास साथै बर्षातको भेलको कमजोर व्यवस्थापन र सामुदायिक स्वास्थ्य र सुरक्षामा खतरा ईत्यादि । यो प्रवाहहरु जवायु परिवर्तन र स्थानिय जनसमुदायको असंबद्ध (uncoordinated) विकास शैलीले बढ्दै जाने सम्भावना देखिएको छ जसले कालान्तरमा आर्थिक क्षती समेत निम्त्याउन सक्नेछ ।

श्रम र कामको अवस्था (ESS2): यस आयोजनामा प्रत्यक्ष (अर्थात परियोजनामा प्रत्यक्ष जिम्मेवारीहरु पूरा गर्न **DoR** द्वारा संलग्न विशेष सल्लाहाकार र प्राविधिक विशेषज्ञहरु), अनुबंधित (अर्थात परियोजनाको मुख्य कार्यहरु गर्न सिभिल कार्य सम्बन्धी ठेकेदारहरु र अन्य तेश्रो पक्षहरुद्वारा संलग्न कामदारहरु) र प्राथमिक आपूर्ती कामदारहरु (अर्थात वालुवा, ढुंङ्गा, रोडा लोडिङ्ग/अनलोडिङ्ग तथा निर्माण सामग्री ढुवानी सेवाहरु जस्ता निर्माण सामग्री आपूर्तीकर्ताहरुका कामदारहरु) लाई रोजगारि उपलब्ध हुने सम्भावना देखिएको छ । उक्त वर्ग श्रम शिविरको कमजोर वासस्थान/सुविधा, श्रमशोषण, सुविधावट बन्चित, रोजगारिमा भेदभाव, बालश्रम वा जबरजस्ती श्रम, व्यवसायिक स्वास्थ्य र सुरक्षा सम्बन्धी जोखिम, सरुवा रोग जोखिम, कामदाको यौन शोषण र दुर्व्यवहार र यौन उत्पीडन (SEA/SH) सम्बन्धी गुनासाहरु पर्नसक्ने पनि त्यतिकै सम्भावना रहेको पाईयो । फलस्वरुप कार्यस्थल दुर्घटनामा कामदारहरु संग सम्बन्धित गुनासा तथा लैंगिक विभेद (GBV) सम्बन्धी गुनासाहरुमा बढोत्तरि आउने समेत मुल्याङ्कन गरिएको छ । अनुबंदित कामदारहरु यस्ता जोखिमहरु बाट बढि प्रभावित हुने पाईएको छ । आयोजनाले करिब ५०० देखि ६०० जना कामदारहरुलाई रोजगारि दिनेछ र करिब ४०% कामदारहरु स्थानिय समुदायबाट लिईने छ । श्रमिकका लागि गुनासाहरु सुन्ने, दर्ता गर्ने र सम्बोधन गर्ने संयन्त्रको स्थापना समेत गरिने छ ।

श्रोत दक्षता र प्रदुषण रोकथाम व्यवस्थापन (ESS3): ESS3 ले मुख्यतया सौदर्य, वायु तथा ध्वनी प्रदुषण, सम्भावित खतराहरु, फोहर मैला व्यवस्थापन, पानीको श्रोतहरुको प्रदुषणका साथै सम्बन्धित जोखिम र प्रवाहहरुलाई समेटेको हुन्छ ।

फोहर मैलाको अनुचित व्यवस्थापन, पूल पूलेसा, कल्भर्ट, निर्माणको क्रममा नदीहरुको मौसमी धार अवरुद्ध, पानीको श्रोतमा थप चाप, वायु तथा ध्वनी प्रदुषण, निर्माण कार्य/निर्माण सामग्रीबाट निस्कने धुँवा, धुलो, खानी सन्चालन र खानीवाट निर्माण सामाग्रीको ढुवानी, ठूल/ठूला मेशीनको प्रयोग र तिनबाट निस्कने धुँवा, कम्पन (vibration) ईत्यादिले हुने प्रदुषण लगायत बाट सम्बेदनशील समुदायमा आत्याधिक प्रभाव र असर पर्ने देखिन्छ । यी सबै प्रभावहरुका असर निर्माण चरणमा बढि देखिए तापनि प्रवाह न्यूनीकरण अध्ययनमा वर्णन गरिए अनुसार ध्वनी, वायु र खानेपानी लगायत राष्ट्रिय मापदण्डहरुको अनुपालन गर्नुका साथै सडक निर्माण परियोजनाहरुमा लागु हुने उत्कृष्ट अभ्यासहरु/विशेष उपायहरुको अनुशरण गरेमा असर न्यूनीकरण गर्न सकिने देखिन्छ ।

सामुदायिक स्वास्थ्य सुरक्षा (ESS4): निर्माण सामग्रीको ढुवानीले स्थानिय समुदायलाई अप्ठ्यारो पर्न सक्ने देखिएको छ । उपआयोजनाका गतिविधिहरु जस्तै पहाड कटान (करिब १ कि.मी. लम्बाई), सडक उत्खनन, हेभी उपकरणहरुको कम्पनले पहिरोको जोखिम र वायु प्रदुषणमा बढोत्तरी हुने देखिन्छ । निर्माणको क्रममा उत्पादन हुने निर्माण सामग्रीको मलुवा भण्डारले परिदृष्य र खेतीयोग्य जमीनलाई वाधा पुऱ्याउनुका साथै जल निकायहरु दुषित हुनसक्ने देखिन्छ । निर्माण गतिविधी, निर्माण सवारी साधनको चाप, राजमार्ग छेउछाउमा निर्माण सामग्रीको भण्डारले यातायात आवागमनमा असर पर्ने देखिन्छ । आयोजना श्रेत्रमा बाहिरी श्रम शक्तिको उपस्थितिले वातावरण र स्थानिय समुदायहरुमा नकारात्मक प्रभाव पर्नसक्ने हुँदा लैंगिक हिंसा (GBV) तथा द्वन्द सिर्जना हुन नदिन समयमै चनाखो भई न्यूनीकरणका उचित उपायहरु अपनाउनु पर्ने देखिन्छ । आयोजना क्षेत्रमा प्रष्ट परिभाषित र सम्बन्धित प्रतिक्रिया संयन्त्रको अभाव भएको श्रम सित सम्बन्धित (GBV) को जोखिमको स्तरलाई पर्याप्त (Substantial) आंकलन गरिएको छ । यस बाहेक GBV सेवा

प्रदायकहरुको संस्थागत र पूर्वाधारात्मक क्षमताको कमीले लैंगिक हिंसाबाट उन्मुक्ति पाएका व्यक्ति/समुदायलाई यथोचित सल्लाह अपर्याप्त मात्रामा उपलब्ध हुने देखिन्छ । यस अतिरिक्त वाह्य श्रमको आगमन र बाहिरियाहरुरुको बढ्दो चलखेल/आवत जावतले CoVID-19, HIV/AIDS, STIs लगायत संक्रामक रोगहरुको फैलावटलाई बढ्न मद्दत पुऱ्याउने देखिन्छ ।

भूमी अधिग्रहण, भूमी प्रयोगमा प्रतिबन्ध र अनैच्छिक पुर्नवास (ESS5): कूल १२० घरधुरीका १२२ वटा संरचानाहरु, ROW अतिक्रमण गरि बनाईएकाले प्रभावित हुनेछन् । आयोजनाकै लागि नयाँ जग्गा प्राप्तीको आवश्यक्ता नहुने समेत अध्ययनको सिलसिलामा जानकारी भएको छ । प्रभावित संरचना मध्ये ५० आवासिय संरचनाहरु, ४५ आवासिय तथा व्यवसायिक संरचनाहरु, १५ व्यवसायिक संरचनाहरु र १२ आवास सम्बन्धी अन्य संरचनाहरु जस्तै भण्डार गृह, शौचालय तथा गोठहरु छन् ।

१२२ प्रभावित संरचना मध्ये १६ व्यवसायिक र ३ आवासिय तथा व्यवसायिक संरचना हरु पूर्ण रुपमा प्रभावित छन् । कूल प्रभावित घरपरिवारमा २२ जनजाती (ROW भित्र अतिक्रमणका कारण), ६ मुस्लिम, र ३ दलित रहेका छन् । यसका साथै विद्यालयको पर्खाल जस्ता निजी संस्थाका पाँच संरचनाहरु प्रभावित हुनेछन् । साथै, आयोजनाले २०६ सार्वजनिक संरचना (१४ मन्दिर, ६५ वटा यात्रु प्रतिक्षालय, ६१ वटा चौतारा, २ वटा सार्वजनिक शौचालय) लाई असर पुऱ्याउने छ र यी सबै संरचनाहरुलाई सम्बन्धीत समुदायसँग परामर्श गरी नजिकैको सार्वजनिक जग्गामा स्थानान्तरण गरिनेछ ।

यस बाहेक १,६४६ बिजुलीका पोलहरु र खानेपानी आपूर्ती (DWS) पाईपहरु लाई स्थानान्तर गर्न आवश्यक देखिएको छ । बुटवल-गोरुसिंघे सडक आयोजनाको यथोचित आवास, कार्य योजना रुपरेखा (RAP) मा उल्लेखित प्रक्रिया अनुसार आयोजना कार्यान्वयनको त्रममा निर्माण सम्बन्धी प्रवाहहरुको समेत व्यवस्था गरिने छ ।

जैविक विविधता संरक्षण र जीबित प्रकृतिक श्रोतहरुको दिगो व्यवस्थापन (ESS6): यस क्षेत्रको विकास र मानव बसोवासको लामो इतिहासको कारण यस क्षेत्रमा मानव सिर्जित क्रियाकलापहरुको प्रभाव अत्याधिक मात्रामा रहेको छ र जसको कारण ROW र वरपरको क्षेत्रहरुमा रहेको वन्यजन्तुहरुको वासस्थान पहिले देखिनै खण्डित अवस्थामा रहेको पाईएको छ । वातावरणीय र सामाजिक मानक (ESS6) र IFC कार्यसम्पादन मानक (PS-6) अन्तर्गत वन्यजन्तुहरुको महत्वपूर्ण वासस्थानको लागि गरिएको आधारभूत प्रारम्भिक आधार र ESIA अध्ययनले देखाए अनुरुप यी CR र EN प्रजातीहरु दक्षिण पूर्व एशीया, दक्षिण एशीया (हिमालय क्षेत्र र नेपाल) मा व्यापक रुपमा छरिएर रहेकोले आयोजनाको बुटवल-गोरुसिंगे सडकको दायाँबायाँ दुवैतिर १ कि.मी. क्षेत्र बिश्लेषणको पारिस्थितिक रुपमा उपयुक्त क्षेत्र (ecologically appropriate area of analysis) धेरै सानो रहेकोले यस उपआयोजनाको सुधारले यी प्रजातीको विश्वव्यापि जनसंख्यालाई असर नगर्ने अपेक्षा गरिएको छ । तसर्थ यस आयोजनाको ROW र DIA मा महत्वपूर्ण वासस्थानको उपस्थिति नरहेको निश्कर्ष निकालिएको छ ।

यो सडक आयोजनाले करिब करिब १५.२ कि.मी. सडक लम्बाईमा २८ हेक्टर बन क्षेत्रलाई असर गर्ने छ । यो आयोजना सुधार बाट प्रत्यक्ष असर पर्ने गरि करिब करिब ९,३८६ रुखहरु काटिने छन् । जसमध्ये २,२२५ ससाना विरुवाहरु, १,६९१ पोल साइजका विरुवाहरु र ५,५११ बयस्क रुखहरु काटिने छन् । ROW भित्रको निर्माण कार्यले गम्भिर रुपमा जोखिममा परेका र लोपोन्मुख वासस्थानहरुमा प्रतिकुल असर नपर्ने देखिएको छ । यसका अतिरिक्त बी.जी. सडक खण्डमा कुनै संरक्षित क्षेत्र, वन्यजन्तु आरक्षहरु वा प्रवासी वन्यजन्तु/चराचुरुङ्गीहरुको आवगमन मार्ग समेत नरहेको निऱ्क्यौल गरेको छ । काटिने प्रत्येक रुखको लागि आयोजनाले नेपाल सरकारले तोकेको मापदण्ड अनुसार डिभिजन वन कार्यालयले तोकेको क्षेत्रमा १ रुख कटान बापत १० रुखहरु पुनर्रोपण गर्नेछ ।

आदिवासी जनजाति (ESS7): उपआयोजना क्षेत्रमा नेवार, मगर र राई गरि जम्मा ३ आदिवासी जनजाति (IP) समुदाय रहेका छन् । कूल २२ जनजातीहरुले ROW अतिक्रमण गरेका कारण संरचना गुमाउने छन् । यो समूहले निजी जग्गा भने गुमाउने छैनन् र आंशीक रुपमा मात्रै प्रभावित हुनेछन् । उपआयोजनाले तिनीहरुको जग्गा जमिनमा कुनै प्रत्यक्ष असर (प्रवाह) पर्ने देखिदैन र कुनैपनि IP समुदाय पूर्ण रुपमा रुपान्तरण हुने छैन र ति समुदायहरुको सांस्कृतिक सम्पदामा समेत कुनै प्रभाव नपर्ने देखिएको छ । ESIA ले मुल्याङ्कन गरे अनुसार जनजाती समुदायमा निर्माणका क्रममा पर्ने सम्भावित प्रवाह र जोखिमहरु मुख्यतया वाह्य श्रमको आगमन, लैंगिक हिंसा, ट्राफिक सुरक्षा तथा निर्माणको क्रममा वायु/ध्वनी प्रदुषण ईत्यादि पाईएका छन् । त्यसैले ESS7 को प्रावधान अनुरुप free, prior and informed consent

(FPIC) को आवश्यक्ता नदेखिएको स्थलगत अध्ययनले औलाएको छ । जनजाती सम्बन्धी मुद्दाहरु RAP मार्फत थप सम्बोधन गरिने छ ।

सांस्कृतिक सम्पदा (ESS8): यसले मूर्त र अमूर्त सांस्कृतिक सम्पदाको जोखिम र प्रवाहहरुलाई रेखाङ्कन गर्ने गर्दछ । ESIA अध्ययनको समयमा पुरातात्विक र ऐतिहासिक रुपमा मूर्त सम्पदाहरु गस्तै गुम्बा वा पुरातन स्मारकहरु बी.जी. सडकमा नरहेकोले यो सम्पदाहरुमा सडक विस्तार कार्यक्रमको कुनै प्रभाव नपर्ने देखिएको छ ।

ROW मा बसोबास गरिराखेका परिवारबाट १४ वटा मठ/मन्दिरहरुको निर्माण भएको देखिएको छ । सरोकारवालाहरु संगको छलफल बाट यी मठ/मन्दिरहरुको कुनै सांस्कृतिक महत्व नरहेको समेत जानकारि गराईएको थियो । निर्माणको चरणमा यो संरचनाहरुलाई परिवारहरु सित परामर्श गरि आपसी समझदारीमा नजिकैको सार्वजनिक जग्गामा स्थानान्तरण गरिने छ । वातावरणीय र सामाजिक व्यवस्थापन योजना (ESMP) मा Chance-finds procedure समावेश गरिएको छ । यदि निर्माणको क्रममा "chance-find" फेला परेमा उक्त प्रक्रियालाई अनुपालन गरिने छ । Chance-find का प्रावधानहरु बोलपत्र, ठेक्का सम्झौता लगायत ठेकेदारको C-ESMP मा समेत समावेश गरिने छ ।

बित्तीय मध्यस्तकर्ताहरु (ESS9): यस परियोजनामा बित्तीय मध्यस्तकर्ताहरुको संलग्नता नहुने भएकोले ESS9 लागु हुने छैन ।

सरोकार वालाको संलग्नता र सूचना प्रकटीकरण (ESS10): सरोकारवालाको परामर्शमा समुदायहरुबाट प्राप्त प्रस्तावहरु निम्न बमोजिम रहेका छन् । प्रभावित भूमी लगायत प्रभावित निजी र सार्वजनिक संरचना र उपयोगिताहरुको लागि पर्याप्त मुवाब्जा, वायु प्रदुषण, वस्ती क्षेत्रमा आकाशे पूल निर्माण, स्थानियहरुलाई शीप विकास र रोजगारीको अवसर, पहिरो क्षेत्र संरक्षण, थप साईड ड्रेन र पूल/पूलेसा तथा कल्भर्टको निर्माण, काटिएका रुखको स्वामित्व सम्बन्धित बन प्रयोगकर्ता समूहलाई दिनुपर्ने, सडक क्षेत्रका सामुदायिक वन क्षेत्रमा बृक्षारोपण र तारबार ईत्यादि । उपआयोजना स्तरको GRM सहितको छुट्टै सरोकारवाला संलग्नता योजना (SEP) समेत तयार गरिने छ ।

<u>वातावरणीय तथा सामाजिक व्यवस्थापन उपायहरु</u>

ESS को प्रावधानहरु अनुरुप मुख्य व्यवस्थापनका उपायहरु यसप्रकार रहेका छन् । इच्छुक सरोकारवालाहरु बिचको सूचनाको आदान प्रदानले सबै न्यूनीकरणका उपायहरु सहज रुपमा कार्यान्वयन गर्न मद्दत मिल्ने देखिन्छ । आयोजनाले स्थानिय निकाय र सरोकारवालाहरु संग स्थानिय विकासको योजना बनाउन समन्वय गर्नेछ ।

उपआयोजनाले वातावरण तथा सामाजिक प्रवाहहरु व्यवस्थापन गर्न न्यूनीकरण पदानुक्रम (mitigation hierarchy) समावेश गरि वातावरण तथा सामाजिक व्यवस्थापन योजना तयार गरेको छ । यसमा न्यूनीकरण उपायहरु, योजना अनुगमन प्रावधानहरु, क्षमता अभिबृद्धि जिम्मेवारी र रिपोर्टिङ्ग प्रणाली लगायत वातावरणीय र सामाजिक लागतहरु समावेश गरिएको छ । यसको अतिरिक्त ESMP ले लैंगिक हिंसा (GBV) सम्बन्धी समस्यालाई सम्बोधन गर्ने उपायहरु प्रदान गरेको छ । श्रमीक सम्बन्धी मुख्य मुद्दाहरुलाई राष्ट्रिय श्रम ऐन २०१७, श्रम नियमहरु २०१८ र विश्व बैंकको ESF 2018 को प्रावधान अनुरुप श्रम व्यवस्थापन योजना (LMP) र व्यवसायिक स्वास्थ्य र सुरक्षा योजना (OHS) तयार गरि परियोजनाको लागि अपनाईएको छ । कामदार सम्बन्धी गुनासाहरुको समाधान र व्यवस्थापनमा मद्दत गर्न आयोजनामा कार्यरत कामदारहरुको GRM को व्यवस्था गरिएको छ । कामदारहरुको शीविर संचालन तथा व्यवस्थापन योजना र कामदारहरुको आचार संहिता तयार पारिने छ । जसले लैंगिक हिंसालाई निरुत्साहित वा न्यूनीकरण गर्न समेत मद्दत गर्नेछ । आयोजना गतिविधी बाट हुनजाने भौतिक र आर्थिक बिस्थापनलाई सम्बोधन गर्न छुटै RAP तयार गरिने छ । आयोजनाबाट सबै प्रकारका हानी/नोक्सानी (निजी र सार्वजनिक सम्पत्तिहरु) entitle matrix अनुसार प्रतिस्थापन लागत समेत समावेश गरि क्षतिपूर्ती दिईने छ । आयोजना कार्यान्वयनको क्रममा हुने कुनैपनि अतिरित्त प्रवाहहरु सम्बोधन गर्न RAP तयार गरिएको छ र सो मा भएका प्रावधान अनुरुप क्षतिपूर्ती रकम निर्धारण गरिने छ । ESMP अनुसार ठेकेदार आयोजना स्थलमा परिचालन भए पश्च्यात र निर्माण कार्य सुचारु गर्नु पूर्व ठेकेदारले अनिवार्य रुपमा C-ESMP तयार गर्नुपर्ने हुन्छ ।

C-ESMP ले नेपाल सरकार तथा विश्व बैंक तथा IFC को कामदारको लागि आवास निर्देशीका (workers' accommodation guidelines) अनुरुप OHS योजना, खानेपानी तथा फोहर व्यवस्थापन योजना, श्रमीक शीविर व्यवस्थापन योजना, ट्राफिक व्यवस्थापन र सडक सुरक्षा व्यवस्थापन योजनाहरु, खानी तथा निर्माण सामग्री उत्खनन

क्षेत्र व्यवस्थापन योजना र आयोजना स्थल पुनर्स्थापना योजना समावेश गर्नेछ । आयोजनाको सरोकारवालाहरु पहिचान गरि र आयोजनाको जिवनचक्र भरि सरोकारवालाहरु संग संलग्न हुने योजना उपलब्ध गराउनको लागि आयोजनाले सरोकारवाला संलग्नता योजना (SEP) तयार गर्नेछ ।

SEP ले महिला र युवतीहरुलाई जोड दिदै स्वास्थ्य र सुरक्षीत रहने प्रबृतीको प्रवर्द्धन गर्दै सामुदायिक चेतना र संम्बेदनशीलताको लागि सामाग्री उपलब्ध गराउने छ । SEP मा कुनैपनि प्रश्न र गुनासाहरु उठाउनको लागि सरोकारवालाहरुको लागि आयोजना स्तरमा GRM को विवरणहरु समेत समावेश गरिएको हुनेछ ।

सामान्य जोखिम र प्रवाहहरुको लागि न्यूनीकरण उपायहरु: सामान्य जोखिम र प्रवाहहरुको न्यूनीकरणका लागि निम्न उपायहरु अवलम्बन गर्न प्रस्ताव गरिएको छ जो यस प्रकार रहेका छन् । बायोइन्जिनियरिङ्ग पछि सुदृढीकरण संरचनाहरु सहितको संरक्षण योजना, प्रभावित परिदृष्य (landscape) को पूर्नस्थापना, खानी उत्खनन तथा भण्डारण योजनाको विकास, इन्धन कुशल यन्त्र तथा वाहानको छनौट र बृक्षारोपण द्वारा कार्बन व्यवस्थापन/न्यूनीकरण सम्बन्धी सिफारिस, अर्थपूर्ण परामर्शका साथ समुदायलाई विश्वासमा लिई सबै प्रभावित संरचना/उपयोगीताको उचित स्थानान्तरण र पुनर्स्थापन, शिकार निरुत्साहित र नियन्त्रण सम्बन्धी योजना, उपयुक्त स्थानहरुमा गति सीमा संकेतहरु स्थापना र चालकलाई सचेतना प्रदान गर्ने, गुनासोको लागि गुनासो सुनुवाई संयन्त्रको स्थापना, श्रमीकहरुको लागि काममा आवत जावत गर्न सहजताको लागि यातायातको व्यवस्थापन, ठेकेदारहरद्वारा व्यवसायिक स्वास्थ्य र सुरक्षा व्यवस्थापन योजनाहरुको तयारी र कार्यान्वयन, कामदारहरुका लागि शाइनिङ्ग ज्याकेट (एप्रोन), बुट, पञ्जा र हेलमेट जस्ता PPEs हरुको उपलब्धताका साथै सुरक्षा उपायहरु अपनाउने, श्रम कानूनको अनुपालन, कामदार शीविर संचालन निर्देशीकाको स्थापना, खतरनाक सामग्रीको प्रयोग, भण्डारण, ढुवानी तथा विषर्जन गर्नको लागि योजना, पानी गुणस्तर योजना, महिला तथा किशोर/किशोरी केन्द्रित सामुदायिक चेतना र संवेदनशीलता सम्बन्धी योजना, खतरनाक रसायन र फोहर मैला व्यवस्थापन र विसर्जन सहितको योजना इत्यादि निर्माण शुरु हुनु अगावै विकास गरिसक्नुपर्ने प्रावधान रहि आएको छ र यस आयोजना विस्तारले कुनैपनि मूर्त वा अमूर्त पुरातात्विक रुपमा महत्वपूर्ण सम्पदाहरु प्रभावित हुने छैनन् ।

साईट विशिष्ट न्यूनीकरण उपायहरु, निर्माण स्थलमा ट्राफिक व्यवस्थापनका प्रावधानहरु समावेश गरि बायोईन्जिनियरिङ्ग लगायत अन्य भौतिक संरचनाहरुको निर्माण गर्ने, धुलो र धुंवा नियान्त्रण गर्ने, हावा र ध्वनी प्रदुशणको मापन अनुगमन, निर्माण क्षेत्रबाट विषर्जन गरिने पानीको गुणस्तर अनुगम साथै धुलो नियन्त्रण गर्न नियमित पानी छर्ने व्यवस्था मिलाउने, आयोजना क्षेत्रमा पानीको बहाव सुनिश्चित गर्न cross drainage संरचनाहरु जस्तै (बक्स कल्भर्ट, पूल/पूलेसाको निर्माण, साईड ड्रेन) निर्माण गरिने छ । सडक सुरक्षाको लागि ट्राफिक संकेत, सडक सुरक्षा संकेत, crash barrier, पैदल यात्रुहरको लागि आकाशे पूल इत्यादिको स्थापना । बाढी तथा नदी कटान नियन्त्रणको लागि river training works को स्थापना, वन्यजन्तु आवत जावत गर्ने स्थानमा गति सिमा सहित संकेत चिन्हहरुको स्थापना, बृक्षारोपण इत्यादि गरिने छ । सार्वजनिक उपयोगिताहरुको स्थानान्तरण (खानेपानी, आपूर्ती लाईनहरु, बिजुलिका पोलहरु, सिंचाई, कूलो/नहर इत्यादि), क्षतीग्रस्त पूर्वाधारहरुको पुनरस्थापना, सुरक्षा उपायहरु (PPEs) र CoVID-19 माहामारीबाट बच्न अतिरिक्त गतिविधीहरुको लागि चाहिने रकमको व्यवस्थापन न्यूनीकरण लागत योजनामा समावेश गरिएको छ । श्रम विमाको लागत, खानी तथा निर्माण सामग्री उत्खनन, कामदार शिविर, batching plants को पनर्स्थापना लाग्ने लागत पनि न्यूनीकरण लागत योजनामा समावेश गरिएको छ ।

वातावरणीय तथा सामाजिक प्रतिवद्धता (ESCP) को लागि मुख्य उपाय र कार्यहरु

ESCP ले ESS मा भएका प्रावधानहरु पुरा गर्न उपाय र कार्यहरु पहिचान गरेको हुन्छ । यो ESCP मा आयोजनाको लागि आवश्यक ठहरिएका ESP, LMP, IPPF र RAP को विकास समावेश गरिएको छ ।

सडक विभागको विकास साहायता कार्यान्वयन महाशाखा (DCID) द्वारा सञ्चालन र कार्यान्वयन गरिएका वातावरण तथा सामाजिक प्रवर्द्धन योजनाका कार्यक्रमहरुको अनुपालन भए नभएको अनुगमनको जिम्मेवारी भौतिक पूर्वाधार तथा यातायात मन्त्रालय (MoPIT) मा निहित रहने छ ।

ESCP मा तोकिए बमोजिम सडक विभाग द्वारा अनुगमन गरि विश्व बैंकलाई रिपोट बुझाउनु पर्नेछ । विश्व बैंकले आयोजनाको कार्यान्वयन अवधि भर भएका भौतिक उपाय र कार्यहरुको प्रगति र सम्पन्नताको अनुगमन र मुल्याङ्कन गरिनै रहने छ ।

यदि आयोजना परिवर्तन र अप्रत्यासित परिस्थितीहरुको अनुकुल व्यवस्थापन प्रतिबिम्बित गर्न अथवा आयोजना कार्यान्वयन सम्पादन मुल्याङ्कनको प्रतिक्रियाका क्रममा यदि आवश्यक भएमा ESCP परिमार्जन र आवधिक गर्न सकिने छ ।

संस्थागत व्यवस्था

भौतिक पूर्वाधार तथा यातायात मन्त्रालय अन्तर्गत रहेको सडक विभाग बी.जी. सडक स्तरन्नोती कार्यान्वयनको लागि प्रमुख निकाय हो । सडक विभागमा आयोजनाहरु विकास र कार्यान्वयन गर्न पाँच उपनिर्देशक/महाशाखाहरु रहेका छन् । क्षेत्रीय कार्यान्वयनलाई सहज बनाउन सडक विभागले ३३ वटा डिभिजन सडक कार्यालयहरुको स्थापना गरेको छ । विकास सहयोग कार्यान्वयन महाशाखा (DCID), सबै दाताहरु द्वारा प्राप्त अनुदान तथा आयोजना संचालन गर्ने प्रमुख निकाय मध्ये एक हो ।

DCID अन्तर्गत आयोजना व्यवस्थापन इकाई (PCU) ले प्रारम्भिक वातावरण परिक्षण (IEE), ESIAs, RAPs/IPDPs तयार पार्ने काम गर्छ र अन्य E&S जोखिम व्यवस्थापन गर्ने कार्य गर्दछ । यस आयोजनाको व्यवस्थापनका लागि PCU बनाइने छ । सडक विभागको Geo Environment and Social Unit (GESU) सडक विभागमा E&S जोखिम व्यवस्थापन र अनुगमनको लागि प्रमुख क्षेत्रीय निकाय हो । GESU ले सरकारी/दातृनिकायहरु द्वारा अनुदान प्राप्त आयोजनाहरुको IEEs, ESIAs, RAPs र IPDPs को अनुपालन, अनुगमन र समिक्षा गर्ने गर्दछ । भौतिक पूर्वाधार तथा यातायात मन्त्रालयलाई वातावरण संरक्षण ऐन (EPA) ले यातायात क्षेत्रको आयोजनाहरुको IEEs समिक्षा र अनुगमन गर्ने प्रमुख जिम्मेवार सरकारी निकाय तोकेको छ । यसले बन तथा वातावरण मन्त्रालय (MoFE) ले समिक्षा र स्वीकृति प्रदान गरिएका ESIA प्रतिवेदनहरुको समिक्षा गरि अनुमोदन गर्दछ । MoFE अन्तर्गत EIA इकाइले ESIAs प्रतिवेदनहरु समिक्षा गरि स्विकृती प्रदान गर्ने कार्य गर्दछ । वन तथा भूसंरक्षण विभाग (DoFSC)/डिभिजन बन कार्यालय, श्रम तथा व्यवसायिक सुरक्षा विभाग (LoLOS) र आयोजना प्रभावित नगरपालिका/गाउँपालिका जस्ता अन्य संस्थाहरुले आयोजना कार्यान्वयनको क्रममा सहयोगी भूमिका खेलेको हुन्छ । ठेकेदार/उपठेकेदारहरुले आयोजना निर्माणका दौरान ESMP र सम्बन्धित योजनाहरुको पालना गर्नु अनिवार्य हुन्छ । ESMP का प्रावधानहरु बोलपत्र, कार्य सम्झौता तथा DoR-ESCP मा समेत उल्लेख गरि समावेश गरिएको छ । संस्थागत सुद्धृदिकरण घटक अन्तर्गत आयोजनाले वातावरणीय तथा सामाजिक जोखिम र प्रभावहरु व्यवस्थापन गर्न आयोजना कार्यान्वयनमा संलग्न विभाग र निकायहरुको क्षमता अभिबृद्धिमा सहयोग पुर्याउने उद्देश्यले तालिमहरुको आयोजना गर्नेछ ।

1 Introduction

The Government of Nepal is working towards accelerating economic development, reducing regional imbalances and addressing inequalities in the country. Recognizing that access to efficient transport and trade system is a key determinant of economic opportunity and service delivery. The government has requested World Bank funding to support the improvement and expansion of the East-West Highway, starting with the Butwal-Gorusinghe section. The World Bank's support for the project will be part of Bangladesh, Bhutan, India Nepal Regional Transport and Trade Facilitation Program (BBIN/Nepal Phase I). Under this program, the GoN, through the Department of Roads (DoR), intends to upgrade the Butwal –Gorusinghe (BG) road section (50km) of East-West Highway from 2 lanes to 4 lane road. DOR is the Project's implementing agency and has prepared a comprehensive Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP). The ESIA is presented in this report, and the RAP is presented under a separate cover.

The GoN has requested funding for this Project from World Bank through the proposed 'Bangladesh-Bhutan-India-Nepal (BBIN) Multi-phase Programmatic Approach (MPA) Regional Transport and Trade Facilitation Program - Nepal Phase 1' (hereinafter referred to as **BBIN 1**). The BBIN 1 will support the GoN for (a)Upgrading of Butwal-Gorusinghe-Chanauta section of East-West Highway from 2 to 4 lanes, (b) Construction of a green resilient urban bridge (including detailed design/urban design and construction), (c) Support for development and implementation of green resilient highway concept, integrating transportation functionality and ecological sustainability, and (d) Upgradation of trade facilities at critical locations. DOR has also prepared an Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) for the overall BBIN 1 and presented under separate covers.

1.1 Background

Efficient movement of goods and people within and across the borders of Nepal is key to economic growth, and this goal is currently being hampered by challenges in cost-efficiency and resilience of trade and transport. The Butwal – Kohalpur – Gaddachauki section of the East-West (E-W) Highway is proposed to address these challenges. This project would be the first phase of a larger investment program along the western part of the E-W highway corridor that would allow the Government to achieve its development goals in terms of regional trade and sustainable economic growth.

East-West Highway is the main domestic as well as international trade corridor of Nepal. East-West highway (EWH) was constructed about 50 years ago with single-lane bituminous carriageway width and has been rehabilitated/upgraded to the double lane during different periods between 1998-2005. East-West Highway is the main domestic as well as international trade corridor of Nepal. The East-West highway is part of the Asian Highway 2 (AH2). The Asian Highway Network (AHN), also known as the Great Asian Highway, is a cooperative project among countries in Asia, Europe and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and focused on improving the highway systems in Asia.

The present condition of the Butwal –Gorusinghe (BG) Road section does not respond to the need for increased traffic flow and requires improvement. The existing highway is a two-lane carriageway road sealed with Bituminous Surface Treatment (DBST) in almost all areas.

The proposed project will support capacity, quality, and safety improvements of the East-West Highway. Butwal –Gorusinghe road section is of great importance in providing connectivity to the people of Lumbini Province and the rest of the country.

1.2 BBIN MPA Regional Transport and Trade Facilitation Program - Nepal Phase 1

The proposed BBIN 1 aims to develop cost-efficient and resilient trade and transport in Nepal along the main selected corridors. The BBIN 1 will have the following components:

- **Component 1: Digital Systems for trade**. This component may support the adoption and Implementation of Digital and Automated Systems for improvement of Nepal's cross-border clearances: (a) Development of electronic Automated Border Management including electronic cargo tracking system, (b) Business Intelligence and Data Analytics Package and Risk Engine (c) Development of web-based supply MIS for automation of registration processes and permits.
- **Component 2: Green and Resilient Transport and Trade Infrastructure**. This component will support (a) Upgrading of Butwal-Gorusinghe-Chanauta Road Section of the East-West Highway from 2 to 4 lanes, (b) Construction of a green resilient urban bridge (including detailed design/urban design and construction), and (c) Support for development and implementation of a green resilient highway concept, integrating transportation functionality and ecological sustainability.
- **Component 3: Institutional and Policy Strengthening for Transport and Trade**. This component will provide support in streamlining the policy environment for regional trade and cross-border movement of goods through (a) Bangladesh-India-Nepal Motor Vehicle Agreement related reforms, (b) Customs reforms, (c) Private sector support initiatives, (d) Capacity Strengthening, and (e) Project preparation studies.
- **Component 4: Contingency Emergency Response** will support unforeseen emergency needs. In case of a major natural or human made disaster, GoN may request the Bank to re-allocate project funds to this component to support its quick response and reconstruction

1.3 The Proposed Subproject

Location and Current Road Conditions. Butwal - Gorusinghe Road Section of the East-West Highway starts from the Tinau Bridge at Butwal and ends at Gorusinghe (Budhi). This road section is 50 km in length. For most of the section, the width of the existing road is 8.00 m, including a 6 m wide carriageway and 1m shoulder on both sides. The project area lies between 27°42'14.80"N Latitude and 83° 27'36.87"E Longitude at Butwal to 27°39'18.85"N Latitude and 83° 0'2.79"E longitude at Gorusinghe. Butwal is at the intersection of Nepal's two different National Highways, East-West Highway and Siddhartha Highway. It connects western Nepal with the capital Kathmandu through the highway and air links (via the airport at Siddhartha Nagar). The proposed Butwal – Gorusinghe Road is located in the Rupandehi and Kapilbastu districts of Lumbini Province. The location map of Butwal Gorusinghe road in the context of Asian highway is shown in **Figure 1.1**.

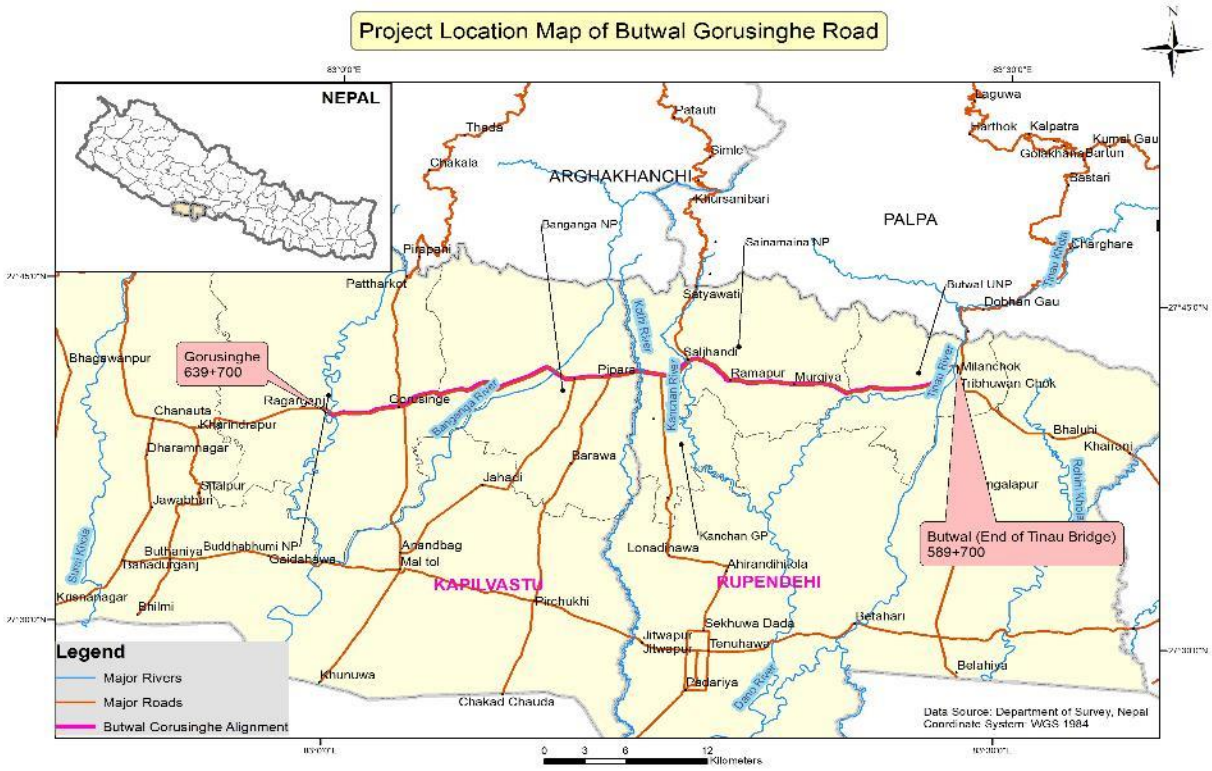


Figure 1.1: Location of the Subproject (BG Road)

Proposed Construction Works. A detailed description of the proposed facilities to be built is given in Chapter 3. A summary of the main physical works is given below:

- Widening of 50 km Butwal-Gorusinghe Road from 2 lanes to 4 lanes
- Construction of service roads on both sides of the carriage way in semi-urban areas
- Construction of footpaths, pedestrian sheds, cycle lanes and service roads on both sides of the carriage way in urban areas
- Construction of 31 new bridges with lengths varying from 10 to 100 m

1.4 The Environmental and Social Assessment of the Butwal_Gorusinghe Road

Studies and basic data: This ESIA is based on field studies and data collected during August 2021-January 2022 by the consultant team charged with the design of the project. A team of ecologists and environmental and social specialists of the design consultant have participated in the studies and collected data on the existing physical, biological and socio-economic environment of the project area. The team included Mr. Rajan Shrestha and Mr. Abisheke (environmental), Mr. Rabin Dhakal (social), and Mr. Prayag Raj Tamarkar (ecology) and Mr. Bharat Regmi (forestry). An independent consultant, Dr. Venkata Nukala, was retained by DoR to guide the design consultants for necessary data collection and prepare an independent ESIA report as per the guidelines of the World Bank with support from DCID environmental and social specialists, Mr. Yubaraj Satyal (environment) and Ms. Rama Shrestha (social). The team has conducted 35 consultation meetings (involving 544 individuals) with the affected communities, local governments, relevant environmental and forest departments, community-based organizations and NGOs. Field sampling and analysis were carried out at 16 locations for river water quality and at 9 locations for air and noise quality. The methodology followed for biological studies is given in Annex 1.

1.5 Content of the Report

Chapter 1 has introduced the overall Project and the current subproject. **Chapter 2** reviews the prevailing government regulatory requirements relevant to the environmental assessment and World Bank ESF applicable to this subproject, and actions taken by DRO to comply with these requirements. **Chapter 3** presents a detailed description of the proposed project facilities and other salient information relevant to the environmental and social assessment. Description of the baseline environmental, biological and social conditions in the project area are presented in **Chapter 4**. Potential environmental and social issues from the Project implementation, as well as the appropriate mitigation measures to address these negative impacts, have been discussed in **Chapter 5**. An Environmental and Social Management Plan (ESMP) is presented in **Chapter 6**. The proposed institutional arrangements for the management and monitoring of E&S impacts and risk are given in **Chapter 7**, together with the proposed grievance mechanism. Finally, **Chapter 8** describes the consultations carried out with the stakeholders.

2 Project Description

This chapter presents a detailed description of the proposed activities in the Upgradation of the Butwal-Gorusinghe Road Project.

2.1 Salient Features of Existing Project Road and Proposed Upgrades

The 50-km long Butwal – Gorusinghe Road is located in the Rupandehi and Kapilbastu district of Lumbini Province (see Figure 1.1 for the location map). It is a Section of East-West Highway that starts from the end of the Tinau Bridge at Butwal and ends at Gorusinghe (Budhi). The starting chainage of the road is KM 589+700 (this chainage is referenced to the East-West Highway) and ends at KM 639+700.

This road section is 50 km in length. The road alignment passes through one sub-metropolitan city and 4 municipalities. They are.

- Rupandehi district (from staring point to 25.6 km): Butwal Sub-metropolitan City, Sainamaina Municipality, Sainamaina Municipality, Kanchan Rural Municipality
- Kapilbastu district (from 25.6 km to the end point): Banganga Municipality, Buddhabhumi Municipality

The salient features of the existing road and proposed road upgrading works are given in Table 2.1.

Table 2.1: Salient Features of Existing Road and Proposed Upgrades

Features	Existing Road	Proposed Upgrades
Length	50 Km	50 km
Terrain	Plain (47.3 km), Rolling (1.7 km)	Plain (47.3 km), Rolling (1.7 km)
Right of Way	50 m	50 m
Total width (Road + shoulders)	7.50 m to 8.50m	• 24 m in non-urban (rural and forest) areas (total length: 22.68 km) • 33 m in semi-urban areas (10.76 km) • 50 m in urban areas (16.36 km)
Number of lanes	2	4 (each lane width 3.5 m)
Number of Additional Lanes for service roads	None	• None in non-urban areas • 2 (each width is 3.5m) in semi-urban areas (on both sides of shoulders) • 4 (each width is 3.25m) in urban areas
Foot paths	None	• None in rural and semi-urban areas. • 2 (each width 2 m) in urban areas (on both sides of service roads)
Cycle lanes	None	• None in rural and semi-urban areas (shoulder width can be used as a cycle lane in non-urban areas and service road in semi-urban areas is proposed for local traffic, including motorcycle and cycle) • 2 (width 2.3 m) in urban areas (on both sides of foot paths) –
Length of median	None	3 m width of the median along 50 km
Existing shoulders widths	0.50 m to 1.00m (un paved)	2.5 m Paved shoulders
Number of bridges	31	31
Number of culverts	153	160
Length of retaining walls	112m	1500 m, approximately

Features	Existing Road	Proposed Upgrades
Length of breast walls	208m	500 m, approximately
Length of gabion walls	56 m	2000 m, approximately
Length of side drains	25 Km	370.44 km
Road safety improvements		Number of major villages/bazaars: 19 Number of major junctions: 4 Number of minor junctions: 12

2.2 Description of the Existing Project Road

For most of the section, the width of the existing road is 8.00 m, including a 6 m wide carriageway and 1m shoulder on both sides. In the Initial 1.7 km, the alignment passes through the foot of the hillock, and the remaining 47.3 km section passes through the plain area. There are major junctions at Jitpur, Char-number Chowk, Bangai and Gorusinghe and there are twelve minor junctions that need to be upgraded. From 611+800 to 617+900 (Pipara) and from Kaila Khola Bridge (627+200) to Gorusinghe junction (634+900), the alignment passes through a dense forest area. Major roadside tree cutting is required in this section while upgrading the road. There are relatively minimum obstacles such as buildings, houses within the ROW. However, there are number of bus waiting sheds, resting places (Chautari), electrical poles and cables and telecommunication facilities within the ROW that have to be relocated during the widening of the road.

The pavement condition is good to fair. Traffic signs, delineator post, road painting, crash barriers are in poor condition. In many places, damage to pavement was found due to poor surface drainage management. Most of the sections don't have longitudinal drainage facilities. There is a drainage system in the city area only.

Drainage management, water logging, road safety, traffic congestion are major issues due to increase in population growth on both sides of the highway, however, there are no road crossing structures established at the populated settlement areas all along the alignment

In the road alignment, there are 31 existing minor and major bridges. Among them, Badganga Bridge is the longest bridge with a length of 304 m. Out of 31, 23- numbers are of RC T-beam construction, one number at Kaila Khola (47/H001/310) is pre-stressed T-Beam construction, 6-Bridges are of solid slab and one box-type construction.

2.2.1 Current Traffic and Future Traffic Estimates

The current traffic levels are measured at four locations (Butwal West, Saljhandi West, Jitpur West, and Gorusinghe East) for 72 hours continuously. The average vehicular traffic, excluding motor cycles (MC) and rickshaws, varies from 4,582 (in Gorusinghe) to 15,634 (in Butwal). The detailed traffic counts are given in Table 2.2.

Table 2.2: Existing Traffic on Butwal – Gorusinghe Road

Station Name	Surveyed Date From	Surveyed Date To	ADT (v/d)	ADT exc. Motor Cycle and Rickshaw (v/d)	AADT (v/d)	AADT exc. MC and Rickshaws (v/d)	AADT in PCU	AADT in PCU exc. MC and Rickshaws
Butwal West	07-Apr-21	09-Apr-21	40,981	15,643	36,883	14,079	34,655	23,064
Kanchan River	07-Apr-21	09-Apr-21	13,989	6,181	12,590	5,563	14,152	10,614
Jitpur West	07-Apr-21	09-Apr-21	19,134	8,032	17,411	7,309	16,577	11,525
Gorusinghe East	07-Apr-21	09-Apr-21	7,748	4,738	6,972	4,264	10,361	9,007

The future traffic volume growth rate was calculated by applying the future real GDP growth rate to traffic demand elasticity. The projected future traffic near Butwal is given in Table 2.3.

Table 2.3: Projected Traffic Near Butwal

Year	Truck			Bus			Car		2-3wheel		utility vehicle	others		Total (v/d)	
	multi-axle	heavy	light	Big	mini	micro	Car	four wheel	M/C	three wheeler	utility vehicle	tractor	power tiler	in.MC	ex.MC
2018	189	940	68	152	1,092	200	1,483	620	10,959	372	771	16	5	16,867	5,908
2029	315	1,574	114	287	2,062	379	4,000	1,670	21,801	703	1,292	26	5	34,228	12,427
2033	370	1,848	134	351	2,520	463	5,528	2,308	27,161	859	1,517	30	5	43,094	15,933
2038	444	2,223	161	441	3,171	582	8,016	3,348	34,896	1,082	1,824	35	5	56,228	21,332
2043	521	2,608	188	538	3,862	707	11,043	4,613	43,319	1,318	2,140	40	5	70,902	27,583
2048	599	2,998	217	640	4,591	841	14,598	6,098	52,350	1,568	2,459	45	5	87,009	34,659

2.2.2 Need for the Project (No Project Alternative)

The "No Action" alternative assumes that there will be no alteration of the existing road. This would imply that the road section would be left in its present state with the following geometric defects:

- Presence of road hazards such as "S" curves with poor visibility;
- Localized flooding and overtopping due to narrow cross-sections without proper drainage channels;
- Water logging on the carriageway due to lack of and shallow side drains;
- Lack of crash barriers, particularly along the embankment in built-up areas;
- No provision for wildlife crossing increases the risk of collision with vehicles, particularly at night;
- Inadequate road signs to warn motorists of impending hazards; and
- Lack of pedestrian crossings in the settlements;

The impacts of these defects against the backdrop of an increase in traffic in the future are: i) increased risk of injuries and mortalities from road crashes due to inadequate road safety measures; ii) accelerated deterioration of the road condition due to inadequate drainage works will increase road maintenance cost; iii) increase in road congestion due to lack of road capacity will lead to increase in operating cost, and travel time resulting to economic loss; iv) congestion and accelerated deterioration of road leads due to non-optimal travel speed will increase fuel consumption leading to higher emissions, deterioration of air quality, and increase impacts on human health. An increase in traffic, particularly at night, will increase the risk of vehicle-wildlife crashes endangering the population of wildlife. However, one positive note of not improving the road is the preservation of trees along the road right-of-way and avoiding further disturbance to wildlife habitat in the project area; and the avoidance of economic and physical displacement. Finally, without the project, all construction-related impacts like camp site management, occupational and community health and safety, shifting of utilities, dust, noise, and vibration from construction equipment are avoided.

2.3 Proposed Interventions

The proposed project involves key upgrading activities, including geometry improvement, pavement upgrading, drainage improvement, retaining structures, slope protection/stabilization, other off-road works, and traffic management and road safety.

Geometry Improvement

This involves widening of road to varying widths (24m in rural and forest area, 32m in semi-urban, 50m in urban) to meet the design standards including sections along forest area, agriculture area, religious and cultural sites, markets, and built-up areas. Along selected major built-up areas and market fronts, consideration has been made in the preliminary design to widen the road to full width. The geometry improvement will enhance the serviceability of the road, provide a hard stand for parking/stopping vehicles and better drainage management.

Table 2.4: Location of Urban, Semi-Urban and Rural Areas as per Road width

S.N.	Location	From	To	Length(m)
1	Urban (50m width)	589+700	598+200	8500
2	Semi urban (33m width)	598+200	601+640	3440
3	Urban (50m width)	601+640	604+500	2860
4	Semi urban (33m width)	604+500	611+820	7320
5	None urban (24m)	611+820	617+800	5980
6	Urban (50m width)	617+800	621+500	3700
7	None urban (24m)	621+500	635+200	13700
8	Urban (50m width)	635+200	636+500	1300
9	None urban (24m)	636+500	639+700	3000
	Total Length			**50,000**

Source: Preliminary Design of Butwal –Gorusinghe Road, 2021

Road Width for Highway

Adequate roadway width has been provided beside the shoulders and a central median for dividing the traffic flow directions. Based on a comparative review of international standards and safety, the values proposed to be adopted for the roadway elements by the Consultant for the project highway are as follows

Table 2.5: Road Cross Section

S. No.	Element of Road	Urban	Semi -Urban	Rural
1	Carriageways, m	2 * 7.50	2 * 7.50	2 * 7.50
2	Service Lane, m	6.50*2		
2	Additional Lane, m		2 * 3.50	
2	Central Median, m	3.00	3.00	3.00
3	Side Median, m	3.00*2		
4	Divider, m		1.00*2	
5	Foot Path, m	4.00*2		
6	Paved Shoulder, m	2.5*2	2.5*2	2.5*2
7	Verge, m		0.50*2	0.50*2
8	Total Formation Width, m	50.00	32.00	24.00

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

Depending upon the development of the urban and market area along the road side, three major cross-sections are proposed to upgrade the existing road.

- Cross-section for urban areas
- Cross-section for semi-urban areas
- Cross-section for rural areas

Cross-section for urban areas: For enhancement of the urban environment and drain off the storm water, three numbers of longitudinal green belt and four numbers of longitudinal drain has been proposed in this type of cross-section. In spite of the main dual carriage way of the width of 7.50 m each with central median of 3.00 m and both side shoulder 2.50m, in both sides of the main dual carriage way, a 6.50 m service lane has also been proposed with a median between main dual carriage way and service lane. Then after a 4.00 m width is proposed for the foot path and cycle lane. The total width of urban area cross-section is 50.00m. (Carriageway 4-lane- 2x7.5m Paved Shoulder- 2x2.50m(with Rumble Strip as required) with Central Median - 3.00m, 6.00 m service lane with 3.00 m Side Median and 4.00 m Foot Path.

Cross-section for semi-urban areas: For accommodation of the semi-urban area traffic like tractors, three wheelers, motorcycles, etc., an additional lane on both sides of main dual carriage way of the width of 7.50 m each with central median of 3.00 m and both side shoulder 2.50m, has proposed. Side drain for this cross-section has been proposed as per requirement. A 1.00 m width lane separator between the main dual carriage way and additional lane is also proposed. The total width of the semi-urban area cross-section is 33.00m (Carriageway 4-lane- 2x7.5m Paved Shoulder- 2x2.50m (with Rumble Strip as required) with Central Median of 3.00m and 3.50 m additional lane with 1.00 m lane separator and 0.50 m verge).

Cross-section for rural areas: The total width of the semi-urban area cross-section is 24.00m (Carriageway 4-lane- 2x7.5m Paved Shoulder- 2x2.50m (with Rumble Strip as required) with Central Median - 3.00m). Main dual carriage way of the width of 7.50 m each with a central median of 3.00 m and both side shoulder 2.50m.

The proposed cross-section of the road is given in Figures 2.1, 2.2 and 2.3 for rural, semi-urban and urban sections, respectively.

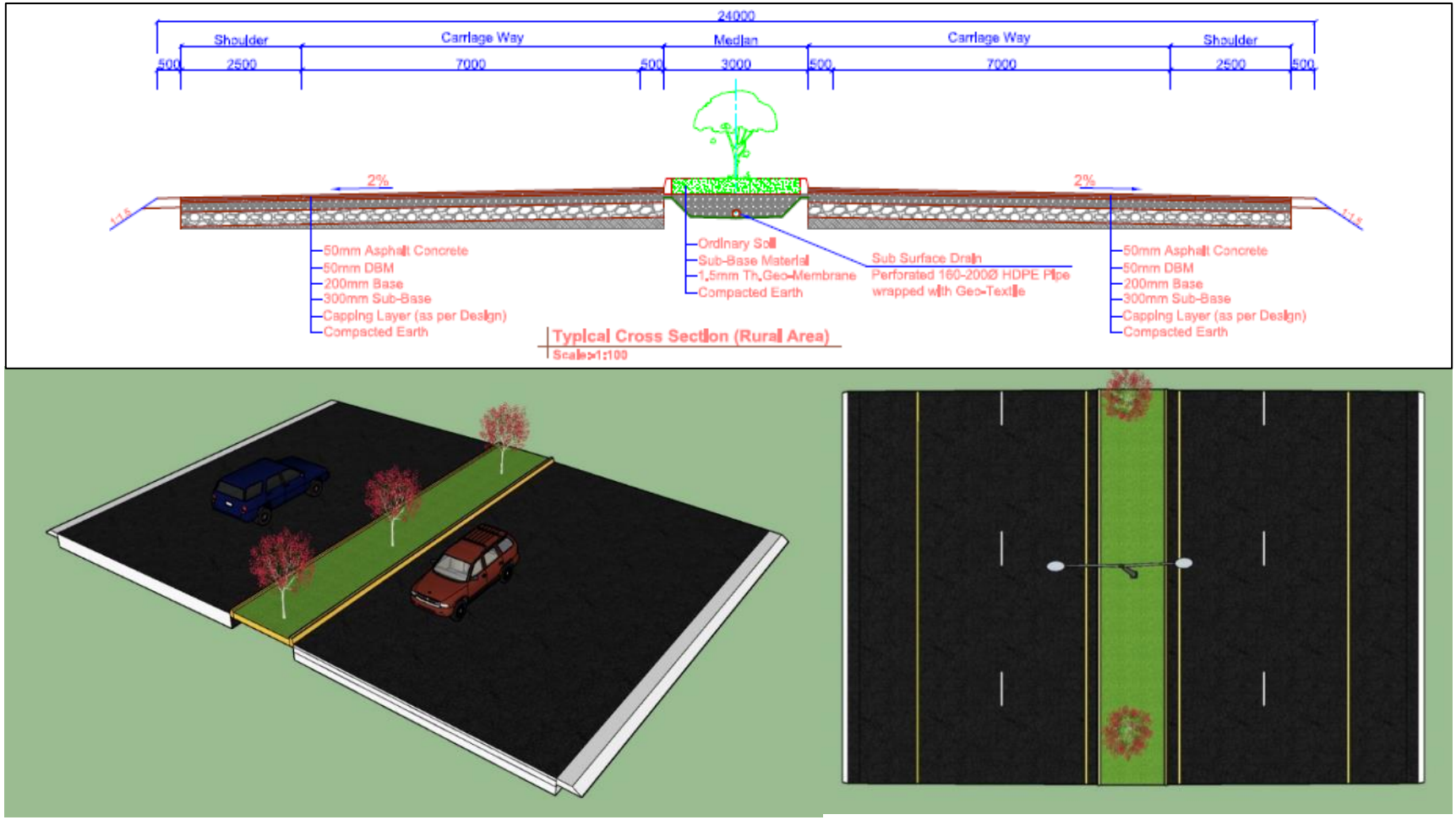


Figure 2.1: Typical Design of Rural Area (4 Lane Road)

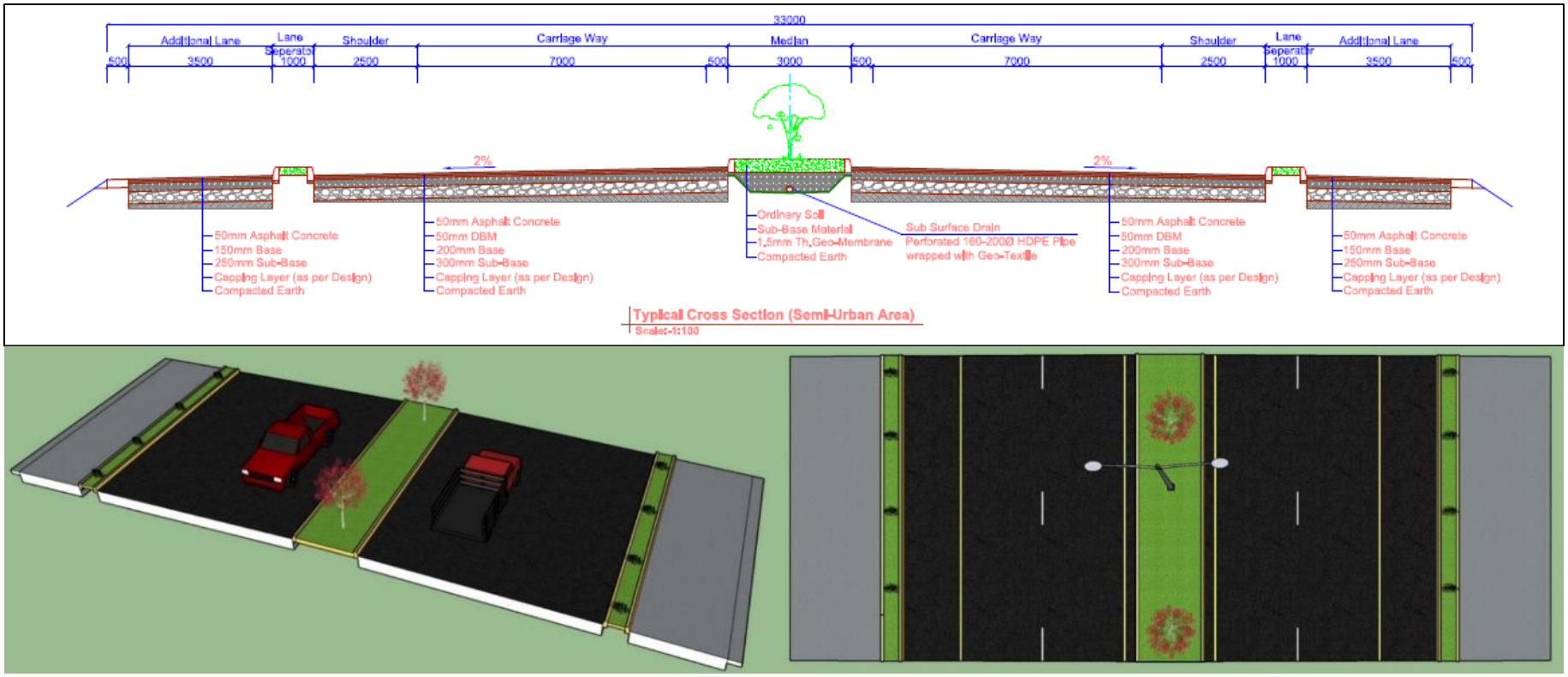


Figure 2.2: Typical Design of Semi-Urban Area (Intermediate Lane)

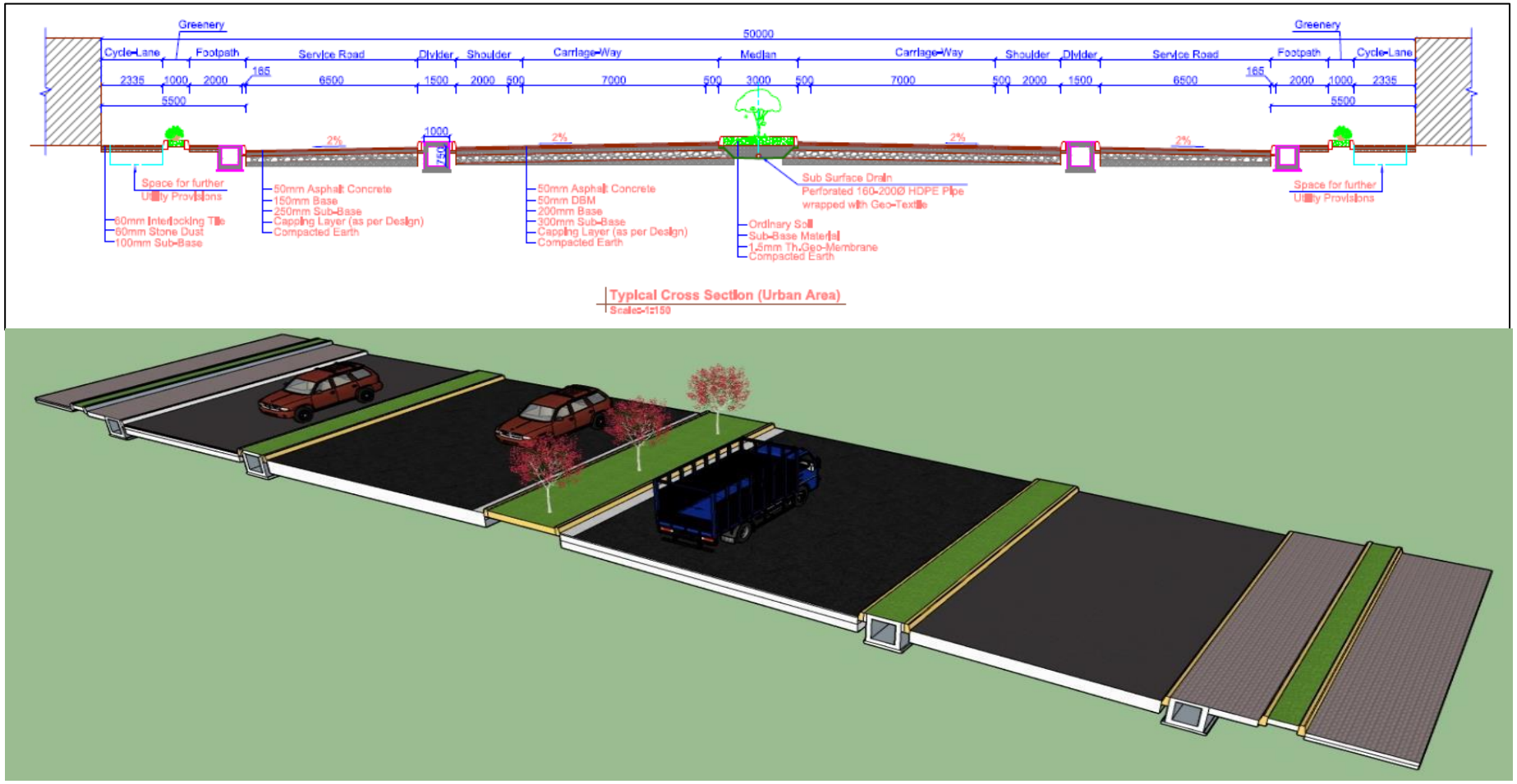


Figure 2.3: Typical Design of Urban Area (6 Lane Road)

Embankment Slope in filling

The slope of the embankment is linked with its height. In accordance with the Standards for Safety in Road Design, the following are adopted for Embankment in Fill:

Height of embankment 4.5 m and above : 2 H : 1V with crash barriers

Height of embankment 3 m to 4.5 m : 2.5 H : 1 V

Height of embankment 1.5 m to 3 m : 3 H : 1 V

Height of embankment less than 1.5 m : 4 H : 1 V

The Consultant proposed to provide slopes of 1.5H: 1V in Fill sections.

Embankment slopes in Cutting:

Cut slopes are proposed as 1H: 2V or steeper with Intermediate berms in general, however, these sections will be specifically analyzed for stability before adopting this slope or steeper slopes.

Pavement

Pavement will be designed to withstand 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 or as per IRC 37: 2001 guidelines published by Indian Road Congress.

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 be provided to ensure the safety of vehicles diverging from or merging into high-speed road. The intersection will be considered for major feeder roads, minor feeder roads, district roads. Road furniture will be provided in the form of road signs, crash barriers, road markings, delineators, foot paths, covered side drains.

Bridges

Different types of superstructures for bridges has required for design, such as RCC T Beam, PSC Girder, IPC Girder, PSC Box Girder, etc. DOR Nepal Bridge Standards — 2067 will be the main guideline for the design of bridges. All bridges have been designed for a discharge of 100 years return period. All bridges shall be designed as per IRC loadings.

Basically, for major and minor bridges, RCC and PSC superstructures and for multi-cell culverts RCC box bridges are proposed. A preliminary span arrangement is proposed, as shown in **Table 2.6**. The span lengths of the new bridges are tentative and subject to further refinement.

Table 2.6: Proposed Preliminary Span Arrangement

SN	Existing bridge parameters					New proposed parameters			Location
	Name of Bridge	Type of Bridge	Total length	Spans	Span Length	Bridge type	No. of spans	Span lengths	US/DS/ Twin
1	Sub way	RCC slab	6.7	1	6.7	Box culvert			

SN	Existing bridge parameters					New proposed parameters			Location
	Name of Bridge	Type of Bridge	Total length	Spans	Span Length	Bridge type	No. of spans	Span lengths	US/DS/ Twin
2	Guhye Khola (Jitgadi Khola)	RCC Girder	21.3	1	21.3	RCC	1	22	US
3	Narshing khola(Dry Nala)	RCC Girder	16.3	1	16.3	RCC	1	16	US
4	Dry Nala	RCC Girder	7.24	1	7.24	Box culvert			
5	Dry Nala	RCC slab	8.3	1	8.3	Box culvert			
6	pakhapani khola	RCC slab	9.6	3	3.2	Box culvert			
7	satgadi no 1	RCC slab	64.29	3	21.43	RCC	3	22	DS
8	satgadi no 2	RCC slab	28.6	2	14.3	PSC	1	30	DS
9	soila river	RCC slab	13.14	1	13.14	Box bridge	2	7	Twin
10	Rajpur khola	RCC slab	26.35	1	26.35	RCC	1	26	DS
11	bamaha khola	RCC slab	32.36	2	16.18	PSC	1	32	DS
12	Ghamaha khola	RCC slab	50.6	3	11,29,11	PSC	1	40	DS
13	Tulbuliya	RCC slab	42.9	3	14.3	PSC	1	42	DS
14	Marthirwa khola	RCC slab	16.35	1	16.35	RCC	1	16	DS
15	meghawa khola	RCC slab	21.2	1	21.2	RCC	1	22	DS
16	Inguria nadi	RCC slab	51.1	3	11,29,11	PSC	1	40	DS
17	Banarhwa Nadi	RCC slab	39.6	3	13.2	PSC	1	40	DS
18	Dry Nala	RCC slab	11.2	1	11.2	Box bridge	2	6	Twin
19	Pahila Nadi	RCC slab	46.2	3	15.4	RCC	3	16	DS
20	Dry Nala	RCC slab	10.62	1	10.62	Box bridge	2	6	Twin
21	Kanchan	RCC slab	63.84	3	21.28	RCC	3	22	DS
22	Kothi river	RCC slab	43	2	21.5	PSC	1	42	DS
23	Gageda khola	RCC slab	8.6	1	8.6	Box culvert			
24	Banganga	RCC slab	289.68	51	5.68	PSC	9	32	US
25	Kaila khola	RCC slab	93.60	3	31.20	PSC	3	32	DS
26	Balhundra khola	RCC slab	20.95	1	20.95	RCC	1	22	DS
27	Harkon Khola	RCC slab	20.90	1	20.90	RCC	1	22	DS
28	Dry Nala	RCC slab	21.45	1	21.45	RCC	1	22	DS
29	Kundra Khola	RCC slab	29.00	1	29.00	PSC	1	30	DS
30	Ghorai Nala khola	RCC slab	21.50	1	21.50	RCC	1	22	DS
31	Dry Nala	RCC slab	13.15	1	13.15	RCC	1	16	DS

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

Culverts

All existing culverts will be tested for capacity adequacy, and accordingly, inferior culverts will be modified. New culverts will be designed for 50 years of return flood. All existing culverts and Bridges less than 10 m spans will be replaced by new RCC Box Culvert and Bridges that will be wildlife-friendly and facilitate wildlife crossings.

Side Drain

The type and size of the side drain will be selected on the basis of 20 years of return flood. It may be an open drain, covered drain, masonry drain or RCC drain as per site requirement, safety guidelines and wildlife-friendly. Approximately 32620m side drain will be constructed.

Retaining Structures

Different types of retaining walls are proposed in the design of road such as Gabion wall, Stone Masonry wall, Reinforced Concrete wall and Geogrid Reinforced Retaining wall as required at site. Geogrid reinforced retaining wall is also known mechanically stabilized earth wall is the application of geogrid of different strength as per need for the stabilization of high fill embankment. Height of wall may be up to 15 m, so high tensile strength geogrid is used in this structure basically ultimate tensile strength ranging from 192 KN/m to 600 KN/m. All retaining structures are designed for a design life of 50 years.

Protection Works

Protection works will be provided in all vulnerable areas like upstream and downstream areas of culverts, bridges, river banks, road sides and other special structures, all protection structures will be designed for design life of 50 years. Approximately gabion 12112 cum, gabion for river training 24458 cum, stone masonry 6255 cum will be required for protection work.

2.3.1 Community Health and Safety Measures in Road Design

Climate Change Adaptation Measures

The proposed hydraulic structures are designed based on the historical hydrological data and factoring in climate change predictions. The proposed bridges are designed for 100-year return flows, culverts are designed for 50-year return flows, and side drains are returned for 25-year return flows. For all these flows, an additional 10% flows are added as climate change adaptation.

Structural Safety

The road is designed following the internal standards adopted for Asian Highways and national guidelines building codes on earthquakes. The project area falls in Category 5 of the seismic code.

Footbridge

At 6 locations, footbridges for the pedestrians to cross the road are planned and designed for pedestrian safety. The footbridges will be primarily located in the market and town area where schools, colleges, hospitals and other public facilities are used by pedestrians.

Road Safety Measures

The following road safety measures are considered in the design of the road, in the urban areas and at 16 intersections and 19 market areas:

- Raised pedestrian footpaths and cycle lanes in urban areas (16.3 km)
- Installation of traffic lights in all major intersections along with zebra crossings and road humps. This includes traffic signs, overhead signs, barriers and road markings, minor realignment at identified black spots etc. The project has proposed for installation of traffic signs nos, streert light, Reinforced Cement Concrete Crash Barrier, Metal Beam Crash Barrier “W”, Metal Beam Crash Barrier “THRIE”, Metal Beam Crash Barrier “UNDER RUN”, Rumble Strip (minimum curve area), Median Fencing, Footpath Railing, Junction improvement etc.

- Other safety measures such as the provision of road signs, delineators, barriers and pavement markings, minor realignment at identified black spots, including pedestrian footpaths in market areas
- Further, provide bus bays at important bus stop locations and additional lanes in market areas; provide guard barriers at bridge approaches and where horizontal curves are sharp and where embankments are greater than 3 metres in height; provide appropriate interchange mechanism at intersections; provide sufficient road furniture including road safety elements including signs, delineator posts etc. and additional signs where there are high pedestrian activities and a high possibility of accidents in order to make the road safer.
- Pedestrian crossing are planned and designed for pedestrian safety aspects. For pedestrian crossing, 6-overhead bridges to cross the road are designed for pedestrian safety aspects. Siting of the overhead bridges identified is primarily located in the market and town area where schools, colleges, hospitals and in other areas where there are high pedestrian movements

2.4 Alternatives Considered in the Project Designs

The "Upgrading of the Road Section Alternative" assumes that the road will be improved as 4 lanes. The upgrading of the road will correct the geometric defects and comply with the Asian Highway standard, improve riding quality, increase road capacity, and enhance road safety.

During the feasibility study and detail design stage, several design options were investigated to determine the most feasible options for upgrading for each land use the road will service and projected traffic. Design parameters like at grade vs. elevated intersections, pavement materials, lane width, maintenance or improvement of drainage and bridges type were assessed, and combinations thereof were formulated to come up with the project design that meets the financial, economic, and technical requirements. Based on these considerations, two options were identified. The description of both options is given in Table 2.7. Of the 2 options studied, the first option (Option 1) was selected mainly due to environmental, technical, and economic reasons.

Table 2.7: Design Options Assessed in the Details Design

Design Alternative	**Description**
Option-I	This option comprised of • Intersections improvement, in existing major Bazaar Areas crossings with adequate traffic safety signage • Service Lane Footpath, i.e. in about 16.3 km urban area, • 24 m road width in forest area • AC pavement in all length • Paved Shoulder in Jungle Section, • Double Lane plus climbing lane Replacement of all Minor Bridge with two-lane additional new bridges • Concrete Bridge • Replacement of pipe culvert and Construction of 153 nos box culvert • Service lane and drain • Pedestrian crossing Bazaar 6no. of foot over bridge • Wildlife underpasses

Design Alternative	Description
	• Installation of traffic safety and community safety measures
Option-II	• This option comprised of • Intersections improvement, Underpass for major intersection and remaining, • Service Lane i.e. existing major Bazaar Areas, • 24 m road width in forest area • Concrete Pavement in all length • Paved Shoulder in Jungle Section, • Double Lane • Steel bridges • Pipe culvert • service lane and drain, • Utility crossing HPC on Bazaar • Foot over bridge • Wildlife underpasses • Installation of traffic safety and community safety measures

Source: Preliminary Design

Since the project involves an existing road and not a Greenfield road, the environmental implications for the various options were more or less similar. All the design options will have a range of environmental impacts that will require concomitant mitigation measures to ensure residual impacts are not significant. Typical road construction-related impacts of the loss of vegetation, deterioration of water and air qualities, and occupation and community health and safety are expected from all the design options. Mitigation measures of all such impacts are carefully implemented.

The significant adverse impacts of the options are loss of vegetation and risk of further destruction of wildlife crossing at forest area. Widening the existing number of lanes from 2 to 4 lanes, the linear barrier for wildlife to cross and with the projected increase in traffic speed, the significance of wildlife-vehicular crashes will inevitably increase unless mitigation measures are implemented.

A number of site-specific options have been studied related to the upgrading of BG Road from 2-lane to 4-lane with the objective of reducing further environmental and social risks, cost and impacts of this chosen option. In the forest area, upgrading options for the project also include opening a new road in either the northern or the southern sides of the existing road. This will cause a significant loss of natural forest and habitat fragmentation than the existing road. The existing forest of ROW was degraded compared to if a new road is constructed on either the northern or the southern sides of the existing road. The existing road alignment is better than the proposal to construct a new road. The following measures will mitigate the impacts on tree cutting in the forest areas and wildlife movement.

- Clearing vegetation/trees in forest area road width will be confined 24m.
- Compensatory tree plantation will be carried out 1:10 ratio.
- Impact on wildlife movement may be reduced by establishing improved and coordinated cross-road structures, ensuring the movement of wild animals. Culverts in the forest areas will be designed to facilitate wildlife movement.
- Warning signs, speed limits, display boards on wildlife protection will be erected in the crossing areas.

2.5 Resource Requirements

2.5.1 Labour

As per the WB ESS2, the subproject will employ direct workers (i.e. Specialised consultants and technical specialists engaged by the DoR to perform direct responsibilities on the project); contracted workers (i.e. workers engaged by civil works contractors and other third parties to perform core functions of the project); and primary supply workers (i.e workers of construction material suppliers such as sand and gravel and loading/construction material transport services),. About 500 workers, both skilled and unskilled, will be required throughout the construction period of five years. Out of which, about 300 will be outside workers (outside the subproject area), and 200 labourers are local, mostly un-skilled or semi-skilled labour. During the peak construction period, the requirement of local labour may increase up to 600.

2.5.2 Cut and Fill

Most of the burrowed soil suitable for embankment and subgrade will be used within the subproject area. The average distance for most of the borrow area sources from the nearest point on the project road. These deposits are accessible from the project road with little or no improvement of existing accesses. Quantities of soil material for use in the embankment and sub-grade construction of the project road are adequate from the project area. All the proposed bypasses will be constructed balancing cut and fill balance consideration.

Approximated required earthwork quantity of cutting and filling is given in **Table 2-8**.

Table 2.8: Approximated Earthworks Quantity

Cutting volume	272,883 cum
Filling Volume	1176517 cum

2.5.3 Source of Construction Materials

Construction materials such as stone, coarse aggregates, sand, sub-base, base course, and surface dressing/asphalt concrete chips are available locally, and others will be purchased from the local market. The potential sources of construction materials (stone, coarse aggregates, sand) are given in **Table 2.9.** The proposed works will require about 61,160 m^3 of Sand, 284,400 m^3 of Aggregate, 68,320 m^3 of Stone, 402,500 m^3 of Subbase, and 259,500 m^3 of Base materials is required for the subproject**.**

Table 2.9: Sources of the Construction Material

S.n.	Name of the Source	Location	Available Materials	Available Quantities (m^3)
1	Belgurduwa Nadi	5 Km away from Chainage 639+600 End Point (Gorusinghe)	Sand and Silt	60,000
2	Banganga Khola	At chainage 622+00 and 5 km away from the road alignment	Boulders, Cobbles, Gravels and Sand	90,000

S.n.	Name of the Source	Location	Available Materials	Available Quantities (m^3)
3	Goghwa Khola	About 12 km away from chainage 640+100	Boulders, Cobbles, Gravels and Sand	22,500
4	Jhingwa Khola	About 13 km away from chainage 640+100	Boulders, Cobbles, Gravels and Sand	112,500
5	Danav Khola	At chainage 598+400 and 5 km away from the road alignment	Boulders, Cobbles, Gravels and Sand	45,000
6	Kanchan Khola	At chainage 611+400 and 5 km away from the road alignment at Saljhandi	Boulders, Cobbles, Gravels and Sand	14,000
7	Tinau Khola	10 Km away from Chainage 589+600 Start Point (Butwal)	Boulders, Cobbles, Gravels and Sand	600,000
8	Rohini Khola	12 Km away from Chainage 589+600 Start Point (Butwal)	Boulders, Cobbles, Gravels and Sand	75,000

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

2.5.4 Construction Materials requirement

Construction of road and bridges following material will be required. Construction materials such as stone, coarse aggregates, sand, sub base, base course, and surface dressing/asphalt concrete chips will be used from proposed quarry sites. Manufactured materials such as cement, steel and bitumen will be mostly sourced from local suppliers. The major construction material with quantity is given in **Table 2.10.**

Table 2.10: Estimation of Quantities of Construction Materials

Type of Material Required	Quantity of Material Required
Cement	51,200.00 Mt
Sand	61,160.00 Cum
Aggregate	284,400.00 Cum
Stone	68,320.00 Cum
Reinforcement	9,245.00 Mt
Structural Steel	1,075.00 Mt
Subbase	402,500.00 Cum
Base	259,500.00 Cum
Bitumen	1,125.00 Mt

Type of Material Required	Quantity of Material Required
Gabion Box	95,800.00 Sqm

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

2.5.5 Use of Energy and Construction Water

Gasoline and electrical energy will be used during the construction phase of the project to prevent pressure on natural forests in the project area. The contractor will avoid using fuelwood for construction purposes and for cooking purposes in labour camps. The energy required for the construction works is mainly kerosene, diesel and petrol. Diesel will be used for the transportation of materials. Kerosene will be used for bitumen heating. Vehicles will use diesel or petrol supplied by the contractor from outside the project area. The required quantity is given in **Table 2.11**.

Table 2.11: Type and quantity of fuel required

Type of fuel	Quantity (liter)
Diesel	2,400,000 liter
Petrol	480,000 liter
Kerosene	2,050,000 liter

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

The technology used for the construction work will be both machine and labor based. Machine based method is mainly used for specialized works like material extraction from borrow/ quarry sites with use of heavy equipment like excavator, bulldozer, etc. Heavy equipment like excavator will also be used for earthwork excavation, vibrator for surface laying and compacting, distributor for laying and compactor for finishing bituminous seal, etc.

Water from the Badganga River, Bamaha River, Kothi River and its tributaries are likely to be used by the construction contractor during the time of construction.

2.6 Subproject Implementation Schedule and Resources

After completion of pre-implementation works such as land acquisition, vegetation clearance, etc., mobilization of contractors will be done. Construction of roads, major and minor bridges in the subproject is planned to start on 2022 and completion is estimated on 3 years (**Table 2.4**). The total cost for the upgradation of BG Road has been estimated to NRs. 15,777,239,424 including VAT.

TASK DESCRIPTION	Year 1				Year 2				Year 3				Year 4			
	Quarters															
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
Construction Phase – Construction Activities																
Site Clearance																
Earthwork Excavation																
Cross Drainage Structures																
Bridges Construction																
Retaining Structures																
Side and Drainage Structures																
Road Pavement Structures																
Bio-engineering																

TASK DESCRIPTION	Year 1				Year 2				Year 3				Year 4			
	Quarters															
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
Environmental Activities																
Traffic Safety, Painting & Road Furniture																
DLP																

Figure 2.4: Construction Schedule of the Subproject

3 Legal, Regulatory and Administrative Framework

This chapter provides an overview of the national legislation and the World Bank Environmental and Social Management Framework that are relevant to the environmental and social assessment of the subroject and actions that are taken (or to be taken) up by DOR to meet these requirements.

3.1 Applicable Environmental and Social Regulations

The Environment Protection Act (EPA), 2019 is mandatory and forms the basis for environmental assessment of the development project, and the Environmental Protection Rules (EPR), 2020 establishes the process to be followed during the preparation and approval of environmental assessment. Also, the Policy Document of DoR on Environmental Assessment in the Road Sector of Nepal (January 2000) requires an Environmental Assessment for national highways and main feeder roads for any kind of interventions such as rehabilitation, upgrading etc. As per 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. Currently, the IEE is in the process of approval and is anticipated to be cleared from MoPIT.

The project will be required to comply with relevant existing and environmental and social laws and regulations in Nepal throughout the life of the project. The policy, legal and institutional framework under which the project will be undertaken is outlined in Table 3.1.

Table 3-1: Key Provisions and Relevance of National Plans, Strategies, Policies, Acts/Rules and Regulations to BG Road

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
Plans			
1	15th 5 years' Development Plan of Nepal (2019-2024)	Enhancement in socio-economy with fast alleviation of poverty by high economic growth in next 5 years based on growth in agriculture, industrial and services sector with a slogan of "Generating Prosperity and Happiness".	Road development and connectivity are vital for economic growth and overall development.
2	20 Year Road Plan, 2002-2022	The objective of the plan being the development of Strategic Road Networks (SRN), aligns with the priorities set out in the Tenth Five Year Plan (2002-2007) as that plan gives priority to constructing feeder and strategic roads connecting North to South encompassing all road development works.	This Act has been established to carry out regular, occasional, periodic and casual repair and maintenance works of roads and levy tolls on, and collect tolls from motor vehicles plying on the road.
3	Nepal National Biodiversity Action Plan, (2014-2020)	The overall goal is to significantly enhance the integrity of Nepal's ecological systems by 2020, thereby contributing to human well-being and sustainable development of the country. This is to be achieved through implementation of a number of sector specific and cross- sectoral strategies and priority actions	The Action Plan emphasizes that governance and legal/regulatory implementation is a major underlying factor behind deforestation and forest degradation.
Strategies			

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
5	Nature Conservational Natural Strategic Framework for Sustainable Development (2015-2030)	The Strategy stresses out the needs to mitigate the current and potential future effects of the pressure of transportation and other infrastructure development on the habitats of endangered flora and fauna based on the landscape concept.	The Strategy Identifies legal and regulatory issues applicable for nature conservation, sustainable development and bio-diversity protection.
6	MoPI''s Five Year Strategic Plan for Prosperous Nepal through Roads, Rail and Transport Development, 2016/17-2021/22	Lays out map for Prosperous Nepal through Roads, Rails and Transport Development.	The strategy aims to reduce the number of casualties and road accidents on the highways and strategic roads
7	Sustainable Development Goals, (SDG) 2016-2030	SDG-9 aims for resilient infrastructure including roads, SDG 11- aims for inclusive, safe, resilient and sustainable human settlements SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss SDG17:to protect women and girls from violence	The SDG provisions for safer roads, biodiversity conservation and reduce gender disparity.
Policies			
8	Nepal National Environment Policy, 2076 BS(2019 AD)	The policy established the framework for the protection, control, and minimization of pollution, environmental mainstreaming, environmental justice, participation, sustainable development, good governance, and capacity development.	The Policy is aimed to ensure rights of the people to live in clean and healthy environment controlling pollution, managing solid waste, and enhancing greenery.
8	Forest Policy, (2015 AD)	The forest policy emphasizes the implementation of community and private forestry development, programs, national parks and conservation areas management programs, soil and watershed conservation program, management and development of medicinal plants and conservation of biological diversity.	The policy stresses conservation of endangered species and emphasizes to avoid forest destruction or chopping down the tree while constructing infrastructures during implementation of project other than forest sector.
9	National Transport Policy, 2058 BS(2001AD)	The principal objective of this Policy is to develop a reliable, cost effective, safe facility oriented and sustainable transport system that promotes and sustains the economic, social, cultural and tourism development of Nepal as a whole	The policy puts high priority in completing the construction of roads connecting all 77 District Headquarters of the Country to the main road network

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
10	Land Use Policy, 2072 (2015)	The objectives of the policy are to categorize or classify entire lands of the country into various Land Use Zones (LUZs), level wise division (Federal, Provincial and Local), and to ensure the use of Land and Land Resources(LLRs) on the basis of land use plans (LUPs) for protection of agricultural land and maintain beautiful, well-facilitated settlement and sustainable urbanization, forests areas including natural heritages, biodiversity and historical, cultural and religious, archaeological and areas of strategic importance	It ensures the participation of government and public agencies as well as the private sector by linking productivity, environmental balance and conservation, social and economic prosperity and poverty alleviation.
12	Land Acquisition, Resettlement and Rehabilitation Policy, 2071 BS(2015 AD)	The policy requires that expenses related to land acquisition, compensation and the implementation of resettlement and rehabilitation plans should be considered as project costs, underlining that compensation amount should be calculated on the market rate.	Policy outlines the needs to conduct an economic and social impact assessment of the development projects.
13	Public-Private Partnership Policy, 2072 BS (2015 AD)	The objectives of this policy are focused on serving to public interests in developing of infrastructures at the same time creating environment for private investment and use of private sector experience, managerial skills, competencies and technical skills for infrastructure development	The policy covers 6 development areas for partnerships including infrastructure and transport.
14	National Health Policy, 2076 (2019)	Universal health coverage including prevention, promotion, treatment, rehabilitation and palliation,	All kinds of pollution to be reduced that may impact general public and program to be implemented and developed along with relevant agencies in the basis of scientific planning.
Acts			
15	Environment Protection Act, 2076 BS (2019 AD)	The law contains several provisions to internalize environmental assessment system and to maintain a clean and healthy environment by minimizing the adverse impacts on human beings and other life forms and physical objects.	The act highlights that any development project, before its implementation has to pass through environmental assessment, which will be either BES, IEE or EIA depending upon the location, type and size of the projects. The Act has included three tiers of provisions (Section 3.2.a) on conducting''environmental study as brief environmental study (BES), IEE and EIA.
16	Public Road Act, 2031 BS(1974 AD)	The Public Road Act is the governing legislation for construction and operation of roads in Nepal.	The Act prohibits the construction of permanent structures (buildings) in a defined distance from the road,

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
			i.e. the road agency has the authority over everything within the right-of-way
17	Forest Act, 2076 BS(2019 AD)	Section 49 of the Act prohibits reclaiming lands, setting fires, grazing, removing or damaging forest products, felling trees or plants, wild animals hunting and extracting boulders, sand and soil from the National forest without the prior approval.	Section 42of the act has made three provisions for using of forest areas: (i) the project should be of national priority sub-Section (1), (ii) there is no alternative other than to use the forest area sub-Section (1/2), and (iii) the project should not have significant impact on environment sub- Section (1)
18	Local Government Operation Act, 2074 BS (2017AD)	The Act provides the functions, rights and duties of local government such as Municipalities, rural municipalities and their wards.	This act empowers the local bodies for the conservation of soil, forest, and other natural resources and implements environmental conservation activities.
19	Soil and Water Conservation Act, 2039 BS (1982 AD)	Provisions to construct and maintain dams, embankment, terrace improvements, diversion channels and retaining walls, protect vegetation in landslide-prone areas and undertake a deforestation programs, and Regulate agricultural practices pertinent to soil and watershed conservations	Section 13 of the act empowers the authority to prohibit the commission of any acts that may cause soil- erosion or soil cutting in a land where any of the acts has been done under Section 4 and in vicinity of such land.
20	Plant Protection Act 2064 BS(2007 AD)	legal provisions for preventing the introduction, establishment, prevalence and spread of pests while importing and exporting plants and plant products, promoting trade in plants and plant products by adopting appropriate measures for their effective control	the act may impose the prohibitions/restrictions in the import of plant or plant product, transport from one district to another district of any plant or plant product.
21	Aquatic Life Protection Act, 2017BS(1960 AD)	Recognition of the value of wetlands and aquatic animals.	Section 3 of the act renders no person shall knowingly use any kind of electric current, explosive substance or poisonous substance with intention of catching and killing any aquatic animal in any water.
22	Control of International Trade of Endangered Wild Fauna and Flora Act, 2074 BS(2017 AD)	The act prohibits on Trade or Transaction of Threatened or Vulnerable wild fauna or flora or specimen thereof	*The act ensues that n*o person shall purchase, sell, possess, use, plant, rear, captive breed, transport, import, export, or cause to be done so a threatened or vulnerable wild fauna or flora or a specimen, except of the cases when a license obtained

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
23	Water Resources Act, 2049 BS(1992AD)	To make legal arrangements for determining beneficial uses of water resources, preventing environmental and other hazardous effects thereof and also keeping water resources free from pollutions.	Section 19 of the act clearly mentions that no one shall pollute water resource by way of using or putting any litter, industrial wastes, poison, chemical or toxic to the effect that the pollution tolerance limit of the water resource as prescribed pursuant to Sub- section (1) is exceeded.
24	Land Acquisition Act, 2034 BS(1977AD)	The Act is the main legislation to guide the involuntary acquisition of land in the country.	Government can acquire land at any place in any quantity by giving the compensation pursuant to the Act for the land required for any public purpose or for the operation of any development project initiated by government, authorized institution (sections 3 and 4).
25	Land Use Act, 2076 BS(2019 AD)	Section 4.1 of the act classifies lands into 10 categories such as agricultural, residential, industrial, commercial, mining and mineral, forest, river, stream, pond and wetland, public use, cultural and archaeological, and others.	The act provisions for the need for economic development and infrastructure building, among others to ensure that land is properly used and managed and that land set aside for one purpose is not used for other.
26	Labour Act, 2074 BS (2017AD)	The Act has been passed for provisions for the rights, interest, facilities and safety of workers and employees working in various sectors and thus ensures the good working conditions and welfare of the workers.	Section 11 (3) of the Labour Act provides for the employment contract and the matters to be covered under the employment contract *and the* Act requires the employment contract to include (a) remuneration, (b) benefits, and (c) terms of the employments of the Employee and such other matters as prescribed. Section 64 (1) states that the main employer must obtain the employees from licensed labour supplier.

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
27	Child Labour (Prohibition and Regulation) Act, 2056 BS(2000AD)	The Child Labour (Prohibition and Regulation) Act 2000 is the main legal expedient to prohibit engaging children in factories, mines or similar risky activities and to make necessary provisions with regard to their health, security, services and facilities while engaging them in other activities.	Under the Section 3 of the Act, child having not attained the age of 14 years is strictly prohibited to be engaged in works as a laborer. Equally, under Section 4, engagement of child in works as a labourer against his/her will by way of persuasion, misrepresentation or by subjecting him/her to any influence or fear or threat or coercion or by any other means is prohibited. Under Section 6, in case any Enterprise, engaging a child in works, must get an approval from the concerned labour office or any authority or official prescribed by that office and form the fathers, mother or guardian of the child.
28	Act related to Children, 2075 BS (2018AD)	The act provisions the children's fundamental rights provided in the constitution, into a legislative provision, which then allows children to exercise their rights legally.	any child under the age of 14 are not allowed working in hazardous labour or the worst form of child labour
29	Road Board Act, 2058 BS(2002AD)	The act makes necessary provisions on having the roads repaired and maintained, making cost effective the expenditures to be incurred in repairing and maintaining the roads and making transparent and effective the repairing and maintenance works of the roads	The Act aims on providing sustainable fund for planned maintenance of the roads. The aim of planned maintenance is to keep existing maintainable roads in serviceable condition, reduce vehicle operating cost and provide more comfort to the road users.
Rules/Regulations			
30	Labour Rules, 2075 BS (2018 AD)	The Labour Rules demands the Employment Contract to cover (a) nature of employment, (b) primary work of the Employee and his/her position, (c) statement that the Employee'' Service Rule will be integral part, (d) date, time, place of contract and its effective date,I) Other important terms and conditions related to the work or service of the Employee	The Labour Rules regulate the Employee work schedule, providing rest period for certain female employees with submitting of certain certificates, determining the percentage of disability, associated with accident in the workplace, other issues relevant to sickness or accident while working, associated with occupational safety and health, etc.
31	Water Resources Regulation, 2050 BS (1993 AD)	Measures are to be taken for the conservation of aquatic life and water-environment and for mitigating social and economic effects of the project in the concerned area.	It is mandatory under Rull7(e) that appropriate measures should be taken to lessen the adverse effects due to the project on the overall environment

3.1.1 National Environmental Standards

National Ambient Air Quality Standard, 2069, The new National Ambient Air Quality Standard (NAAQS) 2012 that came into effect requires effective monitoring and collection of eight-hour and 24-hour samples of air pollutants like Total Suspended Particulates (TSP), Particulate Matter (PM10 and PM2.5), carbon monoxide, lead and ozone levels for at least 347 days out of a 365-day year. The NAAQS further states that no particular place should fail to monitor air samples for two consecutive days. TSP consist of solid and liquid particles in the air that are harmful to health while PM10 is an air particle with a volume less than 10 micron that can easily enter into the end of the respiratory tract and cause serious health impacts. Both TSP and PM10 are considered major air pollutants.

National Standard About Noise Level, 2069, The National Noise Standard 2012 that came into effect as per the rule 15 of Environmental Protection Regulation that requires effective monitoring and collection of Day-time and Night-time noise level permitted limits.

Nepal Vehicle Mass Emission Standard, 2069, Government of Nepal has prescribed different National standards for emissions from vehicles. There are limit values for emission of harmful gases from vehicles as mentioned in the standards.

National Drinking Water Quality Standards, 2005, Major tasks during monitoring to be performed by water supplier are cited as follows: Controlling regularly the quality to ascertain that the water supplied complies with the NDWQS; Periodic monitoring of all the components of the water supply system from the perspective of sanitation and risk to health; Proper supervision, inspection and maintenance as part of operation of the water supply systems; Development of necessary infrastructure like water quality testing laboratory and quality control. Following factors should be considered while monitoring: Type and quality of water sources i.e. surface water, springs, dug-wells, shallow wells, deep wells; Type and size of the water supply system (pipe system, treatment facilities);Local environmental settings (physical infrastructure, geography, etc.); Sanitation and hygienic condition surrounding the water supply system; Socio-economic environment at the local level; Site specific conditions for complying with the standards; User's opinion and suggestions regarding water quality; Health and Hygiene Information (information on water related diseases).

Based on all national documents stated above, this ESIA aligns and complies with the aforesaid national policy framework, indicating across various sectors and fields of expertise, the requirement for the assessment and effective management of environmental and social impacts related to the construction of the BG road.

3.2 Regulatory Institutions

Following institutions are responsible on Environmental and Social issues in the project.

Institution	Role and Responsibility on E&S issues
Ministry of Physical Infrastructure and Transport (MoPIT)	MoPIT is the mother agency of the DoR and is mandated by the EP Act to review and approve IEEs for projects in public works and transport sector. It also reviews and endorses EIA reports for review and approval of the MoFE. The Ministry will also be the one to authorize the Project Management Office (PCU) to initiate preliminary action for land acquisition. This function is handled by the Environment and Social section under the Planning, Monitoring and Evaluation Division.
Department of Roads (DoR)/DCID	The DoR-DCID prepares and implements the ESIA/ESMP, which has to be reviewed and approved by the World Bank as the financing agency of the project. DoR-DCID is directly responsible for managing the E&S risks of

Institution	Role and Responsibility on E&S issues
	individual projects under the program, i.e., from assessment, mitigation planning, implementation to monitoring.
Geo-Environment and Social Unit (GESU)	The focal point for the E&S risk management at of DoR is GESU. GESU provides advisory services to units of DoR on geological, environmental and social safeguards matters. Its main role is to prepare IEEs and EIAs for the DoR projects and have the map proved by the MoPIT in the case of IEEs and by the MoFE in the case of EIAs. Because of this role, GESU interacts with the Environment Unit of MoPIT as well as that of MoFE. GESU also undertakes compliance monitoring and auditing of projects.
EIA Unit under Ministry of Forest and Environment (MoFE)	This unit is tasks to undertake review and approve EIAs. It is reporting directly to the Ministry and not part of the Department of Environment. This unit convenes and engages multidisciplinary team to constitute the EIA Review Committee for each EIA submitted from approval. The EIA approvals typically include conditions which the project must comply or implement in addition to the EMP/ESMP
Department of Forestry and Soil Conservation (DoFSC)	DoFSC under the MoFE reviews and approves applications for RoW of road sections falling within areas classified as public forest. The DoFSC imposes conditions on the acquisition of right of way on forest lands, such as replacement of cut trees.
Department of Labour and Occupational Safety (DoLOS)	DoLOS under the Ministry of Labour and Social Security is currently not involved in the E&S risk management (i.e. it has no role in the EIA process) of development projects. Its role is mainly on the regulatory side. It can formulate and issue policies, rules and standards for OHS consistent with the law. As such, it can occasionally conduct monitoring and audit of workplaces, construction sites and offices of contractors and project management.
District Coordination Committees (DCC)	DCCs can regulate soil and water conservation activities. DCCs are also responsible for reviewing applications of eminent domain land acquisitions and confirming public use. It will be responsible for the issuance of land acquisition notice; the formation of Compensation Fixing Committee which would determine fair compensation; finalize the list of land owners to receive compensation; and receives grievances for submission to the Ministry of Home Affairs
Municipalities and Rural Municipalities	The municipalities are responsible to conduct public hearings of the EIA results and based on it endorse the project. The MoFE will not approve EIAs without the endorsement of municipalities. It will be responsible for approval of quarry borrow area.

3.2.1 Environmental Approvals, Permits and Clearances

The environmental approval, permit and clearance are important part of the project. The **Table 3-2** summarizes the responsible agency for environmental approval, permit and clearances to obtain for implementation of the construction works.

Table 3-2: Responsible Agency for Environmental Approval, permits and clearances

Purpose and status	Responsible party	Timeframe
ESIA Approval	GoN/WB	Before Signing of loan agreement
IEE Approval	MoPIT	Prior to construction

Purpose and status	Responsible party	Timeframe
Permission to relocate affected electric poles along the alignment	Nepal Electricity Authority	Prior to construction
Private property and Acquisition of land	Land owners	Prior to construction
Land acquisition and land ownership issues	Department of Land Management and Archive, Ministry of Land Reform, Cooperatives and Poverty Alleviation	Prior to construction
Operation of quarry/borrow sites and watershed activities in community forest	Ministry of Forestry and Environment/DFO	Prior to, and during construction
Approval of tree cutting	MoFE/Department of Forest/Divisional Forest Office	Prior to, and during construction
Approval of Quarry/borrow operation in River	Municipality and DCC	Prior to, and during construction
Establishing for crusher plants batching plants	Municipality and DCC	Prior to, and during construction
Labour camps at private land	Land owners	Prior to, and during construction
Labour camps at public land	Municipality and DCC	Prior to, and during construction
Solid Waste Disposal Sites	Municipality	Prior to, and during construction

3.3 Relevant International Treaties

Nepal is a signatory party for many international conventions and other treaties. In the current review only those relevant to sustainable development were analyzed and have importance, because they address vital environmental and social issues, which are transboundary or global in nature such as pollution, climate change, biodiversity conservation, address social inequality and provide principles of environmental justice. The table below provides the brief review of international treaties and their provisions, relevant to environmental and social issues during road construction process and applicable in the case of ESIA of the BG road.

- As international policies, numbers of protocols and conventions have guided this study. These protocols and conventions are as mentioned below:
- Convention on Biological Diversity(CBD),1992
- Convention on International Trade in Endangered Species of Wild Fauna and Flora(CITES),(1973amended1979)
- Plant Protection Convention, 1952(Second Amendment,1997)
- World Heritage Convention, 1975
- United Nations Framework Convention on Climate change(UNFCCC), 1992.
- Strategic Approach to International Chemicals Management,2006
- Convention on the Rights of the Child,1989
- International Labour Organization Convention,1998
- The United Nations Declaration on the Rights of Indigenous Peoples, UNDRIP, 2007

UN Declaration on the Elimination of Violence against Women, 1993

The above international protocols and conventions provide guidance on international best practice and focus on the conservation of natural resources and biological diversity, protecting and promoting

environment as well as social issues including the group of conventions of the International Labour Organization and Gender Based Violence (GBV).

3.4 World Bank Environmental and Social Framework and Guidelines

The WB ESF sets out'the WB's commitment to sustainable development and mandatory requirements for the bank finance projects. T'e Bank's ESF is used to assess and manage the environmental and social risks and impacts of the projects. ESSs which are designed to avoid, minimize, or reduce, mitigate and compensate/ offset the adverse environmental and social risks and impacts. The projects supported by the WB are required to meet the 10 ESSs as relevant to the project.

The ESIA will be undertaken in compliance with ESS1 requirements and other relevant ESSs, as follows:

ESS1: please write down the identified risk as per 10 standards here AssessmentAssessment and Management of Environmental and Social Risks which risk category?and Impacts: The ESIA will be prepared to assess all risks and impacts related to relevant standards (ESS2, ESS3, ESS4, ESS5, ESS6, ESS7, ESS8), including stakeholder engagement and assessment and management of environmental and social risks and impacts.

ESS2: Labor and Working Conditions: The ESIA will assess labor risks and working conditions on different types of project workers as per ESS2.

ESS3: Resource Efficiency and Pollution Prevention and Management: The ESIA will assess the risks and impacts related to ESS3, including identification on use of resource efficient technologies and techniques during construction and operation.

ESS4: Community Health and Safety: ESIA will assess the potential risks what are the potential risk related to community? and impacts of the project in relation community health and safety.

ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement: The ESIA will this is ESIA so you have to assessed n identified the major impact here the risks and impacts related to land acquisition as well as physical and economic displacement.

ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: The ESIA will collect baseline information on biodiversity, including identification and assessment of any critical habitats, natural habitats and modified habitats in accordance with ESS6 within the project area of influence (50-m ROW, 300-m direct impact area and 2-km indirect impact area).

ESS7: Indigenous Peoples: ESIA will not will identify it must be identified the presence of indigenous people (IPs) with the project's Direct Area of Influence; collect baseline information on such populations; assess potential project impacts on such them; and provide recommendations for mitigating impacts and extending project benefits to such IPs.

ESS8: Cultural Heritage (what is the potential impact?CH): The cultural heritage baseline survey will be part of the ESIA and project impacts on CH will also be covered by the ESIA.

ESS 9 Financial Intermediaries: Since no financial intermediary is involved in this project, ESS9 is not applicable.

ESS10: Stakeholder Engagement and Information Disclosure: A Stakeholder Engagement Plan (SEP) developed for the overall project will be used to map out stakeholders and engage them all throughout the life of the project.

3.4.1 WBG General EHS Guidelines, 2007

The WBG General EHS Guidelines 2007 guides users on common EHS issues potentially applicable to all industry sectors. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts. The EHS guidelines also provide guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities. The guideline highlights general approach to the management of EHS issues at the facility or project level. The guideline entails the inclusion of EHS considerations into corporate and facility- level business processes in an organized, hierarchical approach highlighting with the identification of EHS project hazards and associated risks. Further, the risk management strategies will incorporate engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences when impact avoidance is not feasible.

3.4.2 Environmental Health, and Safety Guidelines for Toll Roads and Construction Materials Extraction

The EHS guidelines for Toll Roads include information relevant to construction, operation and maintenance of large, sealed road projects including associated bridges and overpasses. The guideline highlights the environmental issues specific to construction and operation of roads include the habitat alteration and fragmentation, storm-water, waste, noise, air emissions, and wastewater. The guidelines also highlight occupational and community health and safety and performance indicator monitoring of environment and occupational health and safety. The issues associated with the construction and operation of roads primarily include physical hazards, chemical hazards, and noise.

The EHS guidelines for Constraterialsterails Extraction include information s information relevant to construction materials extraction activities such as aggregates, limestone, slates, sand, gravel, clay, gypsum, feldspar, silica sands, and quartzite, as well as to the extraction of dimension stone. It addresses stand-alone projects and extraction activities supporting construction, civil works, and cement projects. Although the construction materials extraction guidelines emphasize major and complex extraction schemes, the concepts are also applicable to small operations. The guideline highlights the environmental issues specific to development, operation and decommissioning of constructin material extraction include the habitat alteration and fragmentation, storm-water, waste, noise, air emissions, and wastewater. The guidelines also highlight occupational and community health and safety and performance indicator monitoring of environment and occupational health and safety.

World Bank Good Practice Note on Road Safety

The World Bank is providing a series of Good Practice Notes (GPN) to accompany the ESF to support its implementation. This note focuses on addressing road safety on World Bank financed operations. GPNs are developed in partnership with specialists from inside and outside the Bank and are designed to be reviewed and updated periodically, when appropriate. This note should be read in conjunction with the ESF, including the Policy, the Environmental and Social Standards (ESS1-10) and the accompanying Guidance Notes for Borrowers.

3.4.3 Comparison of WB ESSs and National Regulations

Table 3-3 provides a comparison of the ESSs with national legislative framework and requirements. ESSs create mechanisms for the integration of environmental and social issues into decision making. They provide a set of specialized tools to support development. No financial intermediaries are involved in the

BG Road project so ESS9 is not applicable. The comparative analysis of national regulatory frameworks with ESS1 to ESS8, and ESS10, found that the requirements in regulatory frameworks were aligned with ESSs, however the issues of GHG emission calculation, resource efficiency, community health and safety, and workers GRM have not been adequately addressed. These aspects are considered in different themes of impact assessment in line with international best practices, but not mandatory under existing regulatory frameworks.

Table 3-3: WB ESSs and Comparison with relevant National Laws

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	**Requirements**			
ESS 1: Assessment and management of Environmental and Social Risks and Impacts	ESS 1 requires the Borrower will assess, manage and monitor the environmental and social risks and impacts of the project throughout the project life cycle so as to meet the requirements of the ESSs in a manner and within a timeframe acceptable to the Bank. The Borrower will: (a) Conduct an environmental and social assessment of the proposed project, including stakeholder engagement; (b) Undertake stakeholder engagement and disclose appropriate information in accordance with ESS10; (c) Develop an ESCP, and implement all measures and Actions set out in the legal agreement including the ESCP; and (d) Conduct monitoring and reporting on the environmental and social performance.	Environment Protection Act (EPA), 2019; Environment Protection Regulation (EPR), 2020; and National Environmental Impact Assessment Guidelines, 1993 are legal instruments for the requirements of Environmental and Social Assessment of any development projects.	The Schedules are based on activity type, threshold/size, as well as location. The potential risks associated with the project are omitted in GoN policy. No provision for associate project projects/activities; large projects can be split into smaller projects to avoid full ESIA study. The EA requirement in Nepal is primarily based on project's size, location and financial threshold; irrespective of the level of potential risks. It gives total freedom to proponent to design and implement EA on their own (for example all documents including Scoping, ToR, EIA reports are prepared by proponent and approved by concerned government offices. Experiences have shown that not all projects need for EA is justified based on size, location, thresholds. Scope of EIA may not cover all WB ESS.	• ESSA is prepared in compliance, for government clearance, separate IEE or EIA will be prepared as per the standard • The ESMP to be prepared shall be made an integral part of the bidding document so that the Contractor (as for the provision of services) shall adhere to the provisions prescribed in the ESMP during the execution of the project.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
			EPA/EPR does not allow use of other types/forms of assessments. Does not emphasize hierarchy of measures in ES risk management planning	
ESS 2: Labour and Working Conditions	There are numbers of requirements of ESS2 under the following heading: • Working conditions and management of worker relationships; • Protecting the work force; • Grievance mechanism; • Occupational Health and Safety • Contracted workers; • Community workers; and; • Primary supply workers	Labor Act (2017) and Labor Rules 2018; and Child Labor Act (2001) are legal instruments.	Current OHS legislation is not adequate (No separate legislation on OHS). Current OHS mandate is provided only in Chapter 12 of the Labor Act) Lack of industry-specific standards (DoLOS has so far issued only one directive: OHS Directive for Brick Workers)	• Labour Management Procedures (LMPs) will be implemented in the project implementation • Sub-project specific OHS plans will be developed by the contractors
ESS 3: Resource Efficiency and Pollution Prevention and Management	The Borrower shall consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention.	EPA (2019), EPR (2020), National Ambient Air Quality Standards (2003), Nepal Vehicle Mass Emission Standard (2012), National Ambient Sound Quality Standard (2012), Standard on Emission of Smoke in Air by New and Existing Diesel Generator (2012), National Water Quality Standard (2008), Tolerance Limits for Industrial Effluents to be discharged into Inland Surface Waters (2003), The Solid Waste Management Act (2011),	Lack of suitable enforcement mechanisms for legislation on resource use efficiency in projects	• Resource efficiency and pollution prevention in any project activity will be captured in ESIA/ESMP preparation. • WBG EHS guidelines or/ National standards (depending on which one is stricter) related to environmental protection and resource efficiency will be complied with by the project.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
		Solid Waste Management Rule (2013), Water Resources Act (1992), Water Resources Rules (1993), Drinking Water Regulation (1998), Drinking Water Quality Standards		
ESS 4: Community Health and Safety	There are numbers of requirements of ESS4 under the following headings: • Community health and safety and • Security personnel	The EPA identifies the direct and indirect human health impact as one of the components in assessing the effect of development projects. EPA Section 7: Nobody shall create pollution in such a manner as to cause significant adverse impacts on the environment or likely to be hazardous to public life and'people's health.	• There is limited coverage as scope of ESIAs do not necessarily include community safety issues. • Public health legislation does not specifically impose requirements for development and infrastructure projects.	• ESIA/ESMPs developed under the project will address all community health and safety issues that arise during the execution and operation of the project.
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	There are number of requirements of ESS 5 under following headings: • General (Eligibility classification; Project design; Compensation and benefits for affected persons; Community engagement; Grievance mechanism; Planning and implementation); • Displacement (Physical displacement; Economic displacement); • Collaboration with other responsible agencies or subnational jurisdictions; and; • Technical and financial assistance.	Land Acquisition Act (1977) Guthi Corporation Act (1976) Land Acquisition Guidelines (1989) Land Reform Act (1964) Clause 3 of the Land Acquisition Act states that any asset that is required for public purposes shall be acquired by providing compensation. Compensation Fixation Committee shall establish the Compensation rates. Guthi Corporation Act, 2033 (1976). Section 42 of this Act states that Guthi land (religious trust land) acquired for the purpose of the development shall be replaced with	• Does not require preparation of RAP • Does not allow for PAP consultation in the compensation options • Does not allow non-cash compensation options such as land-for-land and replacement homes, only "arrangements for rehabilitation" and "priority in employment". • Valuation of lost assets considers depreciation and hence not at replacement cost • Does not make mention of compensating non-titleholders	• The project shall be required to prepare vulnerability assessment and mitigation plan for the affected people that have impacts on their livelihood after losing the land. • A Resettlement Framework is being prepared to provide guidance for any resettlement activities. • The project shall assist those who have impacts on their livelihoods due to land acquisition by the project, including tenants. • The lost assets need to be fully replaced and affected livelihoods restored.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
		other land, than compensated in cash Compensation shall be provided for loss of crop damaged and income source.	(tenants, long-term land users, encroachers and squatters).	• Pragmatic livelihood assistance program shall be designed by the project. • The project shall develop alternative forms of compensation or assistance for adversely affected non-title holders, encroachers and squatters.
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	There are number of requirements of ESS 6 under the following headings: • General (Assessment of risks and impacts following a precautionary approach); • Conservation of biodiversity and habitats; • Habitats are classified as the Modified habitat; Natural habitat; and Critical habitat; • No Net Loss is achieved to mitigate the loss of natural habitats, where critical habitats are impacted, Net Gain will be demonstrated for the biodiversity values for which critical habitat is designated. • Legally protected and internationally recognized areas of high biodiversity value; • Invasive alien species;	Aquatic Animal Protection Act (1961), National Park and Wildlife Conservation Act (1973), National Park and Wildlife Conservation Regulations (1974), Soil and Watershed Conservation Act (1982), Himalayan National Park Regulation (1979), National Trust for Nature Conservation Act (1983), Forest Act (2019), Conservation Area Management Rules (1996), Buffer Zone Management Rules (1996), Plant Protection Act (2007)	• Natural habitats are not specifically required to be assessed in the EIA • Does not specifically require Biodiversity Management Plan even where biodiversity impact is found significant in the EIA	• All the provisions of relevant laws will be complied with by the project. • A separate Biodiversity Management Plan needs to be developed for project activities that have potential impacts on biodiversity and critical/natural habitats.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	**Requirements**			
	• Sustainable management of living natural resources and primary suppliers.			
ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	There are numbers of requirements of ESS 7 under the following headings: • General (Projects designed solely to benefit indigenous peoples/Sub-Saharan African historically underserved traditional local communities; Projects where indigenous peoples/Sub-Saharan African historically underserved traditional local communities are not the sole beneficiaries; Avoidance of adverse impacts; Mitigation and development benefits; Meaningful consultation tailored to indigenous peoples/Sub-Saharan African historically underserved traditional local communities; • Circumstances requiring free, prior and informed consent, FPIC (Impacts on lands and natural resources subject to traditional ownership or under customary use or occupation; Relocation of indigenous peoples/ Sub-Saharan African historically underserved traditional local communities from lands and	National Foundation for the Development of Indigenous Nationalities Act (2002), Local Self-Governance Act (1999), ILO Convention 169 (2007) The GoN encourages to include and consid'r IPLC's concerns in each development and infrastructure programs and formulate a plan or mechanism to incorporate income generation program targeted to IPLC.	• The GoN encourages development programs to incorporate income generation schemes for IPs. • The provision of FPIC and broad community support in relation to IPs is absent. Nonetheless, the GoN has ratified ILO 169 and the United Nations Declaration of Rights of Indigenous People (UNDRIP). • The GoN is in the process of preparing National Action Plan to implement these international commitments.	• An Indigenous People Development Framework (IPDF) is being prepared to provide guidance to mitigate any impacts on IPs. • The project shall seek to maximize the ability of Adivasi/ Janajati to benefit from the project by: a. creating an environment for social inclusion; b. enabling their participation in policy discussions and decision making; c. promoting their culture, language and knowledge through different project activities.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
	natural resources subject to traditional ownership or under customary use or occupation; Cultural heritage); Grievance mechanism; and; Indigenous peoples/Sub-Saharan African historically underserved traditional local communities and broader development planning.			
ESS 8: Cultural Heritage	There are numbers of requirements of ESS 8 under the following headings: • General • Stakeholder consultation and identification of cultural heritage (Confidentiality; Stakeholders' access); • Legally protected cultural heritage areas; • Provisions for specific types of cultural heritage (Archaeological sites and material; Built heritage; Natural features with cultural significance; Movable cultural heritage); and • Commercial use of cultural heritage	• The EPA (2019) and EPR (2020) provision that physical and cultural resources shall not be disturbed or damaged without the prior approval of concerned authority. • Ancient Monument Act (1956) have provisions on cultural heritage	• Does not include intangible cultural heritage • Does not provide for the development of Cultural Heritage Plan • Does not provide for the application of globally recognized practices in the study, documentation and protection of cultural heritage • Does not provide for adoption of chance find procedures	• The ESMF has incorp"rated "Chanc" Finds" provisions and requirements • ESMPs to be developed under the project will aim to address any issues of cultural heritage that may be affected by the execution and operation of the project. • During the drafting stage of this ESMF, not all cultural heritage is identified and documented. However, through a collaborative approach community will be consulted in identifying cultural heritage sites with local significance/importance and documented and follow CHP-CFP.
ESS 10: Stakeholder Engagement and Information Disclosure	There are numbers of requirements of ESS 10 under the following headings: • Engagement during project preparation (Stakeholder	• Prevailing national polices including EPA 2019 and EPR 2020 has envisaged the stakeholder engagement at different stage of the project	• Does not require stakeholder analysis and preparation of stakeholder engagement plan • Does not provide for continuous stakeholder	• The project has prepared a Stakeholder Engagement Plan (SEP) to ensure that stakeholder engagement activities are effective and meaningful consultation is

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
	identification and analysis; Stakeholder Engagement Plan; Information disclosure; Meaningful consultation); • Engagement during project implementation and external reporting; \Grievance mechanism; and; • Organizational capacity and commitment	design and implementation. Stakeholder consultation, disclosure and grievance hearing system are provisioned.	engagement/consultations beyond EIA process during construction and operation phase	carried out including guideline for establishing a comprehensive GRM with clear, safe and accessible procedures to identify and respond to grievances, including SEA/SH, cases.

4 Baseline Environment

This chapter defines the subproject influence area and presents a detailed overview of the physical, biological, and socio-economic environment within the subproject influence area, and results of the primary investigations.

4.1 Zone of Influence (ZoI)

The subproject affected municipalities and rural municipalities are considered ZoI of the project. The ZoI of the subproject area has been categorized as Direct Impact Area (DIA), covering the area from centre of the road to 150m,and Indirect Impact Area (IIA), covering the area between 150 m to 1 km of the road.

The Direct Impact Area (DIA) of the subproject includes all the areas where activities related to the construction will take place. The area include

- 50 m ROW (25 m on either side from the center of the road), because the footprints of the proposed activities are located in this ROW and changes in the current land use within this area. During the operation stage, this area will be impacted by the increased level of traffic volume, which can have repercussions on the safety of people.
- Further 150m on either side from the centre of the road will have a greater likelihood of impact on the nearby human population, private land and resources and impacts on physical, biological as well as socio-economic and cultural environment and, thus, it is subjected to high impacts.
- The direct impact area has been calculated as the extent of direct road effect on the environment, which is from 100 to 200 m from the center of the road (each side)[3], we took an average 150 m each side, because the BG road passes mostly through a plain area with agriculture land, settlement and dense vegetation. Dense vegetation itself mitigates negative impacts of dust, noise and disturbances. As the operation of crusher plants, batching plants, campsites, etc., will be included within the area. In addition, labour related issues affecting the socio-economic and cultural environment are also expected to occur in this area.

The adjacent areas within 1 kilometre on each side of road alignment are considered as the Indirect Impact Area (IIA). In this area, physical and biological environment will experience impacts during the time of construction. The Indirect Impact Area is evaluated as area of avoidance of the road by wildlife, which varies from 1,000 m for small animals to 5,000 m for some large predators (Transportation Research Board and National Research Council, 2005). Besides, indirect impacts will appear as cumulative effects during the operation stage in the form of adverse impacts linked to better access to the area, such as increased poaching, fodder collection, deforestation, unplanned human encroachment along the road and other similar activities. Impacts inadvertently during the construction phase are likely in these areas due to various construction activities. **Figure 4-1** presents the direct impact zone and indirect impact zone of the subproject.

[3] Transportation Research Board and National Research Council. 2005. Assessing and Managing the Ecological Impacts of Paved Roads. Washington, DC: The National Academies Press. https://doi.org/10.17226/11535)

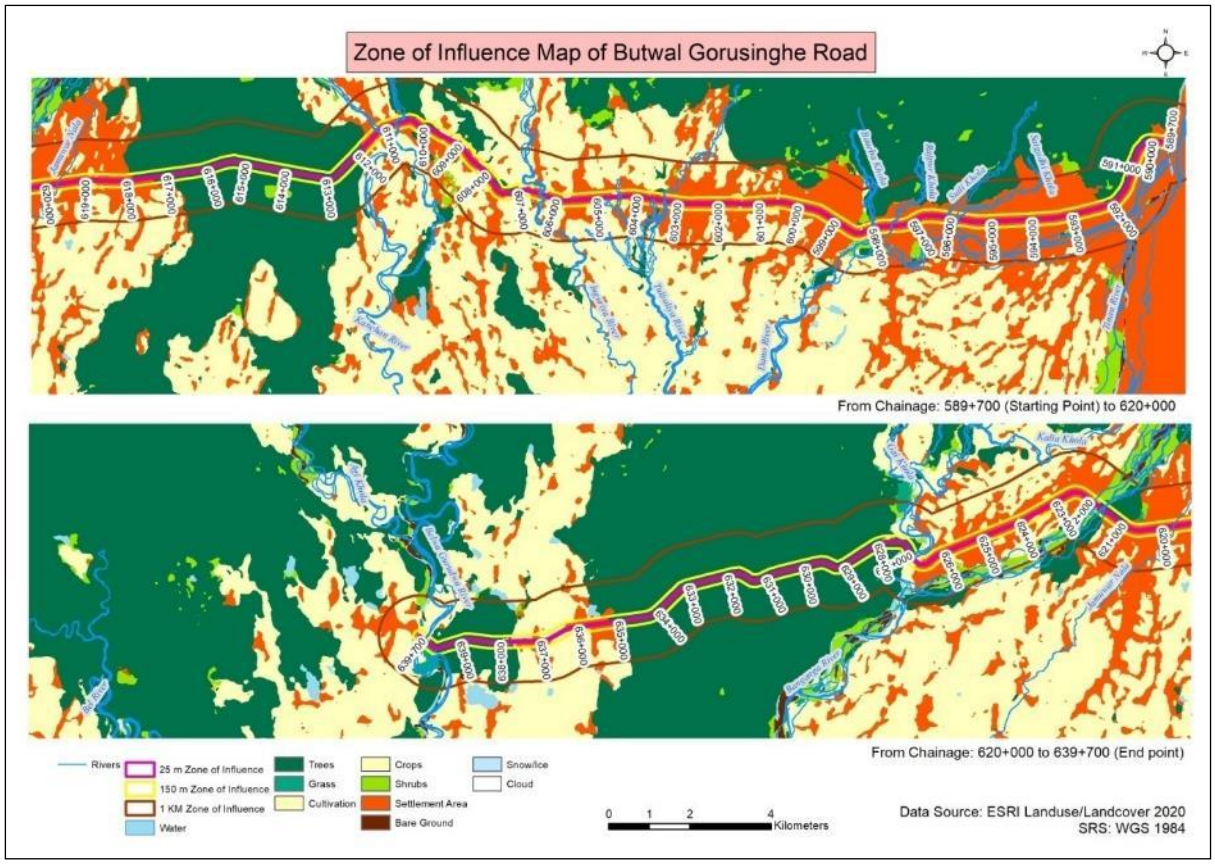


Figure 4.1: Direct impact and Indirect Impact area along the Road

4.2 Physical Environment

4.2.1 Terrain

The subproject area lies in Siwalik and Terai, with an elevation of 117 to 158m amsl (above mean sea level). The alignment begins from the end of the Tinau Bridge at Butwal at an elevation of 149m amsl and ends at Gorusinghe (Budhi) at an elevation of 117 m amsl. The maximum elevation is 1158m amsl at Basgadhi. The road lies in Kapilbastu and Rupandehi District and the length is 50 km. The subproject lies about 300 km south-west of Kathmandu, 250 km south of Pokhara and 120 km west of Chitwan. Rupandehi and Kapilbastu district lies in outer Terai whereas. The alignment from chainage 589+700 Tinau bridge to 591+400 falls under the foothills of the Shiwalik range, whereas the remaining lies in Gangetic plain (Terai).

Rupandehi is a part of Lumbini Province in south-western Terai of Nepal, bordering India in the South, and Palpa, Nawalparasi and Kapilvastu in the North, East and West respectively. It lies within the coordinates 27º20’ N to 27º45’ N and 83º10’E to 83º40’E. The combination of Terai plain (100 masl) and Chure hills region (1219masl) gives the district diverse geography within an area of 1360 sq. km.

Kapilvastu district lies in Lumbini Province, on south-western Nepal between coordinates 27 028’ to 27 055’ N and 82 042’ to 83 014’ E. Geographically, the district can be divided into the low land plains of Terai and the low Chure hills. The district is situated at an elevation of 93 masl to 1,491 masl. The Topographical Map showing road alignment has been given in **Figure 4-2**.

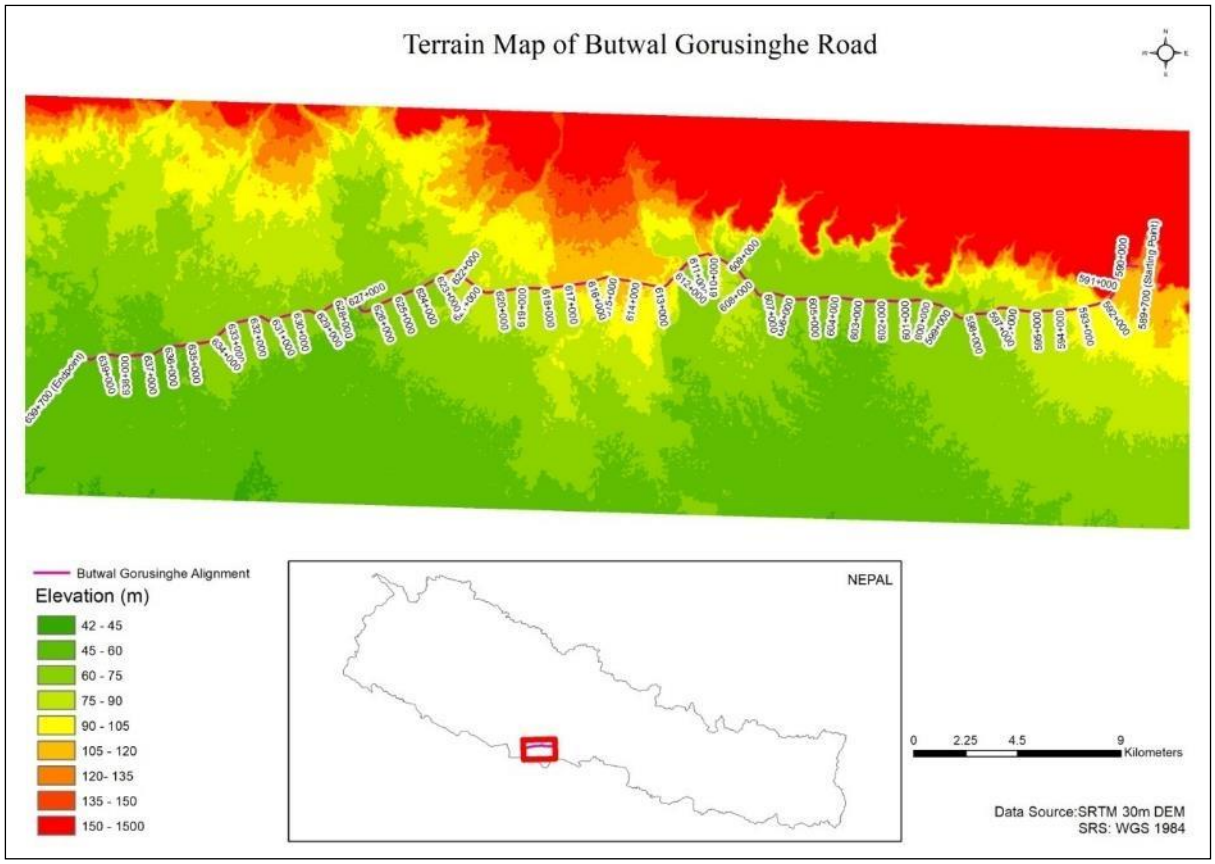


Figure 4.2: Topo Map of BG Road

4.2.2 Land Use Pattern

The existing land use patterns along the BG road alignment are predominantly urban and peri-urban settlements followed by agricultural farmlands, forests, barren areas, and water bodies. The area along the highway is highly populated, which is confirmed by analysis of land use in the road corridor with 60.8% of total area, occupied by settlements with agricultural land (mostly villages and small towns located along the highway), 15.8% agriculture land, 20.6% forest/grassland and the remaining are water bodies and others. However, the 50 RoW (25m on both sides from centre line) of road is almost clear and the existing formation width of the road is 7 to 12m, which means road upgrading will occur requiring minimal additional land use changes. With reference to the preliminary design, there is no additional forest area and agricultural land needed beyond RoW. The ROW's land has already been transferred to DoR/GoN.

The land use map of the BG road is shown in **Figure 4-3.** Some photographs depicting the current land use are shown in Figure 4.4.

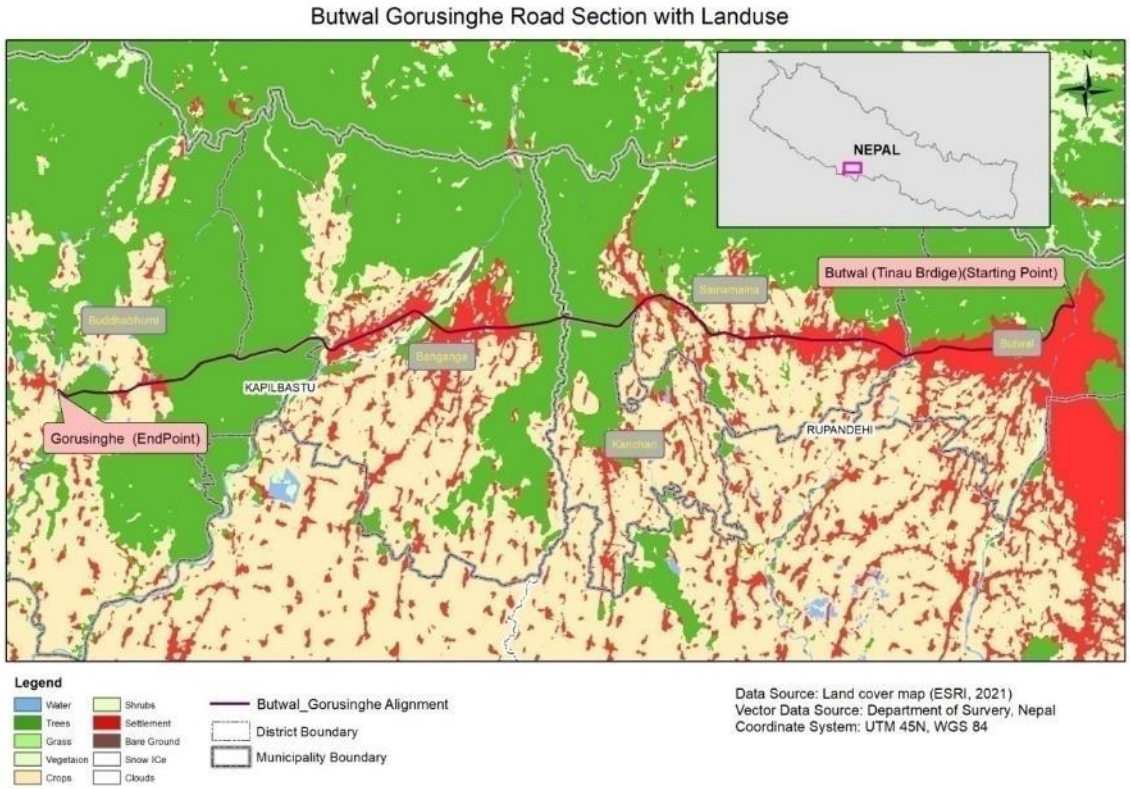


Figure 4.3:: Landuse Map of Subproject Area

Figure 4.4: Settlement, Agricultural field, Forests and Water bodies in the Road corridor

The land use characteristics of the subproject districts are given in Table 4.1. The total area of the districts is 475,105 ha, while the total area of the land under ROW is approximately 236.12 ha

(excluding the existing road surface). Compared with the district forests cover and agricultural land, forest land loss in the RoW is about 0.024%, and agriculture land loss is 0.088%.

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Table 4-1: Land Use Pattern of Subproject Districts

District	Forest Area (Ha)	Pasture Land(Ha)	Agricultural land/grass (Ha)	Others (Ha)	Total (Ha)
Kapilbastu	77838	933	93855	3068	175,694
Rupandehi	39332	1005	96798	3098	140,233
Total	117,170	1,938	190,653	6,166	475,105
Land use in ROW	28.46 ha		35.32	132.67	236.12

Source: Environment Statistic of Nepal, Central Bureau of Statistics, 2013

The detailed Chainage-wise land-use patterns are presented in **Table4-2**.

Table 4-2: Land Use Pattern of Subproject Districts

Chainage		Length (m)	Land use Type
From	To		
589+700	591+230	1600	Settlement
591+240	609+500	18260	Settlement
609+500	610+700	1200	Forest + Agriculture land, Settlement
610+700	611+870	1170	Settlement
611+870	617+730	5860	Community Forest
617+730	617+900	170	Settlement
611+900	618+000	6100	Agriculture Land
618+000	621+200	3200	Settlement
621+200	621+600	400	Agriculture Land
621+600	621+860	260	Community Forest
622+120	626+840	4720	Settlement
626+840	626+970	130	Agriculture Land
626+970	627+100	130	Community Forest
627+200	635+200	8000	Community Forest

Chainage		Length (m)	Land use Type
From	To		
635+200	636+420	1220	Settlement
636+420	637+000	580	Agriculture Land
637+000	637+720	720	Agriculture Land
637+720	639+000	1280	Community Forest
639+000	639+050	50	Settlement
639+050	639+700	650	Community Forest, Barren Land

Source: Field Survey 2021

4.2.3 Climate

The road lies in a tropical and sub-tropical climate with humid and hot characteristics. In general, the rainy season starts in June and ends in September. About 80% of the rainfall occurs in this season. In the dry season, the Northwest wind brings dry and cold wind bearing little moisture and accounts for the remaining 20% of the annual rainfall.

- Winter – November – Feb
- Spring – March to May
- Summer – June – August
- Autumn –September - November

Temperature

Based on the temperature data of Kapilbastu (Taulihawa) and Rupandehi (Bhairahawa Airport) from 2007-2016. The average minimum temperature of Kapilbastu is 18.79^{0}C and the maximum temperature is 30.93^{0}C. The average minimum temperature of Rupandehi is 19.04^{0}C and the average maximum temperature is 31.08^{0}C.

Table 4-3: Table showing Average Minimum and Maximum Temperature of

SN	Districts	Station Name	Station No.	Average Min Temperature	Average Max Temperature
1	Rupandehi	Bhairahawa Airport	705	19.04	31.08
2	Kapilbastu	Taulihawa	716	18.79	30.93

Rainfall

The average annual rainfall in Rupandehi and Kapilbastu District is2501mm, 1622 mm, respectively. There is high rainfall in July and gradually decreases from August to October.

Table 4-4: *Rainfall Stations in the Project Area*

Station name	Road Section	Index No.	Record Length, years	Rainfalls, mm	
				Annual	Monsoon
Butwal	0+000 to 25+563	0703	59	2501	2209

Station name	Road Section	Index No.	Record Length, years	Rainfalls, mm	
				Annual	Monsoon
Taulihawa	25+563to 50+000	0716	45	1622	1411

4.2.4 Hydrology

All major rivers in the project area are characterized by large floods with heavy suspended loads during the monsoon from June to September. Most of the major rivers in the project area are perennial. However, some rivers have low flows during the dry period. The project alignment starts from the banks of the Tinau River.

The meandering nature of many rivers signifies the unstable banks, hence river bank erosion and scouring are eminent in most rivers. The banks are not defined in most cases. Moreover, the high groundwater table and the flat terrain exacerbate the situation during flooding. The surrounding areas of these rivers are prone to flood every year.

A list of major rivers and rivulets (*Kholas* and *Kholsies*) crossed by the road alignment is presented in **Table 4-5**. Banganga River is a major river in the project. It is characterized by large floods with heavy suspended loads from June to September during the monsoon. Some small rivers and streams that originated from Siwalik Hills are prone to flash floods during the monsoon but have no flows during the rest of the time. Figure 4.5 shows the catchment area of the rivers crossed by the BG road.

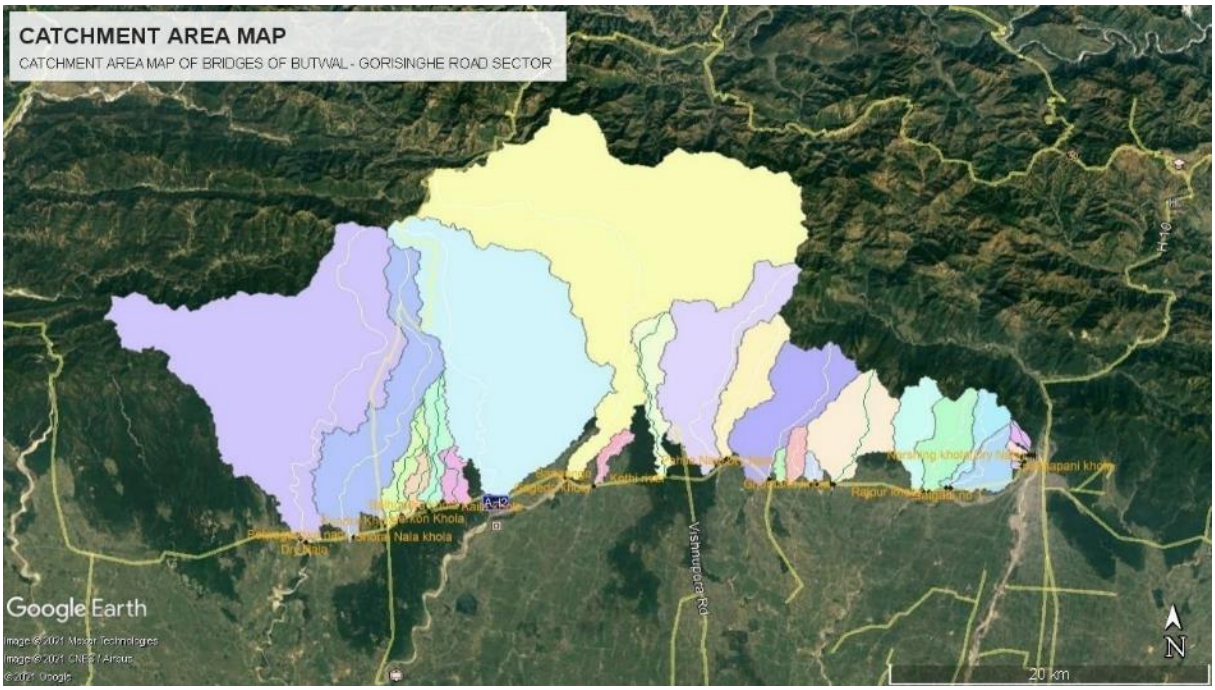


Figure 4.5: Catchment area of the Rivers crossed by Butwal-Gorusinghe Road

Table 4-5: List of Rivers along the BG Road

SN	Name of River	Existing Type of Bridge Over the River	Length of Existing Bridge (m)
1	Sub way	RCC slab	6.70
2	Jitgadi Khola	RCC Girder	21.30

SN	Name of River	Existing Type of Bridge Over the River	Length of Existing Bridge (m)
3	Narshing khola(Dry Nala)	RCC Girder	16.30
4	Dry Nala	RCC Girder	7.24
5	Dry Nala	RCC slab	8.30
6	Pakhapani	RCC slab	9.60
7	Satgadi no 1	RCC slab	64.29
8	Satgadi no 2	RCC slab	28.60
9	Soila river	RCC slab	13.14
10	Rajpur khola	RCC slab	26.35
11	Bamaha khola	RCC slab	32.36
12	Ghamaha khola	RCC slab	50.60
13	Tulbuliya	RCC slab	42.90
14	Marthirwa khola	RCC slab	16.35
15	Meghawa khola	RCC slab	21.20
16	Inguria nadi	RCC slab	51.10
17	Banarhwa Nadi	RCC slab	39.60
18	Dry Nala	RCC slab	11.20
19	Pahila Nadi	RCC slab	46.20
20	Dry Nala	RCC slab	10.62
21	Kanchan	RCC slab	63.84
22	Kothi river	RCC slab	43.00
23	Gageda khola	RCC slab	8.60
24	Banganga	RCC slab	289.68
25	Kaila khola	RCC slab	93.60
26	Balhundra khola	RCC slab	20.95
27	Harkon Khola	RCC slab	20.90
28	Dry Nala	RCC slab	21.45
29	Kundra Khola	RCC slab	29.00
30	Ghorai Nala khola	RCC slab	21.50
31	Dry Nala	RCC slab	13.15

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

Flood Estimation for Drainage Structures

Bridges will be designed taking 100 years return period. DoR (2017) estimated the design flood discharge passing through the existing bridges using rational formula and were compared with flood discharge estimated using several empirical methods **Table 4-6.**

Cross drains will be designed for 50 years return period flood (DoR, 2017). Based on the estimation of discharges, the feasibility study pointed out the necessity of new crossing structures along with replacing existing culverts that are inadequate to pass design discharge. DoR (2017) also found that the existing side drains are more or less adequate for a flood of 25 years return period but might be increased for an increased return period of flood.

Table 4-6: Estimation of Design Floods for Rivers of Butwal Gorusinghe Road Section

Name of River/Stream	A, km^2	100 Year Design Flood (Q_{100}), m^3/s				
		DHM 2004	MHSP 1997	Tinau HSC	PCJ 1996	Final
SUB_WAY						
JITGADI_KHOLA	1.87	32.5	34	18	50.5	50.5
NARSHING_DRY_NALA	0.73	16.5	17.1	7	24.6	24.6
DRY_NALA	0.36	9.9	10.2	3.5	15.4	15.4
DRY_NALA	0.18	6	6.2	1.7	8.5	8.5
PAKHAPANI	0.12	4.5	4.6	1.2	5.9	5.9
SATGADI_NO_1	8.11	93.4	99.2	77.9	140.9	140.9
SATGADI_NO_2	6.97	83.8	88.8	67	130.1	130.1
RAJPUR_KHOLA	14	138.4	147.7	134.5	203.7	203.7
BAMAHA_KHOLA	12.5	127.6	136	120.1	185.4	185.4
GHAMAHA_KHOLA	16.3	154.4	165.1	156.6	231.2	231.2
TULBULIYA	8.71	98.4	104.5	83.7	145.5	145.5
MARTHIRWA_KHOLA	1.31	25.1	26.2	12.6	36.9	36.9
MEGHAWA_KHOLA	0.99	20.6	21.4	9.5	28.7	28.7
INGURIA_NADI	24.5	207.1	222.3	235.4	320.4	320.4
BANARHWA_NADI	8.87	99.6	105.9	85.2	146.6	146.6
PAHILA_NADI	16.8	157.8	168.8	161.4	237.2	237.2
DRY_NALA	1.4	26.4	27.5	13.5	39.2	39.2
KANCHAN	47	331	357.7	451.6	522.2	522.2
KOTHI_RIVER	12.9	130.5	139.2	123.9	190.3	190.3
GAGEDA_KHOLA	1.42	26.6	27.8	13.6	39.7	39.7
BANGANGA	198	932.3	1021.9	1902.3	1505	1902.3
KAILA_KHOLA	133	700.1	764.3	1277.8	1072	1277.8
BALHUNDRA_KHOLA	4.86	64.6	68.2	46.7	102.1	102.1
HARKON_KHOLA	7.84	91.2	96.8	75.3	138.6	138.6
DRY_NALA	3.91	55.3	58.2	37.6	88.1	88.1
KUNDRA_KHOLA	42.1	305.8	330	404.5	482.5	482.5
GHORAI_NALA_KHOLA	22.8	196.6	210.9	219.1	303.4	303.4
DRY_NALA	0.12	4.5	4.6	1.2	5.9	5.9

Note: DHM= Department of Hydrology and Meteorology, A=Area, km2= Square Kilometer

Groundwater

The project area lies in the Terai region. This area has abundant groundwater resources and has fertile soil. Groundwater is the primary source of drinking water supply and irrigation. The aquifers are mainly recharged by rainwater and perennial streams like Tinau River, Badganga River and their seasonal tributaries. The foothills of Siwaliks, which consist of course materials and thick vegetation (Bhabar Zone) also act as a major recharge zone. The seasonal range of depth to the water table in the Terai varies from 0 to 10m.

4.2.5 Geology

The general geomorphic profile of Nepal is shown in Figure 4.6. The Mahabharat range, on the northern side, consists of high mountains. The Chure Range or Siwalik hills are small hill ranges on the southern side of the Mahabharat range. Terai is an approximately 20 m wide flat region, filled with the sediements of the Gangetic plain, located on the south side of the Siwalik hills. The East-West Highway mainly passes through the Terai region. The initial section of BG road falls within foothills of Siwalik (From 589+700 to 591+400), and the remaining section in Upper Terai and Middle Terai (**Fig. 4-6**). The Upper Terai is covered by clay and sands, but superficially, the zone is covered by a thin layer of residual soil.

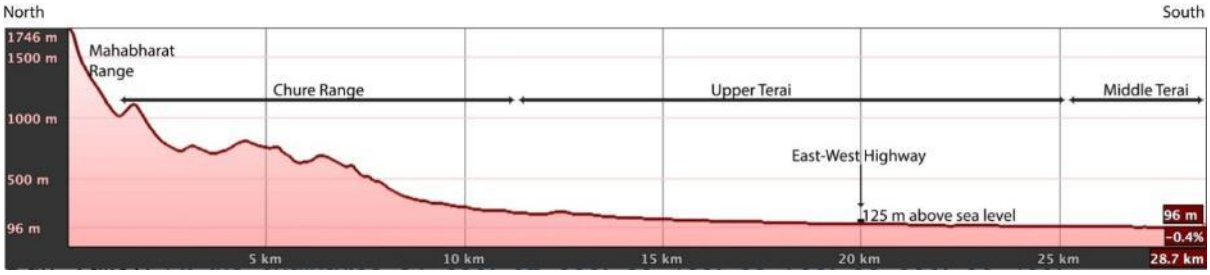


Figure 4.6: *General north-south topographical profile across the East-West Highway, which shows the various geomorphic zones*

Between Butwal to Basgadi

From Butwal to Basgadi is covered by cultivated land and forest. This section falls in the Upper Terai zone. On the surface, the alignment composed of residual soil and thickness of the residual as topsoil is considered as less than 10 m then thick boulder bed with cobble and sands of the Upper Terai zone can be found. Landslide, gully erosion and old slide scarp are observed from Chainage 590+000 to 591+000.

Between Basgadi and Pipara

Between Basgadi and Pipara, this section belongs partly in the Upper Terai zone and partly in the sediments of the Middle Terai zone. The Middle Terai zone is composed of sands and silt as well as clay somewhere thick boulder beds can be met. This area is more stable.

Between Pipara to Gorusinghe

From Pipara to Gorusinghe, the area is covered by also the Middle Terai zone and is composed of thick beds of sands and clays. But on the surface, thick beds of topsoil have covered the loose sediments of the Middle Terai zone. The area is covered by cultivated land and settlement and forest. This area is also more stable.

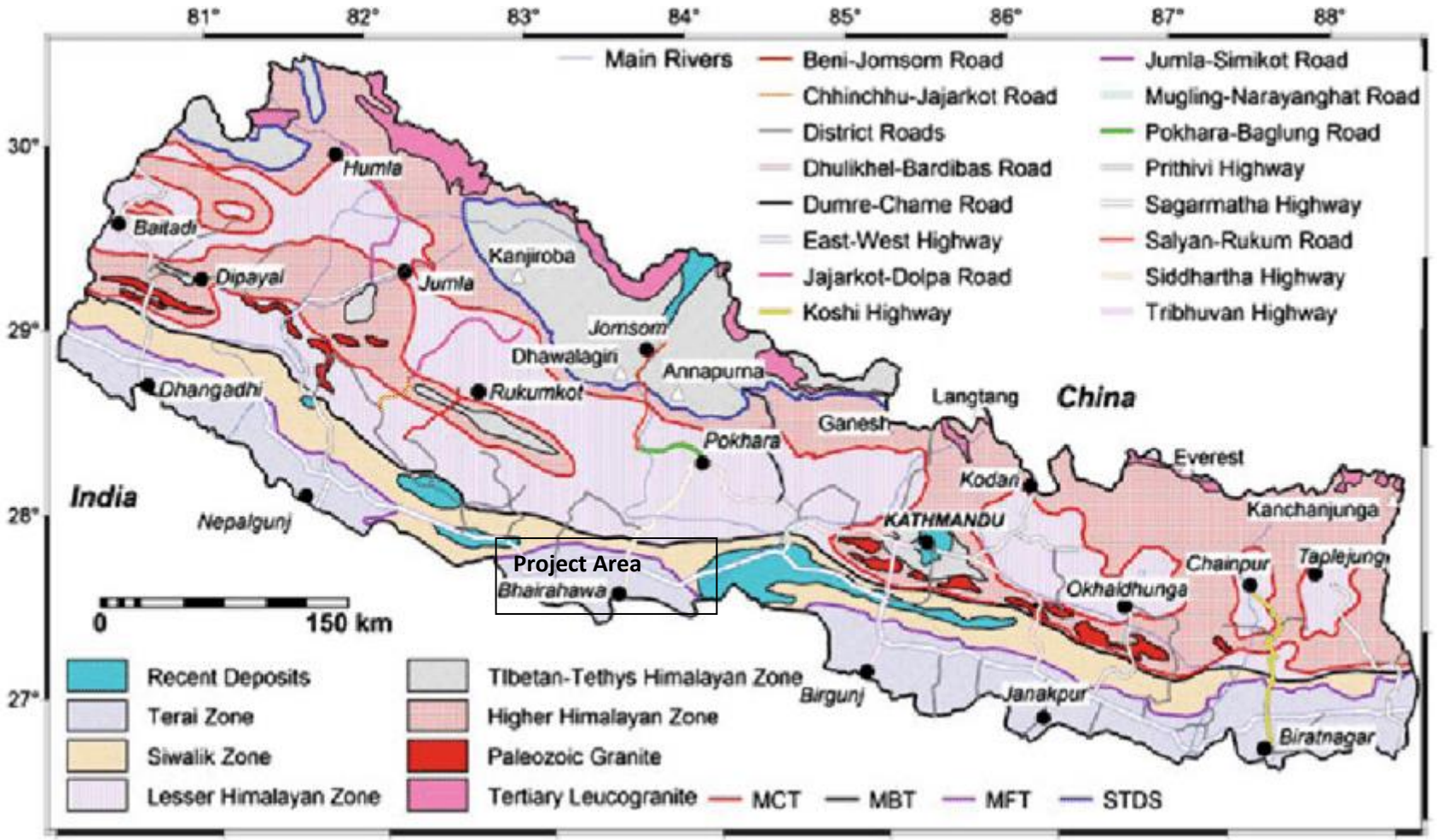


Figure 4.7: Geological Map of Nepal

The geological characteristics of the proposed bridge sites along the road corridor from Butwal to Gorusinghe are described in **Table 4-7.**

Table 4-7: Geological characteristics of major bridge sites of the BG Road

Chainage	Name of Bridge/River	Geological and geomorphological characteristics
595+450	Satgadi no 1	Depth to bedrock/Soil at foundation and abutment: • sediment cover – BoulderMixed Soil (Gravel) • rock at depth- No • river flow direction- flow from north to south • Straight River
603+000	Ghamaha River	Depth to bed rock/Soil at foundation and abutment: • sediment cover – BoulderMixed Soil (Gravel) • rock at depth- No • river flow direction - flow from north to south • Riparian around the channel
610+425	Pahila River	Depth to Soil/bedrock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • rock at depth – No • Small Gully • Fluvial deposits
610+510	Dry Nala	Depth to Soil/bedrock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • rock at depth – No • Small Gully • Fluvial Deposits
610+820	Kanchan River	Depth to bedrock/Soil at foundation and abutment: • sediment cover – BoulderMixed Soil (Sand and Gravel)
614+685	Kothi River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • Narrow River • rock at depth – No • river flow direction- north to South flow • Forest area
619+440	Gageda River	Depth to Soil/bedrock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • Meandering River • rock at depth – No • river flow direction- north to south flow • Fluvial sediments
621+420	Banganga River	Depth to bed rock/Soil at foundation and abutment: • sediment cover – BoulderMixed Soil (Sand and Gravel)
626+600	Kaila khola River	Depth to bed rock/Soil at foundation and abutment: • sediment cover – BoulderMixed Soil (Sand and Gravel)

Chainage	Name of Bridge/River	Geological and geomorphological characteristics
628+885	Balhundra River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • rock at depth – No • river flow direction- north to south flow • Forest area
631+000	Harkon River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • rock at depth – No • river flow direction- North to South flow • Straight river near the bridge site area • Narrow River channel
633+800	Dry Nala	Depth to Soil/bed rock at foundation and abutment: • sediment cover – BoulderMixed Soil (Sand) • rock at depth- No • river flow(Small Gully) direction- flow from North to south
633+200	Kundra River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – BoulderMixed Soil (Sand and Gravel) • rock at depth- No • river flow direction- flow from north to south • Meandering river
636+218	Ghorai River	Depth to Soil/bed rock at foundation and abutment: • Sediment cover – BoulderMixed Soil (Sand and Gravel) • rock at depth- No • Small Gully
639+310	Dry Nala	Depth to Soil/bed rock at foundation and abutment: • sediment cover – BoulderMixed Soil (Sand and Gravel) • rock at depth- No • Small Gully

Source: Feasibility Report of BG 2020

Seismicity

Nepal is located in one of the most active seismic zones of the earth. This is because Nepal lies in the collision zone between the Indian Plate and the Eurasian Plate. The Indian plate is continuously moving at a rate of approximately 20mm per year and pushing the Eurasian plate resulting in devastating earthquakes in this region time and again. In the last century alone, Nepal experienced some catastrophic damages due to the earthquakes of 1934, 1980, 1988, and 2015.

Seismic records have revealed that western Nepal has not experienced as many earthquakes as expected and is in a state of seismic gap. This situation is interpreted as this area is waiting for a big earthquake anytime in the future. For the construction of big infrastructures, specific standards had not been developed in Nepal to counter the seismic tremor. However, the national building code published by the Government of Nepal can be used as general guidelines. Based on the building code and some other literature (Figure 4.8), The Peak Gravitational Acceleration (PGA) value in the project area range from 0.095 to 0.115g.

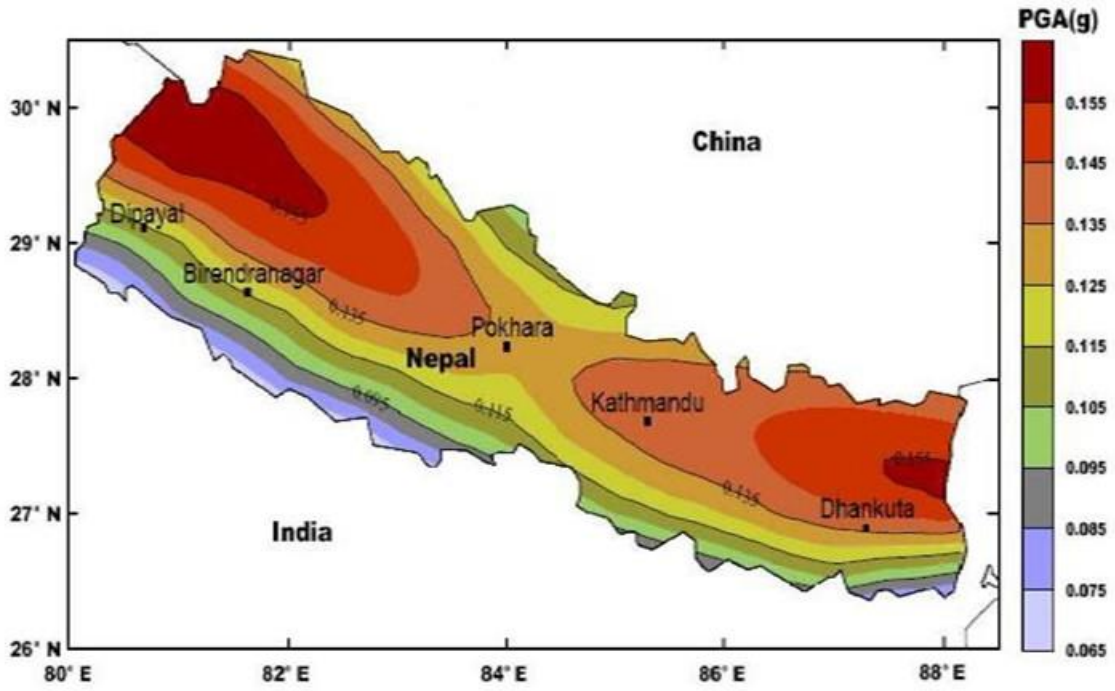


Figure 4.8: Peak Ground Acceleration Map of Nepal

Landslide and Slope Stability

Slope stability depends on the existing geological structures, lithology of the rock units, soil type, topography, and hydrological condition (active seepage and spring). Failures have occurred in the colluvial deposits after the Tinau River, specifically along the first 1 km stretch of the BG road. Furthermore, embankment erosion has been occurred due to floods in the project area. The Badganga basin frequently suffers from flash floods as the catchment response to high intensity and short duration precipitation is swift, leading to flooding and water-logging downstream. In addition, there have been numerous instances where heavy rainfall in the downstream areas has led to water logging. Landslide, gully erosion and old slide scarp can be seen from Ch 590+000 to 591+000. Mainly Ch 590+550-990+600-590+700,590+800, 591+000 is found active landslides, and gully erosion. The locations of potential landslides are indicated in the landslide hazard map (**Figure 4.9**).

Riverbank erosions were observed at chinages Km 610+100, KM 611+000, Km 621+420, and KM 640+200.

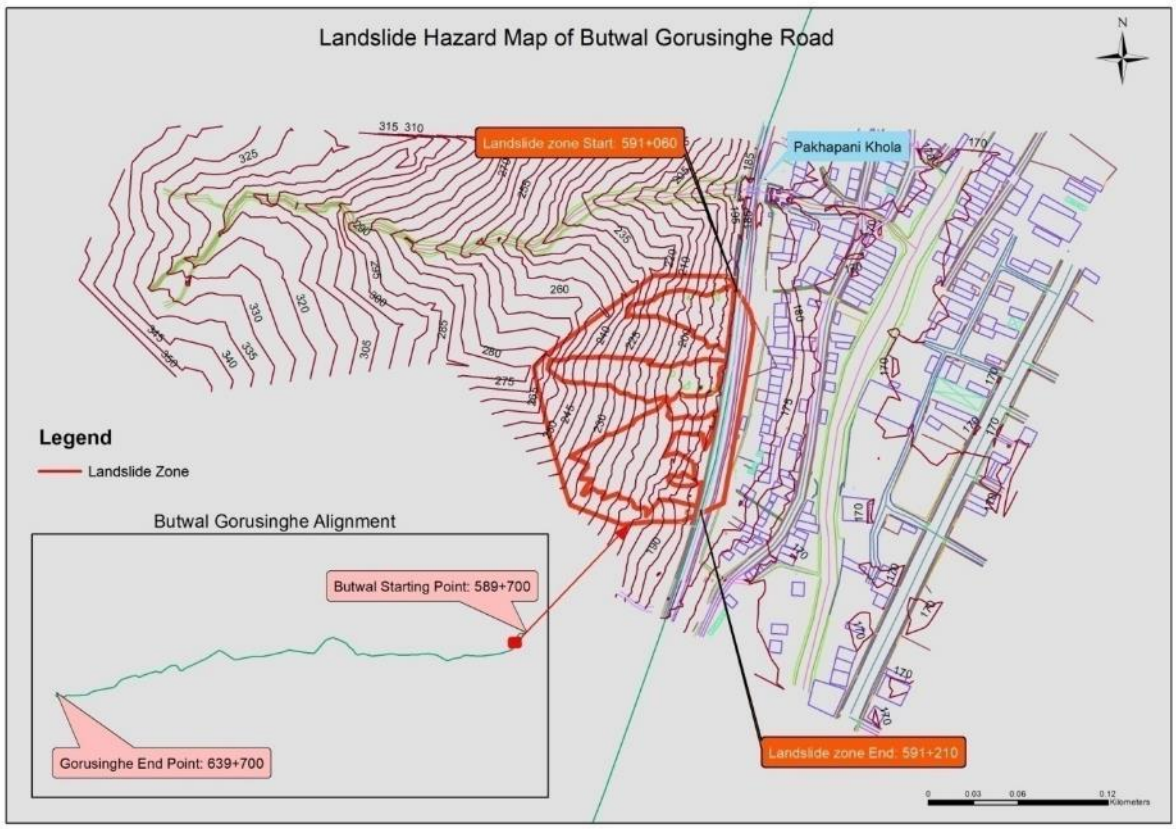


Figure 4.9: Landslide and unstable slopes along BG road Section

4.2.6 Sources of Construction Material

The construction material will be sourced from the existing quarry and brrow sites and potential locations of these sites are given in Table 2.9. These sources are mainly rivers that carry huge sediment loads during the monsoon and dry during the remaining seasons or with limited flows in narrow channels. The sediments, such as sand, gravels, cobbles and boulders, deposited in the river beds are commercially extracted with necessary government approvals. The annual availability of the materials at these sources is estimated to be 2.7 million $m^{3,}$ and the proposed construction works will require about 0.4 million m^3 of these materials. The baseline environmental conditions of these sites are given Table 4.8. .

Table 4-8: *Identified Sources of Locally Available Materials*

S.n.	Name of the Source	Location	Available Materials	Baseline	Access to BG Road
1	Belgurduwa Nadi	5 Km away from Chainage 639+600 End Point (Gorusinghe)	Sand and Silt	Currently in use by licensed perators	5 Km gravel road from end chainage
2	Banganga Khola	At chainage 622+00 and 5 km away from the road alignment	Boulders, Cobbles, Gravels and Sand	Currently in use by licensed perators	2 km black topped road and 3 km earthen road

S.n.	Name of the Source	Location	Available Materials	Baseline	Access to BG Road
3	Goghwa Khola	About 12 km away from chainage 640+100	Boulders, Cobbles, Gravels and Sand	Currently in use by licensed perators	About 7 km black topped road and 5 km earthen road
4	Jhingwa Khola	About 13 km away from chainage 640+100	Boulders, Cobbles, Gravels and Sand	Currently in use by licensed perators	About 7 km black topped road and 5 km earthen road
5	Danav Khola	At chainage 598+400 and 5 km away from the road alignment	Boulders, Cobbles, Gravels and Sand	Currently in use by licensed perators	About 5 km earthen road
6	Kanchan Khola	At chainage 611+400 and 5 km away from the road alignment at Saljhandi	Boulders, Cobbles, Gravels and Sand	Currently in use by licensed perators	About 5 km earthen road
7	Tinau Khola	10 Km away from Chainage 589+600 Start Point (Butwal)	Boulders, Cobbles, Gravels and Sand	Currently in use by licensed perators	About 5 km black topped road and 5 km earthen road
8	Rohini Khola	12 Km away from Chainage 589+600 Start Point (Butwal)	Boulders, Cobbles, Gravels and Sand	Currently in use by licensed perators	About 7 km black topped road and 5 km earthen road

4.3 Chemical Environment

4.3.1 Air Quality

The main sources of air pollution in the project area were windblown dust either from agricultural land or from the highway, moving vehicles, fuelwood for cooking.

The air quality monitoring was carried out in 9 locations. The nine locations along the alignment were selected to represent the typical land use conditions such as highly crowded areas and sensitive receptors (Hospital, School, etc.), settlements, forest areas and rural areas.

The air quality parameters that were measured during the monitoring were: Total Suspended Particles (TSP), Respirable Particulate Matter (PM_{10}), Respirable Fine Particles ($PM_{2.5}$), Nitrogen Oxides (NOx) and Sulphur Di Oxide (SO2)..

Table 4-9: Detail Information about Stations

Air and Noise Quality Measurement Station	Location	Coordinate	Remarks
STA01	Butwal (Starting Point)	27°42'15.31"N, 83°27'27.32"E	Residential Area and Settlement
STA02	Ramdevi college	83°24' 02.33"E, 83°24' 02.33"E	School/college Area
STA03	Murgiya Chowk	27°41'15.57"N, 83°20'24.35"E	Settlement
STA04	Saljhandi	27°42'08.65"N, 8°15'53.77"E	Residential Area and Settlement

Air and Noise Quality Measurement Station	Location	Coordinate	Remarks
STA05	Pipra (Forest Area)	27°41'37.40"N, 83°13'35.55"E	Forest Area
STA06	Jitpur	27°41'12.55"N, 83°10'44.25"E	Settlement
STA07	Forest Area	27° 40'37.69"N, 83° 06'7.80"E	Forest Area
STA08	Gorusinghe Bazar	27°39'42.36"N, 83°02'20.77"E	Commercial Area
STA09	Dry Nala (End Point)	27°39'21.25"N, 82°59'56.50"E	End Point

Field survey, December, 2021

Air quality data has been collected for PM_{10},$PM_{2.5}$.and TSP, (NOX, SO2, Lead, Benzene & CO.

The data has been presented in Table 4.10. Figure 4-10 shows the average 24-h average concentration recorded for particulate matter. The measurement result shows that the $PM_{2.5}$ exceeds the NAAQS limits (40 µg/m^3) and WHO Air Quality Guideline, 2005 in the monitoring stations except near forest area (STA07). However, the particulate matter concentrations were recorded unusual in all the monitoring stations due to the high number of vehicular movements and open burning activities nearby. Thus, the higher concentration of PM2.5, PM 10 and TSP was recorded in STA04 (Saljhandi) 167.82 µg/m3, 244.73 µg/m3 and 312.55 µg/m3 and followed by STA06 (Jitpur) due to degraded road condition, higher vehicular movement and burning activities nearby the monitoring sites. The minimum was recorded in Station 07 (Forest Area).

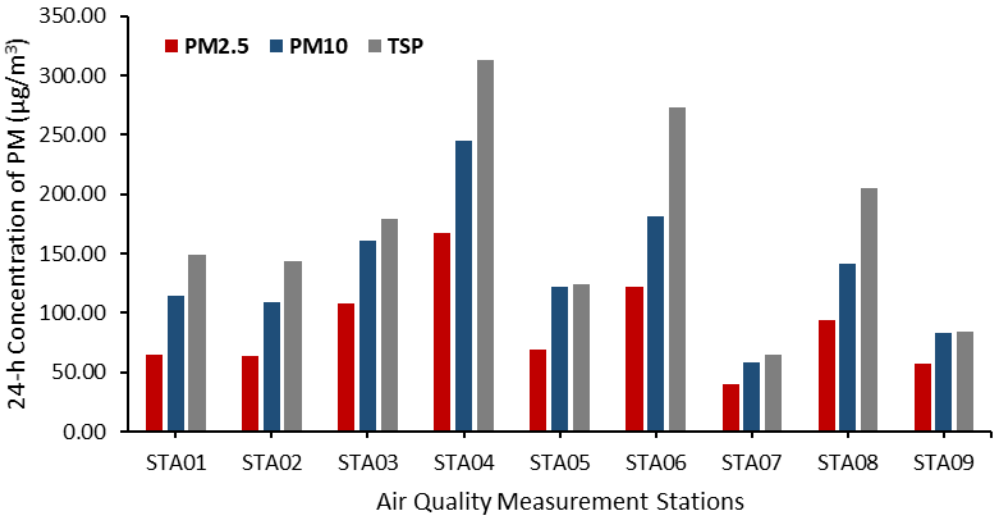


Figure 4.10: 24-h average concentration of particulate matter ($PM_{2.5}$, $PM_{10}$and TSP)

Table 4-10: Air Quality Data in the Subproject Area

Station	Average 24-h Concentration (µg/m^3)

	PM2.5 (µg/m3)	PM10 (µg/m3)	TSP (µg/m3)	NO_X	SO_2
STA01	64.68	114.55	149.23	156.65	51.70
STA02	63.72	109.41	143.13	124.90	41.03
STA03	108.36	160.98	179.35	107.81	53.52
STA04	167.82	244.73	312.55	43.90	124.79
STA05	69.46	122.31	123.77	80.38	59.33
STA06	122.28	180.88	273.16	56.31	59.80
STA07	40.16	58.85	65.3	33.24	23.84
STA08	93.97	141.34	205.31	82.64	136.26
STA09	57	83.13	84.7	58.24	58.58
NAAQS, 2012	<120	<40	<230	80	70
WHO, 2021	50	25	<150	20	40

4.3.2 Noise Level

The major sources of noise pollution in the subproject area are traffic and other commercial activities in the road alignment. The noise level in the subproject area has been measured at 9 stations. The noise levels were measured at the same location where air quality has been measured. The average 24 hours noise level varies from 30 dB(A) to 129 dB(A). The maximum noise level was recorded in Station 01(Butwal) and a minimum in Station 07(Forest Area) during the daytime. The noise levels generally exceed the residential area standards but fall within the commercial area standards except near the Butwal city (Station 1). . The noise data (day time and night time) during the measurement period are give in Table 4-11.

Table 4-11: Noise Levels along the Road

S. N	Code of Station	Noise Level dB(A)					
		Day Time			Night Time		
		Min	Average	Max	Min	Average	Max
1	STN01	49.30	70.85	129.10	39.50	69.24	98.50
2	STN02	41.00	57.84	102.20	32.80	50.59	99.90
3	STN03	47.50	65.65	102.80	30.30	50.65	98.10
4	STN04	41.00	65.20	123.50	29.90	50.93	107.00
5	STN05	42.90	67.36	114.70	-	-	-
6	STN06	32.00	58.20	103.30	44.90	66.51	99.50
7	STN07	30.10	58.37	123.90	-	-	-
8	STN08	44.00	65.41	110.10	36.80	54.56	102.20
9	STN09	33.00	60.90	127.40	32.60	54.81	103.80

Note: Considering Day time from (7 am to 8 pm) and Night time (from 9 pm to 6 am).

Table 4-12: National Ambient Sound Quality Standard, 2012 and (WHO), 1999

S.N.	Description	NASQS limit (dBA)		WHO limit (dBA)	
		Day	Day	Night	Night
1.	Commercial	75	70	70	70
2.	Residential	65	55	55	45

4.3.3 Water Quality

Groundwater Quality

Groundwater is the primary source of drinking water in the subproject area. The water quality of three wells was analyzed at Badara, Buddhabhumi-and Tamnagar. The samples at Badara and Buddhbhumi were directly collected from the tubewells and the sample at Tamnagar (was collected from a water supply tap. The results are given in Table 4.13. All the parameters are within the permissible standards of national drinking water quality standarads NDWQS, except for Iron level of Badara, Buddhabhumi-2.

Table 4-13: Drinking Water Quality along the Road

S. N.	Parameters	Location and Values			NDWQS, Nepal
		Tamnagar, Butwal-12	Bansgadhi Sainamaina -8	Badara, Buddhabhumi-2	
1.	pH at 17^{o}C	7.7	7.9	7.6	6.5 - 8.5
2.	Electrical Conductivity, (μS/cm)	550	605	550	1500
3.	Turbidity, (NTU)	<1	<1	3	5
4.	Total Hardness as $CaCO_3$, (mg/L)	294	352	282	500
5.	Total Alkalinity as $CaCO_3$, (mg/L)	283	363	297	-
6.	Chloride, (mg/L)	3.96	<0.5	1.98	250
7.	Ammonia, (mg/L)	N. D. (<0.05)	N. D. (<0.05)	<0.05	1.5
8.	Nitrate, (mg/L)	7.08	0.81	0.44	50
9.	Calcium, (mg/L)	84.97	91.38	90.58	200
10	Magnesium, (mg/L)	19.93	30.14	13.61	-
11	Iron, (mg/L)	N. D. (<0.05)	0.07	**1.14**	0.3
12	*E. coli* Count, (MPN Index /100mL)	Nil	Nil	Nil	Nil

Surface Water Quality

Water quality sampling and analysis were carried out from 10 rivers that cross the BG Road. The analyzed parameters and results are given in Table -4-14. There are 8 water quality guidelines in Nepal, covering various aspects and goals of water standards for different categories of water use.

Table 4-14: Water quality of rivers along the road

Parameters	Name of River									
	Banganga	Kaila	Kanchan	Tinau	Tulbuliya	Ghamaha	Pahila	Banarahawa	Kothi	Bamaha
pH @ 15°C	8.4	8.1	8	8.5	8.2	8.3	8.1	8.1	7.7	8.2
Conductivity, (µS/cm)	346	483	414	321	449	458	410	601	700	480
Turbidity, (NTU)	1	2	1	2	2	1	<1	3	1	1
TDS, (mg/L)	231	320	276	213	298	304	273	400	465	320
TSS, (mg/L)	<1	3	7	3	2	2	2	5	<1	1
Total Hardness, (mg/L)	231	320	276	213	210	232	220	322	462	248
Ca, (mg/L)	44.09	80.96	71.34	40.08	57.71	66.53	68.94	90.58	128.25	75.35
Mg, (mg/L)	12.15	20.42	13.61	17.5	16.04	16.04	11.67	23.33	34.51	14.58
Total Alkalinity as $CaCO_3$, (mg/L)	160	286	234	172	236	236	217	326	444	253
Nitrate, (mg/L)	0.96	0.44	1.25	1.11	0.81	1.7	0.74	0.07	0.07	0.81
Sulphate, (mg/L)	<1	2.47	2.47	9.06	<1	<1	<1	<1	2.47	<1
Chloride, (mg/L)	<0.5	0.5	1	0.5	3.47	5.94	<0.5	3.96	<0.5	2.48
BOD, (mg/L)	<1	2	2	3	<1	<1	<1	2	<1	1
COD, (mg/L)	1	7	9	10	2	3	2	9	3	6
Total Phosphorous as PO_4-P, (mg/L)	N. D. (<0.01)	N. D. (<0.01)	N. D. (<0.01)	N. D. (<0.01)	0.08	0.04	0.08	0.08	0.04	N. D. (<0.05)
Fe, (mg/L)	N. D. (<0.05)	0.13	N. D. (<0.05)	N. D. (<0.05)	0.13	0.08	<0.05	0.63	<0.05	0.34
Mn, (mg/L)	<0.02	0.03	<0.02	<0.02	0.02	0.03	0.02	0.23	0.04	0.07
Pb, (mg/L)	0.01	0.02	0.01	<0.01	0.01	0.01	0.02	0.02	0.03	0.02
Cu, (mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn, (mg/L)	N. D. (<0.01)	<0.01	N. D. (<0.01)	<0.01	<0.01	<0.01	<0.01	<0.01	N. D. (<0.01)	0.02

4.3.4 Sanitation Infrastructure

Roadside markets, small shops, groceries, restaurants, and teashops are the main source of wastealong the roadside. The major percentage of waste generated from the roadside market and hotels are organic wastes such as waste food materials, fruits and vegetables, wood pieces, etc. whereas the remaining percentage of waste are plastics, pet bottles, beer/whisky glass bottles, tin cans, broken pieces of glasses, rubber, iron pieces etc. The current practice of waste management observed in the project area is that organic waste is managed locally by composint. Non- biodegradable wastes are collected by municipalities and are disposed of in dedicated locations. At some places, it was noticed that the waste is

thrown along the roadside and into the rivers. All municipalities and rural municipalities allocate budget for collection and the management of solid waste. There is no centralized sewerage collection and treatment system in the project area. Generally, all households have individual toilets with septic tanks.

4.4 Biological Environment

4.4.1 General ecosystem and biodiversity – Terai Lanscape

Nepal is a mountainous country with mountain ridges and deep valleys, supporting a wide range of floral and faunal habitats. Nepalese wetlands have high ecological value, as they provide habitat for many threatened and endemic species of flora and fauna, and serve as resting places for many migratory and globally threatened birds. Fishes, amphibians and reptiles are no exception. These diversities face a severe threat to a level of extinction due to anthropogenic development, associated with soil and water pollution, deforestation, habitat loss, unsustainable extraction, etc. Nepal has accelerating activities such as construction of dams for hydropower and irrigation, road and other linear infrastructure development, in addition to recent population growth, climate change, land use changes have direct impact on the ecology of these Himalayan mountains and snow caps. Among many of the human activities, building roads is a significant activity in process in Nepal. Roads travel through the Forests and Farmland, grassland and wetlands, etc. Major impacts of road construction/upgradation on ecosystems include loss, degradation, and fragmentation of ecosystems due to construction, road kills, injuries and casualties of wildlife, wildlife – vehicle collisions, among others.

The East-West Highway is largely located in the Terai Arc Landscape (TAL). The TAL extends for over 900 km from the Bagmati River, Nepal in the east to the Yamuna River in Uttaranchal, India in the west, with an area of 51,002 km² (approx. 16% of Nepal). The TAL was created to better protect species such as tiger, rhino and elephant that cannot be effectively conserved within protected areas alone but require a landscape-scale approach. The TAL exists as a transboundary landscape that extends into India. The TAL features in Nepal's National Biodiversity and Strategic Action Plan (NBSAP).

The TAL harbors globally important biodiversity and conserves several of Asia's large mammals, birds, reptiles, and freshwater fishes; sustain environmental flows in important rivers; and provides ecosystem services that support the socio-economic well-being of people and development in the Terai and Churia region of Nepal. The scale of the landscape also allows for ecosystem-based climate change adaptation strategies. Key species for conservation in the TAL are tiger, greater one-horned Rhinoceros, swamp deer, Asian elephant, blackbuck, Gangetic dolphin, gharial, great hornbill, sarus crane, Bengal florican, lesser adjutant stork and several vulture species. The TAL is also densely populated. According to the 2011 census there were more than 7.5 million people in the TAL. The average annual population growth rate is 2.1%.

The BG road section covered under this ESIA is located centrally within the TAL (Figure 4.11) that is within a densely populated part of the TAL. The BG road does not overlap with any protected areas or wildlife corridors and does not fragment any significant natural habitats identified within the TAL.

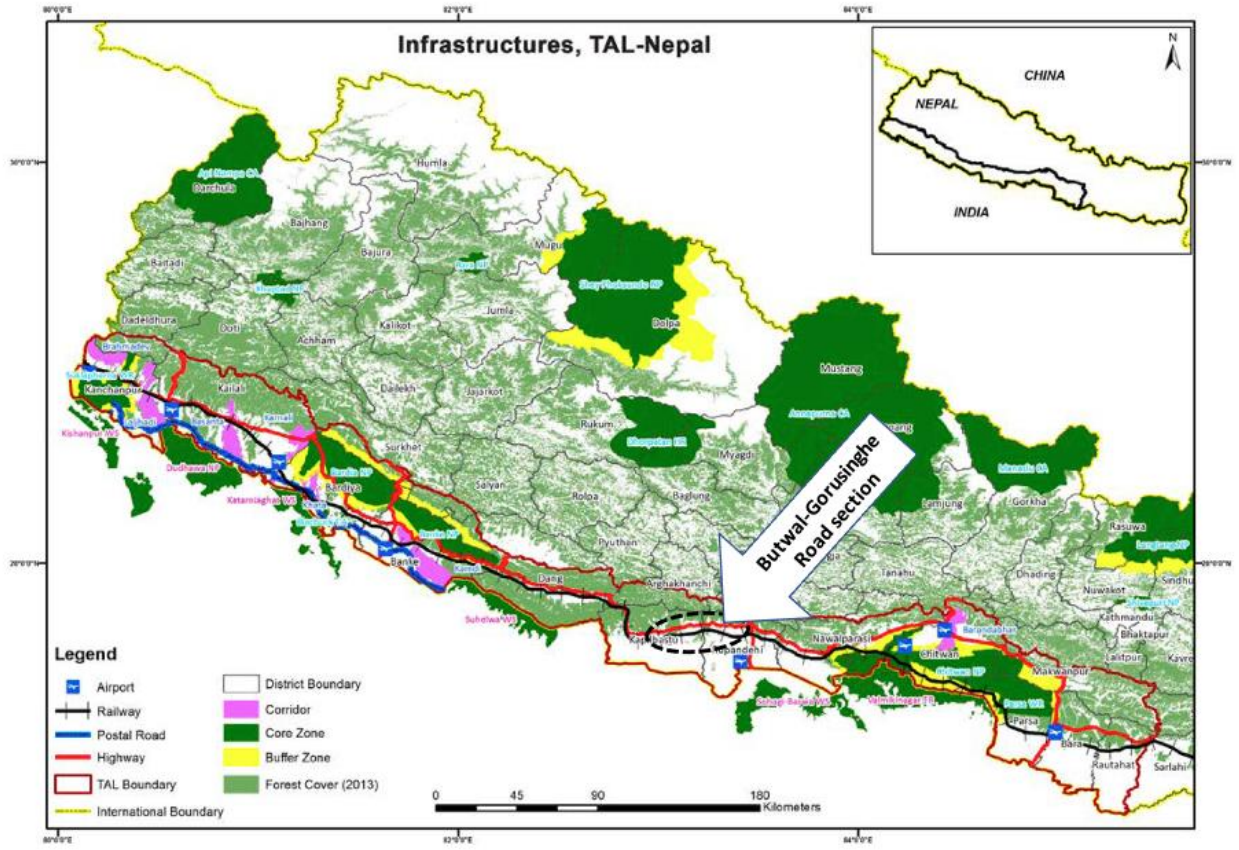


Figure 4.11: *Location of the Project within the Terai Arc Landscape*

The Butwal - Gorusinghe Section largely traverses residential areas, farms, community forests and rivers crossings. The forest areas along the BG road are marked in Figure 4.11. There are two major forest blocks – one is 5.86 km long section from KM 611+870 to KM617+730 (Saljhandi-Pipara Forest block – see box A in Figure 4.12) and the other one is 8.23 km long section from KM 626+970 to KM635+200 (Gorusinghe Forest block – see Box B in Figure 4.12). In addition, there is a small 1.28 km long section from KM 637+720 to KM 639+000 (Badhare/Budhi Forest – see Box C in Figure 4.12). Saljhandi – Pipra forest block is a good Sal (*Shorea robusta*) forest and, Gorusinghe forest blocks is mixed deciduous forest with patchy good Sal forest blocks. Gorusinghe forest block is already degraded compared to Sljhandi-Pipra block of forests along the highway. Wildlife mobility is noted in Saljhundi-Pipar forest block and Gorusinghe forest block. Saljhandi-Pipar and Gorusinghe forest block extend southward from Churia/Siwalik forest with movement of wildlife south-north and vice versa. Badhare/Budhi Forest block is a degraded, scanty, dry and confined in a small area. Saljhandi-Pipara and Gorusinghe forest block extends to north connecting Churia range from where wildlife migrates down south, road side and/or some crossing the road to visit forest blocks south of the road (See Figure 4.12). The highway runs through most of the seasonal rivers except the Tinau River and Banganga River, which had a very limited flow during the dry season, times of field study. Most of the other rivers were dry. Majority of springs/streams/ rivers remain dry most of the time in year besides Tinau River, Baanganga River, Kanchan Khola, Kothi Khola, Kandra Khola, Kaila Khola and Harkur Khola with perennial flow with low flow at the dry season. Prime habitat for the fish species is in Tinau River and Baanganga River (Table 5). The riverine ecosystem in the project site is influenced by human activities; Fishing, extraction of river deposits, laundering and bathing, direct sewage disposal, discarded trash deposits, riverbank encroachment and recreational gathering at the riverbanks (picnic spots).

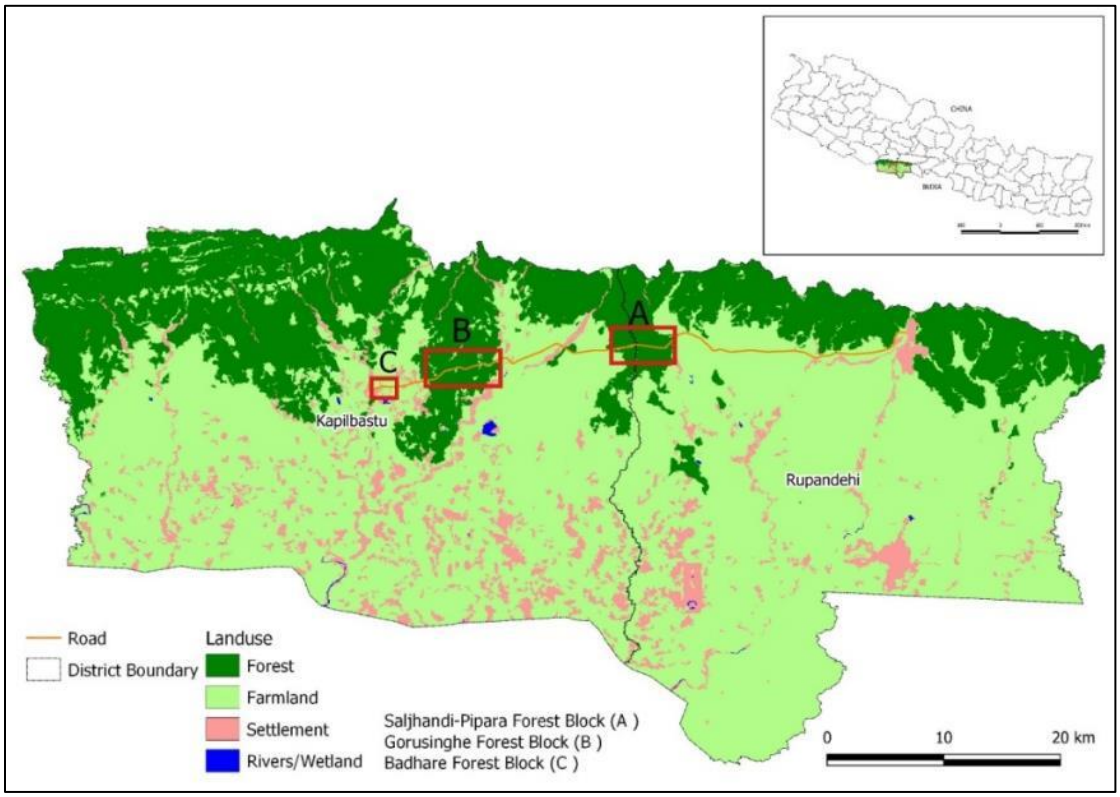


Figure 4.12: Land use map of BG Road

There are 118 identified ecosystems in Nepal, including 112 forest ecosystems, 4 cultivation ecosystems, 1 water body ecosystem, and 1 glacier or rock ecosystem. These ecosystems range from the tall grasslands, marshlands, and tropical and subtropical broadleaf forests along the Terai and Siwalik Hills to the subtropical and tropical broadleaf and conifer forests in the Middle Mountains.

4.4.2 Flora

Different vegetation composition was found on both sides of the road. The road alignment of the project falls in tropical zone with the forest dominated by *Shorea robusta (Sal)* forest and patches of *Dalbergia-Acacia* forest along the riverine sections. *Terminalia sp., Lagerstroemia parviflora, Phyllanthus emblica, Pterocarpus marsupium* has the major associated species of *Shorea robusta* forest. In the *Dalbergia-Acacia* forest, *Dalbergia sissoo, Acacia catechu* and *Bombax ceiba* has the major species. Both native and introduced plant species are found along the road. Native species were mainly found in natural forests where as local people have planted exotic species in their home-yard for different purposes.

Different patches of vegetation composition were found on both sides of the road. The major blocks of forest area distributed from 611+870 to 617+730(5860m) in Rupandehi district. Another major block of forest is from 626+970 to 635+200(8130m) and 637+720 to 639+000 (1280m) in Kapilbastu district. The forest is managed by the Government, community and collaboration forest. Approximately 28.46 ha forest land will be change in to the road. Compare with the district forest area coverage, forest land loss in the RoW is about 0.024%.

Tree Species

A Tree Census Survey (TSE) has been done to count the tree species along the ROW of the road. TSE identified all the tree species and documented. All the tree species were categorically measured at breast height for diameter, height and taken GPS coordinate. Trees were classified on sapling, pole and trees based on diameter breast height (dbh). Tree species with dbh less than 10 cm is categorized as a sapling, from 10 to 30 cm as a pole and above 30 cm as a tree. The distribution of trees along the alignment, both side of the road were counted and recorded in the data sheets. More than 80 tree species were recorded during the survey and the list of these species is given in **Table 4-15.**

Table 4-15: Tree species found in the subproject area

Local Name	Botanical Name		Local Name	Botanical Name
Amala	*Phyllanthus emblica*		Kagati	*Citrus aurantifolia*
Amara	*Unknown*		Kapur	*Cinnamomum camphora*
Amilo	*Citrus maxima*		Katahar	*Artocarpus heterophyllus*
Amrit	*Unknown*		Khair	*Acacia catechu*
Ashoka	*Saraca asoca*		Khaltu	*Unknown*
Asna	*Terminalia tomentosa*		Khaniyo	*Ficus cunia*
Badahar	*Artocarpus lakoocha*		Khirro	*Sapium insigne*
Bajhi	*Anogeisus latifolius*		Kimbu	*Morus alba*
Bakaino	*Meliaaz edaarach*		Kjai	*Unknown*
Bakal lady	*Unknown*		Kumbi	*Careya arborea*
Bamboo bush	*Dendrocalamus sps*		Kusum	*Schleiche raoleosa*
Bar	*Ficus benghalensis*		Kutmero	*Litseamono petala*
Barro	*Terminalia belerica*		Lichi	*Litchi sps*
Batokorukh	*Unknown*		Mango	*Mangifera indica*
Bayer	*Ziziphus zuzuba*		Masala	*Eucalyptus sps*
Bedulo	*Ficus sarmentosa*		Mauwa	*Englehardia spicata*
Bel	*Aeglemar melose*		Neem	*Azadira chtaindica*
Belauti	*Psidium guajava*		Nyaro	*Ficus semecordata*
Bhalayo	*Semecarpus anacordium*		Pipal	*Ficus religiosa*
Bijaysal	*Pterocarpus marsupium*		Pyalophul	*Unknown*
Bodari	*Unknown*		Pyari	*Unknown*
Botdhairo	*Lagerstroemia parviflora*		Rajbrikshya	*Cassia fistula*
Cchhinchini	*Unknown*		Rohini	*Mallotus phillipensis*
Chiku	*Unknown*		Sal	*Shorea robusta*
Chiple	*Unknown*		Sami	*Ficus benjamina*
Chulbule	*Unknown*		Satisal	*Dalbergia latifolia*
Curry leaf	*Messua ferra*		Shrikhanda	*Santalum album*
Dabdabe	*Garuga pinnata*		Sifalikan	*Unknown*
Degar	*Unknown*		Simal	*Bombax ceiba*
Dhamina	*Unknown*		Simalchini	*Unknown*

Local Name	Botanical Name		Local Name	Botanical Name
Dhupi	*Cupressus sps*		Sisso	*Dalbergia sissoo*
Dumri	*Ficus racemosa*		Sitafal	*Annonare ticulata*
Emli	*Tamarix diocia*		Sitalchini	*Unknown*
Gayo	*Bridelia retusa*		Suntala	*Citrus sps*
Ghanteful	*Unknown*		Supari	*Areca catechu*
Gulmohor	*Delonix regia*		Taki	*Bauhinia purpurea*
Hade	*Lenneacoroman delica*		Tatari	*Dillenia pentagyna*
Haldu	*Adina cordifolia*		Teak	*Tectona grandis*
Harro	*Terminalia chebula*		Teju	*Unknown*
Ipilipil	*Leucaena leucocephala*		Tikulikaram	*Unknown*
Jamun	*Syzizium cumini*		Tilka	*Unknown*
Jhilmili	*Unknown*		Tite	*Unknown*
Jhyot	*Unknown*		Tote	*Ficus hispida*
Kadam	*Anthocephalus chinensis*		Vilor	*Trewia nudiflora*

Source: Field Survey 2021

Non-Tree Species (herbs and shrubs)

Details of non-tree species such as herbs and shrubs are given in Table 4.16.

Table 4-16: Non-Tree species found in the subproject area

Herbs		Shrubs	
Scientific Name	**Local Name**	**Scientific Name**	**Local Name**
Acalyphaindica	MuktaBarsiJhar	*Artemissia vulgaris*	TitePati
Achryanthesaspera	Ultachirchiri	*Asparagus racemosus*	Kurilo
Acmella calva	Marethi	*Calotropisgigantea*	Aand
Acorouscalamus	Bojho	*Clerodendrumviscosum*	Bhant
Adiantumcapillus	PakhalleUnyo	*Dendrocalamushamiltoni*	Tama Bans
Ageratum conyzoides	GandheJhar	*Innulacappa*	Payaya
Aloe vera	Ghuikumari	*Justiciaadhatoda*	Asuro
Alternatherasessilis	BhiringeJhar	*Lawsoniainermis*	Mehandi
Amaranthusspinosus	Ban lunde	*Lycopodium clavatum*	Naagbeli
Amaranthus tricolor	Rato lude	*Mimosa pudica*	LajaluJhar
Ananuscosmosus	BhuinKatahar	*Musa paradisica*	Kera
Arisaematortuosum	Baanko	*Nerium oleander*	Karbir
Begonia picta	Makarkanchi	*Osbeckiastellata*	Aangrik
Centellaasiatica	Ghodtapre	*Plumbagozeylanica*	Teete
Chenopodium album	Bethe	*Rauwolfiaserpentina*	Sarpagandha
Colocasiaesculenta	Pindalu	*Ricinumcommunis*	Ander
Coriandrumsativum	Dhaniya	*Scurrulaelata*	Aainjeru
Curcuma longa	Besar	*Vitexnegundo*	Simali

Herbs		Shrubs	
Curucumaamada	AamaHaldi	*Woodfordifruticosa*	Dhairo
Cymbopogoncitratis	Pire Ghans		
Cynodondactylon	Dubo		
Lepidiumsativum	Chamsur		
Linumusitatissimum	Alasa		
Menthaspicata	Pudina		
Ocimumtenuiflorum	Tulis		
Rumexnepalensis	Halhale sag		
Tribulusterrestris	GaikhureJhar		
Zingiberofficinale	Adua		

Protected Flora Species

*Shorea robusta (*Sal) and *Pterocarpus marsupium* (Indian kino) is a protected species as per Government of Nepal, banned for felling, transportation and export and Shorea robust is least concern and *Pterocarpus marsupium* is near threatened species as per IUCN .

4.4.3 Forest Types

Forest type by ownership was studied along the road just outside of RoW. The government managed forest, Community forest[4], and Collaborative forest[5] were the three management types found along the RoW with dominance of Community forest (>80%). The subproject site runs through Tilaurakot collaborative forest, a good exemplary collaborative forest in Nepal. Altogether, the road crosses ten community forests, two collaborative forests and a government forest. Details on the names of these forests and their management type are presented in **Table 4-17.**

Table 4-17: Forest Types Based on Ownership

SN	Name	Forest Type	District
1	Pragati	Community Forest	Kapilvastu
2	Saljhandi	Community Forest	Rupandehi
3	Butwal	Community Forest	Rupandehi
4	Mayadevi	Collaborative Forest	Rupandehi
5	Jiteshowr	Community Forest	Rupandehi
6	Piparakot Mahila	Community Forest	Kapilvastu
7	Tilaurakot Collaborative Forest	Collaborative Forest	Kapilvastu
8	Shiva Mandir	Community Forest	Kapilvastu

[4] Community forest is a participatory forest management system, the control, protection and management of forest resources by local communities.

[5] Collaborative forest management (CFM) is a 'community-based' forest tenure regime that works in partnership between the central government, local government and local forest user groups

SN	Name	Forest Type	District
9	Majhaula	Community Forest	Kapilvastu
10	NabaJagriti	Community Forest	Kapilvastu and Rupandehi
11	Shanti	Community Forest	Rupandehi
12	Mayadevi	Community Forest	Rupandehi
13	National Forest	Government Forest	Kapilvastu and Rupandehi

4.4.4 Fauna

Detailed methodology for collecting the fauna is given in Annex 1. The list of key species re also given in Annex 1.

4.4.4.1 Mammals

BG road section passes through three isolated forest patches, i.e. Saljhandi-Pipara Forest block (611+800-617+900), Gorusinghe Forest block (627+000-635+600) and Badhare Forest block (637+700-640+000). Badhare forest is completely degraded while Saljhandi-Pipara forest block and Gorusinghe forest block are fairly in good condition and extend northward connected with Churia range from where mammal species can be observed.

The indirect sign study and road kill survey recorded 12 mammals and additional 12 species listed in various studies totalling 24 mammal species recorded in the study area (Table 4.18). The recorded mammal species include Barking Deer (Muntiacus vaginalis), Fishing cat (Prionailurus viverrinus), Leopard (Panthera pardus), Large Indian Civet (Viverra zibetha), Golden Jackal (Canis aureus), Jungle Cat (Felis chaus), Rhesua Macaque (Macaca mulata), Small Asian Mongoose (Herpestes javanicus), Wild Boar (Sus scrofa).

Fishing cat present in the subproject area is globally threatened, while nine species included of Indian Spotted Deer (Axis axis), Nilgai (Boslaphus tragocamelus), Barking Deer, (Muntiacus vaginalis) Striped hyaena (Hyaena hyaena), Honey badger (Mellivora capensis), Fishing Cat (Prionailurus viverrinus), Crab-eating mongoose (Herpetses urva), Common Leopard (Panthera pardus), Bengal Fox (Vulpes bengalensis) are Nationally threatened species. Striped Hyaena present in the project area is nationally protected mammal. Detailed information on Indian crested porcupine (Hystrix indica) is nationally Data Deficient species.

Table 4-18: Mammal species in the Subproject Area

S.N	Common Name	Species Name	Conservation Status		CITES	Reference
			Global	National		
1	Indian Spotted Deer	*Axis axis*	LC	VU		Suwal and Verheugt,1995; Ernst 2003
2	Nilgai	*Boslaphus tragocamelus*	LC	VU		Suwal and Verheugt,1995; Corbet and Hill, 1992
3	Barking Deer	*Muntiacus vaginalis*	LC	VU		Pellet observed; sound heard
4	Sambar	*Rusa unicolor*				Pellet observed

S.N	Common Name	Species Name	Conservation Status		CITES	Reference
			Global	National		
5	Wild Boar	*Sus Scrofa*	LC	LC		Observed boar ploughing sign; Sign survey
6	Striped Hyaena	*Hyaena hyaena*	NT	EN; Protected		Scat observed
7	Honey Badger	*Mellivora capensis*	LC	VU	III	Prater, 1971; Suwal and Verheugt, 1995; Vanderhaar and Hwang, 2003; Baral and Shah, 2008
8	Fishing Cat	*Prionailurus viverrinus*	EN	EN	II	Photo evidence
9	Crab Eating Mongoose	*Herpetses urva*	LC	VU		Suwal and Verheugt, 1995
10	Leopard	*Panthera pardus*	NT	VU	I	Scat and pugmark observed
11	Bengal Fox	*Vulpes bengalensis*	LC	VU		Pocock, 1936; Mitchell, 1977; Johnson et al, 1980; Ernst 2003; Gompper and Vanak, 2006; Baral and Shah, 2008; Home and Jhala, 2009;
12	Large Indian Civet	*Viverra zibetha*	NT	NT		Road killed; Photo evidence
13	Golden Jackal	*Canis aureus*	LC	LC		Observed; Road killed
14	Jungle Cat	*Felis Chaus*	LC	LC	II	Observed; Road killed
15	Indian Grey Mongoose	*Herpestes edwarsii*	LC	LC		Inskip 1988; Corbet and Hill, 1992; Suwal and Verheught, 1995; Santiapilla et al, 2000; Ernst, 2003; Sheikh, 2005; Baral and Shah, 2008
16	Small Asian Mongoose	*Herpestes javanicus*	LC	LC		Footprints observed
17	Yellow-throated Marten	*Martes Flavigula*	LC	LC		Suwal and Verheugt, 1995; Ernst, 2003; Baral and Shah, 2008; Ghimire, 2010
18	Masked Palm Civet	*Paguma larvata*	LC	LC		Suwal and Verheugt, 1995; Baral and Shah, 2008
19	Small Indian Civet	*Viverricula indica*	LC	LC		Baral and Shah, 2008
20	Rhesus Macaque	*Macaca mulata*	LC	LC		Observed; Photo Evidence
21	Terai Grey Langur	*Semnopithecus hector*	NT	LC	I	Baral and Shah, 2008
22	Five-striped Palm Squirrel	*Funambulus pennantii*	LC	LC		Suwal and Verheught, 1995; Baral and Shah, 2008
23	Indian Hare	*Lepus nigricollis*	LC	LC		Pellets observed
24	Indian Crested Porcupine	*Hystrix indica*	LC	DD		Quills observed

4.4.4.2 Avifauna

The BG road alignment passes through farmland and tropical Sal forest that are rich in the bird species (Grimmett et al., 2016). The survey reported 93 species across the road alignment. The reported birds are 26

full migrants, 8 altitudinal migrants, 2 nomadic, and the rest 55 are residents. Parakeet species such as Plum-headed Parakeet (*Himalayapsitta cyanocephala*), Alexandrine Parakeet (*Palaeornis eupataria*) and Slaty-headed Parakeet (*Himalayapsitta himalayana*) are the most frequently observed and abundant species across the study area. No nesting/roosting site in the forest area in RoW was found during the field survey. The detailed list of species is listed in Annex 1.

Of the total recorded species, 3 species are globally Critically Endangered, 1 Endangered, 1 Vulnerable species, 2 Near Threatened and the rest 87 species are categorized as the Least Concerned Species by IUCN Red List. Similarly, 2 species are nationally Critically Endangered, 1 Endangered and 3 Vulnerable and 4 Near Threatened. None of the species are Nationally protected. Seventeen species among the total reported avifauna are regulated by the Convention on International Trade in Endangered Species (CITES) of wild fauna and flora. It comprised of 16 species listed in CITES Appendix-II and 1 species in CITES Appendix-III. A diversity and abundance of scavenging birds occurs as these are attracted to a vulture feeding station maintained by Bird Conservation Nepal, a local NGO.

Red-headed Vulture (*Sarcogyps calvus*)

Global Status: Critically Endangered

National Status: Endangered

CITES: Appendix-II

Habitat: Open country

Migratory status: Resident

Steppe Eagle (*Aquila nipalensis*)

Global Status: Endangered

National Status: Vulnerable

CITES: Appendix-II

Habitat: Open Country

Migratory Status: Migratory

Lesser Adjutant (*Leptoptilos javanicus*)

Global Stauts: Vulnerable

National Status: Vulnerable

Habitat: Wetland (Farmland)

Migratory Status: Resident

Himalayan Griffon (*Gyps himalayansis*)

Global Status: Near Threatened

National Status: Vulnerable

CITES: Appendix-II

Habitat: Open Country

Migratory Status: Resident

Slender-billed Vulture (*Gyps tenuirostris*)

Global Status: Critically Endangered

National Status: Critically Endangered

CITES: Appendix-II

Habitat: Open Country

Migratory status: Resident

White-rumped Vulture (*Gyps bengalensis*)

Global Status: Critically Endangered

National Status: Critically Endangered

CITES: Appendix-II

Habitat: Open Country

Migratory status: Resident

Figure 4.13: Conservation significant bird species observed in the project area

4.4.4.3 Herpetofauna

BG Road alignment has forest, farmland, springs and rivers that are habitats of Herpetofauna. Most of the herpetofauna such as frogs and toads, and lizards recorded from the study area were gathered through literature, and much lesser herpetofauna were observed during the field study. In total 47 herpetofauna diversity is recorded in the study area. These include 9 species of frogs and toads, 10 species of skinks, Geckos and lizards, 20 species of snakes and python and 8 species of turtle and tortoise (See Annex 1 for list). Crocodiles were neither listed in the report nor were found through field survey. However, mugur crocodile (*Crocodylus palustris*) was reported to have been observed in Kothi River pool during the consultation with division forest office and public. Likewise, most herpetofauna species listed may not necessarily be represented as the limited species were observed during the field survey. To understand the better picture of herpetofauna status in the study area, additional field survey in the different seasons (spring/summer) before construction work would be beneficial as the field survey was limited in winter season, i.e., dormant period when the species undergo hibernation under the ground.

Frogs and toad species reported were globally least concerned species while national status is yet to be assessed. Among listed amphibians, Indian Bull frog (*Hoplobactrachus tigerinus*) is regulated in Appendix-II in CITES. Majority of reptilian species; skinks, Geckos, lizards, snakes and python besides turtle and tortoise reported present in the project district are yet to be assessed for threatened category globally and nationally. Bengal Monitor (*Varanus Bengalensis*) and Golden monitor (*Varanus flavescens*) present in project district are regulated by CITES appendix-II. Golden monitor (*Varanus flavescens*) is protected by the National Park and Wildlife Conservation Act, 1973.

Among snake and python species, Burmese python (*Python molurus bivittatus*), and King cobra (*Ophiophagus hannah*) are globally vulnerable species and listed in CITES appendix-II. Common rat snake (*Ptyas mucosus*) and Monocellate cobra (*Naja kaouthia*) are also regulated by CITES appendix-II while Russell's Viper (*Daboia russelii*) is in CITES Appendix-III. Unlike other herpatofauna, most of turtle and tortoise present in the project site are globally threatened species and regulated by CITES Appendices I and II. Tricarinate hill turtle (*Melanochelys tricarinata*), Indian softshell turtle (*Aspideretes gangeticus)*, and Indian eyed turtle (*Morenia petersi*) are globally endangered while Indian peacock softshell turtle (*Aspideretes hurum*) is globally vulnerable species and Elongated tortoise (*Indotestudo elongate*) is globally critically endangered species. All these cited species were not located during the field survey.

4.4.4.4 Fish

BG Road section passes through two rivers (i.e. Tinau River and Baanganga River), seasonal and perennial springs (18) and seasonal culverts (10) (Table 4.19 gives locations). The field study recorded seven fish species and the presence of additional seven fish species in the project site was reported through the publications; with total of 14 fish species in project site (See Table 3 in Annex 1 for detailed list of species). In addition, one Eel species was reported present in the Baanganga River based on public consultation.

All fish species recorded present in the water bodies of study are classified as Least Concerned. While Copper Mahseer (*Neolissocheilus hexagonalepis*) is nationally Vulnerable, others are common fish species.

One Eel species reported present in Baanganga River could relate to Eel species (*Macrognathus aral*, *Macrognathus puncatus* and *mastacembelus armatus*) reported in Jagadishpur Reservoir which is located 12 kilometers downstream from the Baanganga River. A total of 43 fish species, Including three Eel species, were reported in Jagadispur Reservoir (IUCN, 2015). Jagadishpur Reservoir is drained through canal from Baanganga River and the canal provides fish movement passage between the Baanganga River and the Jagadishpur Reservoir.

Table 4-19: Rivers/Streams/Culverts in the Butwal-Gorusinghe Road Section

S.N	River/Stream/Culvert	Longitude	Latitude	Remarks
1	Belbagdevi Khola	82.995702	27.658257	Perennial stream; very low flow at dry season; some fish species reported
2	Culvert 2	82.999625	27.655614	Seasonal water flow through the culvert
3	Kundra Khola	83.05824517	27.66751327	Perennial stream; Very low flow during dry season; some fish species reported
4	Culvert 4	83.060966	27.669932	Seasonal water flow through the culvert
5	Harkur Khola	83.077429	27.673144	Perennial stream; very low flow during dry season; some fish species reported
6	Baanganga Khola*	83.163549	27.692111	Perennial stream; low flow at dry season; Some fish species present

S.N	River/Stream/Culvert	Longitude	Latitude	Remarks
7	Kaila Khola	83.117485	27.680786	Perennial stream; low flow at dry season; Some fish species present
8	Bahulendra Khola	83.098216	27.67651	Perennial stream; low flow at dry season; Some fish species present
9	Culvert 9	83.029742	27.658772	Seasonal water flow through the culvert
10	Culvert 10	83.094004	27.676752	Seasonal water flow through the culvert
11	Culvert 11	83.181405	27.687346	Seasonal water flow through the culvert
12	Kothi Khola	83.228681	27.693763	Perennial stream; low flow at dry season; Some fish species present
13	Kanchan Khola	83.262446	27.700635	Perennial stream; low flow at dry season; Some fish species present
14	Culvert 14	83.264918	27.702587	Seasonal water flow through the culvert
15	Pahila Khola	83.266879	27.703158	Perennial stream; low flow at dry season; Some fish species recorded
16	Culvert 16	83.292274	27.69114	Seasonal water flow through the culvert
17	Banarhawa Khola	83.297025	27.688688	Seasonal stream; Very low flow during dry season; fish species probable during wet season
18	Ingmuriya Khola	83.302376	27.689236	Seasonal stream; Very low flow during dry season; fish species probable during wet season
19	Megahawa Khola	83.318942	27.688173	Seasonal stream; Very low flow during dry season; fish species probable during wet season
20	Marthiwa Khola	83.322062	27.688455	Seasonal stream; Very low flow during dry season; fish species probable during wet season
21	Tulbuliya Khola	83.33049	27.688575	Seasonal stream; Very low flow during dry season; fish species probable during wet season
22	Ghamaha Khola	83.333373	27.688268	Seasonal stream; Very low flow during dry season; fish species probable during wet season
23	Culvert 23	83.358482	27.68818	Seasonal water flows through the culvert
24	Culvert 24	83.370364	27.687513	Seasonal water flows through the culvert
25	Culvert 25	83.381261	27.682986	Seasonal water flows through the culvert
26	Bamaha Khola	83.385243	27.682495	Seasonal stream; Very low flow during dry season; fish species probable during wet season
27	Rajpur khola	83.38988435	27.68369904	Seasonal stream; Very low flow during dry season; fish species probable during wet season
28	Soila Khola	83.393188	27.684051	Seasonal stream; Very low flow during dry season; fish species probable during wet season
29	Satgadi Khola-2*	83.403841	27.686389	Seasonal stream; No water flows during dry season
30	Satgadi Khola-1*	83.406427	27.68613	Seasonal stream; No water flows during dry season

S.N	River/Stream/Culvert	Longitude	Latitude	Remarks
31	Tinau Khola (Branch)*	83.380249	27.678482	Perennial; Tinau branch flowing southwest; low flow during dry season; Some fish species of reported
32	Jitgadi Bridge	83.456868	27.70446	Seasonal stream; No flow at during dry season
33	Tinau Khola	83.46076132	27.70404285	Perennial and main Tinau river (Butwal); Fish species present
***Streams proposed as quarry site				

Forests as wildlife habitat

Saljhandi-Pipara forest block and Gorusinghe forest block are serving as wildlife corridor for mammal movement across north-south crossing the highway. These forest areas dense refuging wildlife. In Saljhandi-Pipara forest, however, wild mammals crossing the highway in Saljhandi-Pipar Forest are merely observed mainly because of the presence of barbwire fence along of the road (except for Rhesus macaque).

Unlike, forest edge at highway side in Gorusinghe forest block is without a fence providing free movement of wild mammals crossing the highway. Moreover, the forest is comparatively dense. While roadkill records are not maintained in Sub-division Forest Offices, the three cases of road kill of small mammals; Jungle cat, Golden Jackal and Large Indian Civet were recorded in Gorusinghe forest block during the field survey (Figure 4.14).

Rhesus macaque was noted in the Saljhandi-Pipara forest block of highway picking discarded food along the roadside. The macaque approaching roadside was observed at a place where bus stop for sanitary break of commuters. During the break, the commuters disposed of instant food packets and cereals, which attracted macaque to feed on them. No roadkill was observed, however there are higher chances of roadkill of these species.

Figure 4.14: Road Killed Jungle cat (left), Golden Jackal (middle) and Large Indian Civet (right) at Gorusinghe forest

According to the consultation with forest officials and community forest users, wildlife poaching and trapping at Argakhanchi district located about 8 kilometers north of the highway have been resulting in the wildlife congregation near highway area since higher security and forest management activities provided by the forest officials and community forest users groups. The competition for the food source and foraging ground are also inducing the wildlife movement from the high mountain area in the north to the Terai region in the south, which could potentially increase the chances of collision with traffic and wildlife casualties.

4.4.5 Legally Protected and Internationally Recognized Areas of High Biodiversity Value

An IBAT[6] (Integrated Biodiversity Assessment Tool) report was used to assess the proximity of the BG road to Legally protected and Internationally Recognized Area of High Biodiversity Value (collectively referred to as protected areas). The subproject is not located within any protected areas although there are protected areas in the greater vicinity, as described in Table 4.20.

Table 4-20: Legally Protected Areas near the BG Road

Protected Area Name	Status	Distance from Subproject	Potential Impact
Legally Protected Areas			
Chitwan National Park	World Heritage Site, IUCN Category II	50 km East	None, separated by extensive settlement and cultivation.
Chitwan National Park Buffer Zone	IUCN Category VI		
Key Biodiversity Areas (KBA)			
Jagadishpur Reservoir	Ramsar wetland of International Importance	12 km South	None, located in different habitat
Gainda Tal (Gaidahawa lake)	Recognized by IUCN due to the presence of Indian Eyed Turtle (*Morenia petersi*)	West of subproject	Species is recognized as a critical habitat feature with mitigation developed. Refer to text below.
Farmlands in Lumbini area	Agricultural landscape recognized for White-rumped Vulture, Slender-billed Vulture, Pallas's Fish-eagle, Lesser Adjutant, White-throated Bushchat, Bristled Grassbird and Sarus Crane	10 km South	Large area of modified habitat that is not directly impacted. Priority species are assessed for critical habitat.
Nawalparasi forests	Habitat for White-rumped Vulture, Slender-billed Vulture and Lesser Adjutant	20 km East	Not impacted by BG road section, although species are assessed for critical habitat.
Dang Deukhuri foothill forests and west Rapti wetlands	Habitat for Bengal Tiger and Smooth-coated Otter	18 km West	Not impacted by BG road section, although species are assessed for critical habitat.

Gaidahawa lake (Gaida Tal)

The nearest conservation site identified by IBAT is the Gaida Tal KBA or Gaidahawa lake (Figure 4.15). This site has been designated by IUCN due to the presence of the IUCN Endangered Indian Eyed Turtle (*Morenia petersi*). The study team undertook the field survey as well as desk review to assess the baseline condition and potential risks and impacts as the result of the subproject.

[6] The Integrated Biodiversity Assessment Tool (IBAT) provides key decision-makers with access to critical information on biodiversity priority sites to inform risk management and decisionmaking processes that address potential biodiversity impacts.Developed through a partnership of BirdLife International, Conservation International, International Union for Conservation of Nature (IUCN) and United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC), the vision of IBAT is that decisions affecting critical natural habitats are informed by the best scientific information and in turn decision makers will support the quest to collect and enhance the underlying datasets and maintain that scientific information

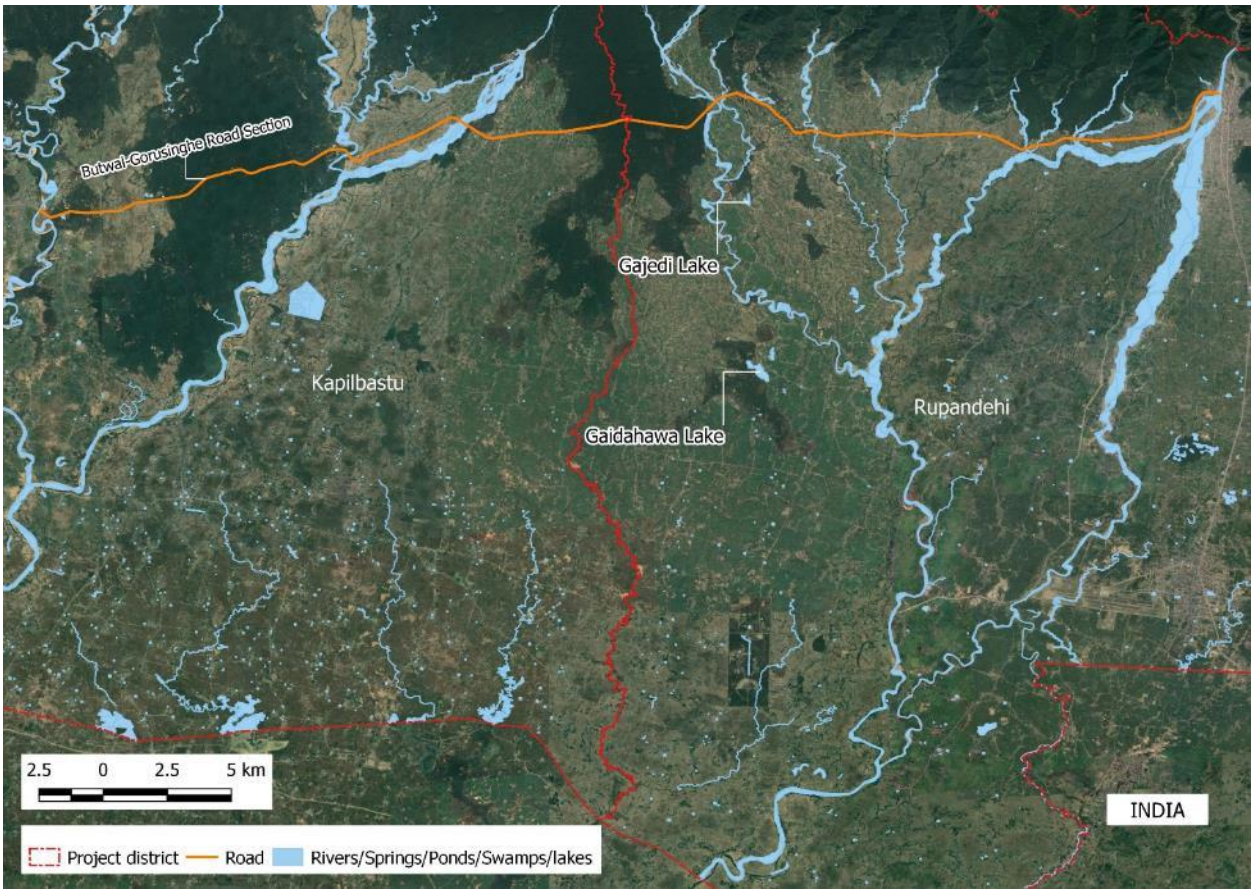


Figure 4.15: *Gaidahawa lake/Gaindatal locational map overlaid in google earth image*

The location of the Gaidahawa lake is Lat: 27.64 Lon: 82.96 situated at Gaidahawa Village. The lake is approximately 12km away from the project site. The lake is spread over an area of 10,391 ha of land and was established in 2005. Gaidahawa Lake is an inland lake in Gaidhawa Rural Municipality, Rupandehi District (Figure below). It is reported as the biggest lake in the Rupandehi District. It is a manmade lake with devoid of inlet and outlet. Water in the lake is filled by the accumulation of monsoon water and aquifer from the forest in the proximity. The lake has been used for the fishery and provides habitat for wetland birds and seasonal stopover and congregation site for migratory birds. The field study reported 17 wetland birds and 3 raptors (Table 4.21).

The Indian Eyed Turtle was not recorded during the field study. However, this turtle was identified in the project area and is assessed for critical habitat status.

Table 4-21: Birds in Gaidhawa Lake/Gaidatal observed during Field Study

S.N	Common Name	Scientific Name	Threatened Status		CITES	Movement Pattern
			Global	National		
	Waterbirds					
1	Asian Openbill	*Anastomus oscitans*	LC	VU		Not a Migrant
2	Bar-headed Goose	*Anser indicus*	LC			Full Migrant
3	Black-crowned Night-heron	*Nycticorax nycticorax*	LC			Full Migrant

S.N	Common Name	Scientific Name	Threatened Status		CITES	Movement Pattern
			Global	National		
4	Cattle Egret	*Bubulcus ibis*	LC			Full Migrant
5	Common Sandpiper	*Actiticus hypoleucos*	LC			Full Migrant
6	Great Egret	*Ardea alba*	LC			Full Migrant
7	Great Cormorant	*Phalacrocorax carbo*	LC			Full Migrant
8	Green Sandpiper	*Tringa ochropus*	LC			Full Migrant
9	Indian Pond Heron	*Ardeola grayii*	LC			Not a Migrant
10	Little Egret	*Egretta garzetta*	LC			Full Migrant
11	Little Ringed Plover	*Charadrius dubius*	LC			Full Migrant
12	Red-wattled Lapwing	*Venellus indicus*	LC			Not a Migrant
13	River Lapwing	*Venellus duvaucelii*	LC	NT		Not a Migrant
14	Ruddy Shelduck	*Tadorna ferruginea*	LC	NT		Full Migrant
15	Small Pratincole	*Glareola lactea*	LC	NT		Full Migrant
16	White-browed Wagtail	*Motacilla maderaspatensis*	LC			Not a Migrant
17	White-throated Kingfisher	*Halcyon gularis*	LC			Not a Migrant
	Raptors					
18	Cinereous vulture	*Aegypius monachus*	NT	EN	II	Full Migrant
19	Himalayan Griffon	*Gyps himalayensis*	NT	VU	II	Full Migrant
20	Osprey	*Pandion Haliaetus*	LC		II	Full Migrant

Terai Arc Landscape Conservation Initiative

The Terai Arc Landscape (TAL) is recognized by the Government of Nepal as a priority conservation landscape since 2001. The second Strategy and Action Plan for the TAL (TALSAP) for the period 2015 to 2025 has been prepared by the Ministry of Forests and Soil Conservation to address persisting and emerging threats to ensure socio-ecological integrity of the TAL. The TALSAP has a defined goal, seven outcomes, 16 strategies each with specific strategic actions, numerous targets and a monitoring and evaluation plan. The TALSAP budget was estimated at NPR 28,111 million (USD 281 million).

4.4.6 Critical Habitat Assessment

This section aims to identify the occurrence of critical habitat features based on the five critical habitat criteria defined in the World Bank ESS6.

Critical Habitat Criteria

Critical habitat is defined in the World Bank ESS as: the areas with high biodiversity importance or value, including: (a) habitat of significant importance to Critically Endangered (CR) or Endangered (EN) species, as listed in the IUCN Red List of threatened species or equivalent national approaches; (b) habitat of significant importance to endemic or restricted-range species; (c) habitat supporting globally or nationally significant concentrations of migratory or congregator species; (d) highly threatened or unique ecosystems; (e) ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described in (a) to (d).

Guidance notes to the ESS6 are available, but do not include guidance on methods or thresholds for critical habitat determination. The following approach has therefore been developed for assessment of critical habitat for the terrestrial conditions applicable to this project:

- Key Biodiversity Areas (KBA) including Important Bird Areas (IBA) and Alliance for Zero Extinction (AZE) sites provide important indicators of potential critical habitat. Careful consideration is also to be given to legally protected areas, Ramsar wetlands of international importance, UNESCO recognized world heritage sites and and Government recognized conservation initiatives.
- ESS6 Criterion (a) requires an assessment against both global (IUCN) and national red list ratings. ESS6 critical habitat criterion (a) places an emphasis on national red lists, while footnote 13 proposes that national red list ratings should be given priority over IUCN (global) red list ratings.
- Where a significant proportion (>= ±0.5%) of the national or global population of a species has a likely presence within the project area, consideration is to be given for the habitat to have significant importance for the species under ESS6 Criterion (a), (b) or (c).
- By IUCN definition, a CR species faces an extremely high risk of extinction and its continued survival in the wild is in a critical state. Therefore evidence of use of habitats within the project-affected area by a surviving population of a CR species suggests that these habitat have a significant importance for the species under ESS6 Criterion (a).
- ESS6 Criterion (b) can be achieved for range-restricted species with evidence or believed to occur within the project-affected area where the full extent of that area overlaps a significant proportion (± 1%) of a species' distribution range.
- There is no specific guidance for assessment of Criteria (d) and (e) and each situation needs to be assessed on a case-by-case basis.

The greater project area, defined by an area within an approximately 50 km radius of the project route, potentially supports an exception diversity of CR and EN species. A list of CR and EN species consolidated from both the IUCN Red List (provided by IBAT) and the Nepal National Red List Series of Mammals (single volume, 2012) and Birds (six volumes, 2016) provides a list of 107 species. A structured screening of these species and assessment against the ESS6 critical habitat criteria is provided in Annex 2. These species are discussed in terms of the critical habitat criteria below.

Criterion (a) - habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches.

Fishing Cat (*Prionailurus viverrinus*) and Striped Hyaena (*Hyaena hyaena*) both have an EN status on the Nepal Red List for mammals and there is evidence of their presence within the project area. These carnivores are threatened by poaching and persecution, reduction in their food availability (fish and carrion respectively) and habitat loss. The project could potentially these carnivores through an increased incidence of road kills and/or fragmentation within the habitat. Mitigation is required to address these impacts and demonstrate net gain as required by ESS6.

Three vulture species with CR and EN red list ratings have the potential to qualify as critical habitats under Criterion (a). Vultures are diverse and abundant in the project area as they are attracted to a nearby vulture feeding station where carcasses are routinely placed at by Bird Conservation of Nepal. However, the feeding station is away from the project route and these birds are unlikely to be significantly impacted by construction or operation of the road section covered by this ESIA. Specific mitigation is not required,

and vultures are therefore not a critical habitat feature of concern for this project.

Yellow-breasted Bunting have not been recorded during baseline however habitats are suitable to support the species and online data reveals their presence in the area. The population of these buntings has declined as they are frequently trapped and illegally traded as cage birds. Indirect impacts of the project may influence these threats, and mitigation is presented at address potential illegal wildlife trade, however the species has not been confirmed in the project area and net gain requirements are not applied.

Criterion (b) - habitat of significant importance to endemic or restricted-range species.
There are no endemic or restricted-range species likely to qualify as critical habitat features for this project.

Criterion (c) – habitat supporting globally or nationally significant concentrations of migratory or congregatory species.
One migratory bird species, the Steppe Eagle (*Aquila nipalensis*) qualifies as a critical habitat feature as the project is located within a broad migratory bird corridor that follows the base of the Himalayas mountain chain. Greater than 25% of the global population of this eagle may migrate along this corridor twice per year, however migrating raptors pass at an altitude whereby they are not impacted by ground activities. Construction and operation of the road section covered by this ESIA is not expected to impact this eagle and no specific mitigation is required. The Steppe eagle is therefore not listed a critical habitat feature of concern for this project and net gain is not required to be demonstrated.

Criterion (d) - highly threatened or unique ecosystems.
Habitats in the project-affected area are disturbed and there is no reason for recognition of unique characteristics. The project area is therefore not considered as a critical habitat under this criterion.

Criterion (e) - ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
No specific ecological functions or characteristics have been identified that are essential to maintain the above critical habitat features, and no critical habitat is therefore recognized under this criterion.

4.5 Socioeconomic and Cultural Environment (Baseline)

4.5.1 General profile of Subproject Area

The subproject is part of the East-West highway and lies in Rupandehi and Kapilvastu districts of Lumbini province. Rupandehi district is one of the major gateways of Nepal from Inida and Kapilbastu is famous for Lumbini which is the birth place of lord Gautam Buddha, a major tourist destination.

The road starts from Butwal of Rupandehi district and passes through Butwal sub-metro-Politian city, Sinamaina Municipality, Kanchan Rural Municipality, Banganga Municipality and Buddhabhumi Municipality and ends at Gorusinghe of Kapilbastu district. The proposed road also links Gautam Buddha International Airport (20 km from Butwal) and Lumbini (12 km from our road) via Bhairahawa, which is adjacent to Indian border. Most of the road passes through built-up and urban settlements connecting district headquarters and further providing access to outside markets in Terai and India.

Except near Butwal city, the settlements along the road are semi-urban and rural. Semi-urban settlements can be seen along the alignment, while rural settlements e can be seen a little away from the road head. The major settlements (Table 4.22) along the road include, Batauli bazar, Maina Bagar,Naya gaun,Belbas,Nayabasti,Bankatahawa,Murgiya,Rampur, Basgadi,Saljhandi, Fireland,Pipra, Badgaun, Jitpur and Gorusinghe Bazar.

Table 4-22: BG Road (District, Municipality and major settlements)

S.N.	Name of Road Section	Length of the Road (KM)	Name of Province	Covered Districts	Covered Municipality and Rural Municipality	Major settlement/Market area
3	Butwal-Gorusinghe	50	Lumbini	Rupandehi and Kapilvastu	Butwal Metropolitan, Sainamaina Municipality, Kanchan Rural Municipality, Banganga Municipality Buddhabhumi Municipality	Batauli bazar, Maina Bagar,Naya gaun,Belbas,Nayabasti,Bankatahawa, Murgiya,Rampur,Basgadi,Saljhandi ,Fireland,Pipra, Badgaun, jitpur and Gorusinghe Bazar. Urban areas are highlighted

Municipality Profile 2020

4.5.2 Demography

The total population of the subproject districts is 255237, with an average household size of 5.69. The population distribution between males and females is 49.43 and 50.56, respectively. Table 4.23 presents the population composition of subproject districts.

Table 4-23: Population Composition of Subproject Districts

SN	District	Total HHs	Total Population	Sex		Average Family size
				Male	Female	
1	Rupandehi	163916	880196	432193	448003	5.37
2	Kapilvastu	91321	571936	285599	286337	6.26
	Total	255237	1452132	717792	734340	5.69

Source: Central Bureau of Statistics (CBS), Nepal 2011

The subproject area coversone sub-metropolitan, one municipality and one rural municipality from Rupandehi district and 2 municipalities from Kapilbastu district. Municipalities and detailed demographic status of affected municipalities are shown in Table 4.24.

Table 4-24: Households and Population Size

SN	Province	District	Municipality	Total HHS	Sex		Total Population
					Male	Female	
1	Lumbini	Rupandehi	Butwal Sub metropolitan	40876	75752	80820	156572
2	Lumbini	Rupandehi	Sainamaina Municipality	15063	29733	32912	62645
3	Lumbini	Rupandehi	Kanchan Rural Municipality	7084	14865	18207	33072
4	Lumbini	Kapilbastu	Banganga Municipality	15894	34833	40309	75142
5	Lumbini	Kapilbastu	Buddhabhumi	11501	31583	33366	64949
	Total			90418	186766	205614	392380

Source: Municipality Profile 2020

Altogether a, a total of 22 wards of five municipalities of Rupandehi and Kapilbastu districts are directly connected with the BG Road and a total of 144914 population from 34971 households are residing in these wards. Among them, 47.08 percent are male and 52.89 percent are female. Population composition of the affected wards under municipalities is presented in the Table 4.25.

Table 4-25: Population compositions of the affected Wards under Municipalities.

SN	Municipality	Ward	Total HHs	Sex		Total Population
				Male	Female	
1	Butwal Sub-Metropolitan City	1,2,12,13	8695	16551	18008	34589

SN	Municipality	Ward	Total HHs	Sex		Total Population
				Male	Female	
2	Sainamaina Municipality	1,2,3,4,5,6, 8,9,10,11	14230	26407	29283	55690
3	Kanchan Rural Municipality	5	1326	2699	3253	5952
4	Banganga Municipality	1.2,4,7,8	7954	16200	19043	35243
5	Buddhabhumi	2 and 4	2766	6375	7065	13440
	Total	22	34971	68232	76652	144914

Source: municipality Profile 2020

4.5.3 Caste and Ethnic Composition

The project area has multi-ethnic composition. Brahmin, Chetri, Janjati, Muslim Madhesi are major groups in the project municipalities. Among the Janjatis major caste are *Magar, , Newar, and Rai*. In all municipalities, there is a presence of Muslim population and Muslims are considered as minority groups in Nepal. The ethnic composition of both districts is presented in Table 4.26. Janjathi are recognized by the Government of Nepal as indigenous peoples with defined rights. However, their presence and sociopolitical characteristics are not aligned with the criteria defined in ESS7. Field studies indicate that the Janjati along the RoW of the road is mixed (including indigenous and non-indigenous people), living as part of mainstream communities with no collective attachment to land and/or distinct cultural and social institutions.

Table 4-26:: Ethnic Composition of Subproject Municipalities.

SN	Municipality	Ethnic Group(%)					
		Brahmin/Chettri	Janjati(IP)	Dalit	Muslim	Madhesi and other Terai caste	Total
1	Butwal Sub-Metropolitan City	46.75	34.52	7.02	1.88	9.83	100
	Sainamaina Municipality	46.5	41.6	7.29	2.14	2.65	100
	Kanchan Rural Municipality	31.42	44.07	15.21	0.51	7.22	100
	Banganga Municipality	38.9	47.48	7.04	1.26	5.52	100
	Buddhabhumi Municipality	28.3	41.02	21.35	8.64	9.69	100

Municipality Profile-2020

4.5.4 Literacy Rate

The average literacy rate of males is 70 percent, whereas the female literacy rat is 55 percent. Table 4.27 presents the literacy rate of subproject districts and Table 4.28 presents the literacy rate for the project municipalities. Kapilbastu district is quite behind the Repandehi in both male and female literacy rates.

Table 4-27: Literacy Rate of Subproject Districts (%)

District	Literacy		Can Read Only	
	Male	Female	Male	Female
Rupendehi	79	61	2	2
Kapilvastu	65	45	4	4

Source: District Profile, 2011The literacy rate of the municipalities are given in the below table

Table 4-28: Literacy Rate

Municipality	Literacy Rate(%)
Butwal Sub metro	89.40
Sinamaina Municipality	87.25
Kanchan Rural Municipality	80.13
Banganga Municipality	84.70
Buddhabhumi Municipality	98.05

Source: Municipality Profile-2020

4.5.5 Religion, Language and Culture

Nepal is multi-lingual, multi-cultural and multi-religious country. Religions practiced in Nepal are Hinduism, Buddhism, Islam, Christianity, Jainism and Sikhism. The majority population, i.e. 81% is Hindu followed by Buddhist (9%) and around 4.4% are Islam, and 1.4% are Christian, and a nominal number is other religions. The project area also follows almost the same kind of representation as per the national figure. Caste-wise, the majority population of the project area, are Brahmin and Chettri followed by Janjati(Indigenous people). Some Madhesi and Muslims are also found residing in the project area. Madheshi, Muslims and Janjati have their own language and culture. The Nepali language is spoken as an official language and Dashain and Tihar(Deepawali) are being celebrated as a national festival however, Buddhist mainly celebrate Loshar and Buddha Jayanti and Janjatis mainly celebrate Maghe and Saune Sakranti except Dashain and Tihar. Holi and Ramadan are celebrated by Madhesi and Muslims, respectively.

4.5.6 Occupational Status

Nepal is an agricultural country and 64% population directly engaged in agriculture farming, and among them very few are doing commercial farming rather than subsistence farming. Major occupations of the project area are agriculture, livestock and small-scale business and cottage industry. Many people are found engaged in Government and private employment, especially hotel, lodge, and other industry. Rupandehi and Kapilbastu are also popular tourist destinations due to birth place of Lord Gautam Buddha. Therefore, a large number of Hotels and lodges and other businesses are being run in the area, which creates employment opportunities. Due to the capital of Lumbini province being connected with the Indian border, both project districts have gradually emerged as business hubs of the country. However the main occupation of the population is agriculture, followed by trade and wage labor.

4.5.7 Land Value

There have been significant changes in the values of land and properties over a few decades in Nepal, including in the project area. A large number of stars hotels and industries have been established in this area, therefore the price of the land has been found to incrase in the last 5 years. These changes will be further exacerbated by upgrading the Butwal Gorusinghe road alignment. Alongside the land use change will be a corresponding increase in both rental and capital values of landed properties on both sides of the upgraded road along the alignment. The increase in demand for residential and commercial use in turn, leads to an increase in property values with it's a positive impact on the local community. The major market area directly connected with this proposed road is almost found double in comparison to the last five years.

4.5.8 Tourism

Tourism in Nepal holds great potential to establish itself as a means of significant economic activity. The project area is one of the main tourist destinations due to the Birth place of Lord Gautam Buddha Due to this reason, a number of tourism-based businesses like Hotels, Cottages, Homestays etc. are being conducted by local and by outsiders at different settlements along the road alignment. Many Buddha's temples exist in many places which are visited by both national and international tourists.

4.5.9 Non-Timber Forest Product (NTFPs)

Non-timber forest products (NTFPs) are useful substances, materials and/or commodities obtained from forests that do not require harvesting (logging) trees. NTFPs can be produced as commodities for rural incomes and markets, as an expression of traditional knowledge or as a livelihood option for rural household needs, and as a key component of sustainable forest management and conservation strategies. Tharu and other Janjati have traditional indigenous skills and have been involved production of those goods that can be sold in the community. They depend on NTFPs for household subsistence, maintenance of cultural and familial traditions, spiritual fulfilment, physical and emotional well-being, house heating and cooking, animal feeding, indigenous medicine and healing, scientific learning, and income. Only this group of people is involved in the collection and marketing of NTFPs along the road alignment. No other social groups are found involved in NTFPs based micro-enterprises in the project area. The remaining fraction of caste groups also uses NTFPs like wood, firewood, roofing materials, fodder, forage, etc.

4.5.10 Historical, Cultural, Religious and Aesthetic Sites and Values

Historical, cultural, religious and aesthetic sites and values Heritage is anything that is considered important enough to be passed on to future generations. Significant numbers of cultural structures such as temples, and resting place with religious trees (Bar/Pipal – Banyan (Chautaro resting place) occur along the existing highway within a significant distance from the road alignment. All the cultural and religious sites are of public importance. A large number of devotees visits these temples for worship and hence these structure will be reinstated beyond the RoW. Altogether, 14 temples along the road alignment will be affected, requiring relocation and rehabilitation .

4.5.11 Settlement Patterns

Settlement patterns in the project areas generally reflect the distribution of arable land and the development of market areas. Accordingly, most of the areas exhibit a clustered and semi-clustered settlement. The study area is basically an urban setting. Most of the houses are of modern and semi-modern types except in Kanchan Rural Municipality, where a large number of houses are semi modern.

Table 4.29 shows the types of houses in the project area.

Table 4-29: Type of Houses (%)

S.No.	Municipality	Pakki(RCC /Modern)	Mud, Stone wooden Bonded(semi modern)	Traditional (wooden or mud-mortar)	Not stated	Hot(temporary nature)	Total
1	Butwal Sub-Metropolitan City	47.45	16.56	47.45	34.58	0.14	100
2	Sainamaina Municipality	67	15	16	2	0	100
3	Kanchan Rural Municipality	26.14	64.36	8.8	0.64	0	100
4	Banganga Municipality	48.28	37.78	1.01	0.47	12.46	100
5	Buddhabhumi Municipality	44.06	55.94	0	0	0	100

Source: Municipality Profile-2020

4.5.12 Migration

Migration from hills to Terai and rural areas is a common phenomenon in Nepal. With the growing pursuit of better jobs and economic opportunities, better education and health facilities and such other and advantages, Rupandehi district with its headquarters Butwal is always a center of attraction when it comes to migration from hilly districts such as Palpa, Arghakhachi ,Gulmi and other adjoining ones from Dhaulagiri zone. Gorusinghe and some other parts of Kapilbastu are also emerging new settlements drawing droves of people from hilly regions. The trend of in-migration to Kapilbastu is also on a significant rise with the spread of historical values of this region, mainly owing to Buddha's maternal ties. Additionally, based on municipality profile, around 15 % of people are absent from both districts living either other district or abroad for employment opportunities.

4.5.13 Basic Utilities and Services

The majority of the sample households of Kapilbastu district have deep well/tube well as the major source of drinking water. On the other hand, the majority of the Rupandehi district are enjoying pipe water system. Based on municipality profile, a large number of population of Kanchan Rural Municipality, Banganga Municipality and Buddhabhumi Municipalities still depend on tube wells as a source of drinking water. Tables 4.30 and 4.30 shows the drinking water facility in the project district.

Table 4-30: Sources of Drinking Water (%)

District	Pipe Tap (%) Source can be tube wells Serviced	Deep Well/Tube Well (%) Unserved	Spout (%) spring	Others (%)	Total (%)
Rupandehi	87	9	1	3	100

District	Pipe Tap (%) Source can be tube wells Serviced	Deep Well/Tube Well (%) Unserved	Spout (%) spring	Others (%)	Total (%)
Kapilvastu	10	85	1	4	100

Source: District Profile, 2011

Table 4-31: Water Supply Facilities

S.No.	Province	Municipality	District	Pipe Tap (%)	Deep Well/Tube Well (%)	Spout (%)	Others (%)	Total (%)
1	Lumbini	Butwal Sub-Metropolitan City	Rupandehi	93.65	1.13	0.5	4.72	100
2	Lumbini	Sainamaina Municipality	Rupandehi	77.72	21.96	0.31	0.01	100
3	Lumbini	Kanchan Rural Municipality	Rupandehi	7.85	90.64	0.51	1.00	100
4	Lumbini	Banganga Municipality	Kapilvastu	19.41	76.23	1.25	3.11	100
5	Lumbini	Buddhabhumi Municipality	Kapilvastu	13.18	85.81	0.4	0.61	100

Source Municipality Profile-2020

The major indicator of sanitation standards in any region is reflected in terms of toilet facilities the region has. It is found that about more than 50 percent of households have toilet facilities. When compared among municipalities, majority of Kanchan municipality households are still practicing open defecation. Table 4.32 presents the toilet facility in the study area.

Table 4-32: Toilet Facility (%)

S.No.	Municipality	Flush (Sewerage)	Flush (Septic)	None	Ordinary	Not Stated	Total
1	Butwal Sub-Metropolitan City	80.4	0	0.2	16.58	2.82	100
2	Sainamaina Municipality	6.4	48	0.3	44.8	0.5	100
3	Kanchan Rural Municipality	0	58.51	33.52	7.76	0.21	100
4	Banganga Municipality	0	80	0	17	3	100

S.No.	Municipality	Flush (Sewerage)	Flush (Septic)	None	Ordinary	Not Stated	Total
5	Buddhabhumi Municipality	0	70.08	5.16	24.76	0	100

Source: municipality profile 2020

4.5.14 Energy Use

Electricity is the main source of lighting energy contributing more than 90 percent. Other sources of lighting energy are kerosene, solar etc. Table 4.33 shows the sources of energy used for lighting purposes.

Table 4-33: Sources of Energy for Lighting (%)

S.No.	Municipality	Sources Energy for Lighting (%)						
		Electricity	Kerosene	Solar	Bio-gas	Not stated	others	Total
1	Butwal Sub-Metropolitan City	98.55	0.29	0.87	0.03	0.02	0.24	100
2	Sainamaina Municipality	99.38	0.23	0.24	0.09	0	0.06	100
3	Kanchan Rural Municipality	93.05	6.44	0.05	0.07	0.17	0.22	100
4	Banganga Municipality	93.32	0	0	0	0	6.68	100
5	Buddhabhumi Municipality	92.93	0	0	0	0	7.06	100

Source: Municipality profile 2020

A large number of Butwal and Sinamaina population depend on LPG compared to other municipalities. Table 4.34 presents the sources of energy for cooking.

Table 4-34: Sources of Energy

S.No.	Municipality	Source of Energy for Cooking (%)							
		Wood	LPG	Kerosene	Cow Dung	Bio-gas	Electricity	others	Total
1	Butwal Sub-Metropolitan City	3.76	95.86	o.o4	0.01	0.25	0.05	0.03	100
2	Sainamaina Municipality	5.83	91.67	0	0	0.09	2.35	0.06	100

S.No.	Municipality	Source of Energy for Cooking (%)							
		Wood	LPG	Kerosene	Cow Dung	Bio-gas	Electricity	others	Total
3	Kanchan Rural Municipality	82.68	9.89	0.07	3.86	3.1	0.01	0.39	100
4	Banganga Municipality	72.4	13.78	0.4	1.84	10.76	0.03	0.79	100
5	Buddhabhumi Municipality	54	8	0	1	1	0	36	100

4.5.15 Ownership of Property

As Nepal is basically a patriarchal society, male members mainly own household property. However, there are some variations within the country, mainly due to cultural reasons. For instance, the empowerment of women within the family is considered high among indigenous people compared to other caste groups. As far as national policy, the government has introduced in the Fiscal year 2004 a rebate of 10% in the cost of land deeds registration fee when the deed is in the name of women. This has led to an increase in landownership among women. The rebate has now increased to 20 % since 2005. The census report 2011 shows that women's ownership of land rapidly increased to 19.71% in 2011 from 9.11% in 2001. The national figure of the ownership of the property of women is increasing. However, women do not have the actual right to utilize their property in practice. The scenario of the increasing ownership of land has reciprocal relation with more males engaged in foreign employment and discount in land tax to women while registering the land. The changing ownership of property from men to women has also contributed to a change in social status.

4.5.16 Status of Women & Disadvantaged Group

Nepal has high incidences of GBV cases, with mostly women as victims. Out of the 15 most GBV prevalent countries in the world, Nepal ranks 4th in domestic violence and violence by a partner.13 The current status of gender inequality and gender-based violence in Nepal reveals the serious need to mainstream gender sensitivity and GBV risk mitigation measures at all organization levels and all phases of project cycle. In Nepal, GBV is prevalent due to unequal gender relations and discrimination towards women in both public and private spheres. It has direct implications on the reproductive health status of women and physical, emotional, and mental health of their children

The overall situation of women in Nepal is far behind when compared with their male counterparts. They are still discriminated and exploited by their own family members. With son preference, social stigma and other prevailing biases still doing rounds; women's mobility, public participation, exposure and orientation are controlled and censored by patriarchal parameters. Participation of rural women is more in household daily drudgeries such as fodder collection, cooking, childcare etc. Thus, they are deprived of making substantial decisions and other avenues of upward mobility.

Rupandehi district has a relatively higher literacy rate as compared to Kapilbastu. Hence, women in Rupandehi have more exposure, opportunities and outlets in different walks of life such as economic generation, participation in public forums, making their voices heard and others. This part is lagging

somewhat behind in the case of Kapilbastu women. Moreover, some underlying social ills like the practice of witchcraft have also retarded many of them, and such bad practices are institutionally sustained to keep women away from the path of progress and enhancement.

The growing trend for abroad jobs has rendered both positive and negative changes. Many households' economic condition has been somewhat better, thus enabling them to afford children's education, better healthcare, sanitation and career choice. On the other hand, access to constant resources has led to conflict, disharmony and even divorce in the worst situation.

Dalit women's are, on the other hand, bearing the brunt of double burdens: untouchability and patriarchy. In both districts, the untouchability issue is significantly more in rural areas than in city centers. Being poorer and landless, Dalits are highly marginalized. Lack of education, job opportunity, economic condition, and health facilities are contributing factors for their lower status than other ethnic groups. Also, Dalit children's school enrollment is yet to improve.

4.5.17 Profile of Subproject Affected People

Project Affected HHs

In total, 120 households will be affected by the Butwal -Gorusinghe Road improvement works due to partial encroachment within the right of way (details are given in Chapter 5). Based on the survey of 74 surveyed households, the affected communities belong to Brahmins/Chettri/Syanishi (42 households) followed by Janjati(IP) (22 households), Dalits (4 households), Jaiswal (1 household) and the Muslims (3 households). Among the surveyed project affected HHs, 2 households are headed by by females.

Demographics of project affected surveyed households

The total persons in the affected households are 660. Out of the affected population, 52.6% and 48.4% are males and females, respectively. The average size of households of the project affected surveyed households is 5.5, greater than the national average of 4.8. About 23% of people are below the age of 14, 63% are between the ages of 15 and 60, and 15% are the above age of 60. About 98 % of male ad 90% of female are literate.

Occupational Status

Among the economically active population of the project affected surveyed households, an overwhelming majority of them are engaged in business (50%) followed by private and government employment (33%), foreign job (11%), and agriculture (6%). The largest fraction of the economically active population is engaged in business. Major businesses are hotels, grocery shops, construction materials shop, petrol pumps, etc.

The average annual household income of the affected households is is less than NR 100,000 for 1% households; NR 100,000 to 200,000 for 11% households; NR 200,000 to 300,000 for 36% households; NR 300,000 to 400,000 to 22% of households; and more than NR 400,000 for 28% households. A per capita income of less than NR 35,738 is assessed as poverty line in Nepal and 4 projected households fall in to the group of below poverty line. .

Vulnerable and disadvantaged groups, communities and individuals

Vulnerable groups are those who experience a higher risk of poverty and social exclusion than the general population. Dalits, ethnic minorities, women-headed households, below poverty level income households and aged member households are categorized under vulnerable. 9 households are revealed to fall under vulnerable groups along the road alignment. Out of total vulnerable HHs identified, 2 HHs are headed by women categories. No endangered and highly marginalized IP groups are found along the alignment.

Newar, Magar and Rai were found along the alignment, however they do not meet the IP criteria set in WB ESS7.

Vulnerability of project affected families

It has long been recognized that some people are more likely to be impacted adversely by construction works than others and least able to react effectively. The causes of vulnerabilities might be physical, social, political, demographic, economic, environmental and attitudinal. The vulnerability of IPs and VCs within ROW along the road alignment is attributed to complete loss of private property like housing structures, small businesses, and socially disadvantaged groups such as women-headed households and households with below poverty level.

Indigenous People

There are three IP communities along the road alignment, namely, Newar, Magar and Rai, Field studies indicate that the Janjati along the RoW of the road is mixed (including indigenous and non-indigenous people), living as part of mainstream communities with no collective attachment to land and/or distinct cultural and social institutions. The subproject will not cause any direct adverse impact to their land, will not cause any relocation of IPs from land they customarily use or occupy, and it will not cause adverse impacts to their cultural heritage.

5 Potential Environmental and Social Impacts and Risks and Their Mitigation

5.1 Impact Assessment Methodology

Potential environmental and social impacts were identified on the basis of a review of feasibility study reports, field visits, stakeholder consultations, and experiences from the construction of road projects in Nepal. The significance of potential impacts was assessed using the criteria and methodology given below.

Impact Magnitude

The potential impacts of the project have been categorized as major, moderate, minor or minimal based on consideration of the parameters such as: i) duration of the impact; ii) the spatial extent of the impact; iii) reversibility; iv) likelihood; and v) legal standards and established professional criteria.

The magnitude of the potential impacts of the project has generally been identified according to the categories outlined in **Table 5.1**.

Table 5.1: Parameters for Determining Magnitude

Parameter	Major	Moderate	Minor	Minimal
Duration of the potential impact	Long term Beyond the life span of the project	Medium Term The lifespan of the project	Limited to the construction period	Temporary with no detectable potential impact
The spatial extent of the potential impact	Widespread far beyond project boundaries	Beyond immediate project components, site boundaries or local area	Within project boundary	A specific location within the project component or site boundaries with no detectable potential impact
Reversibility of potential impacts	The potential impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable

Parameter	Major	Moderate	Minor	Minimal
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions (Certain)	Occurs under worst-case (negative impact) or best case (positive impact) operating conditions (Likely)	Occurs under abnormal, exceptional or emergency conditions (occasional)	Unlikely to occur

Sensitivity of Receptor

The sensitivity of a receptor has been determined based on a review of the population (including proximity / numbers / vulnerability) and the presence of features on the site or the surrounding area. Each detailed assessment has defined sensitivity in relation to the topic. The criteria for determining receptor sensitivity of the Project's potential impacts are outlined in **Table 5.2**.

Table 5.2: Criteria for Determining Sensitivity

Sensitivity Determination	Definition
Very High	The vulnerable receptor with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
High	The vulnerable receptor with little or no capacity to absorb proposed changes or limited opportunities for mitigation.
Medium	The vulnerable receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation
Low	The vulnerable receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation

Assigning Significance

Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor have been determined and the significance of each potential impact established using the impact significance matrix shown in **Table 5.3**.

Table 5.3: Criteria for Determining Significance of Impacts

Magnitude of Impact	Sensitivity of Receptors			
	Very High	High	Medium	Low
Major	Critical	Major	Moderate	Minimal
Moderate	Major	Major	Moderate	Minimal
Minor	Moderate	Moderate	Minimal	Minimal
Minimal	Minimal	Minimal	Minimal	Minimal

5.2 Summary of Assessed Impacts

The project's potential impacts and their significance have been assessed using the methodology described in Section 5.2 above. A summary of these impacts and their significance are presented in **Table 5.4,** along with the key mitigation measures. A detailed assessment of impacts and proposed mitigation measures are given in the subsequent sections.

Table 5.4: Potential Impacts and their Significance

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
Environmental and Social Considerations in the Project Design					
1. Improvement in Road Safety (at 4 major junctions, 12 minor junctions and 12 major villages/bazars)	Very High	Major	Critical beneficial	• Raised pedestrian footpaths and cycle lanes in urban areas • Installation of traffic lights in all major intersections along with zebra crossings and road humps • Footbridges at six locations at intersections where schools, colleges and hospitals are located • Other safety measures such as the provision of road signs, delineators, barriers and pavement markings, minor realignment at identified black spots, including pedestrian foot paths in market areas • Universal access measures for disabled and elderly	Critical beneficial
2. Protection of landslides and river bank erosion (Landslide, gully erosion and old slide scarp can be seen from Ch 590+000 to 591+000. Mainly Ch 590+550-990+600-590+700,590+800, 591+000 is found active landslides, and gully erosion, river bank cutting at Ch 610+100, 611+000, 621+420, 640+200)	Very High	Major	Critical beneficial	• Implementation of Bioengineering and retaining structures, specifically RCC Modified Wall, Geo-Grid Wall and Semi-Flexible 3D Galvanized Steel Mat. Other measures such as terracing and weep holes to maintain sub-surface drainages etc. will also be implemented • Avoid haphazard excavation of slopes. • Bank protection works near the proposed bridge sites • Stabilizing the excavated slopes and river banks with retaining structures	Critical beneficial
3. Impact on Wildlife Movement including critical habitat species KM 635+200 (8130m) and KM 637+720 to KM 639+000 (1280m)	High	Moderate	Major	• Construction of new, reinstallation and predator-proofing of existing fences affected by widening in the forest areas. • Conduct daily monitoring of all roadkill incidents over several months to understand the risks to wildlife and identify key locations of roadkill risk. • Assessment of forest habitats and modelling to identify locations and dimensions for crossings to allow freedom of movement for large carnivores and other fauna.	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
				• Construction of wildlife crossings in forest areas • Speed limits for construction vehicles in the forest areas (limit to 40 km per hour) with warning signboards	
Environmental impacts due to Project siting					
1. Improvement of Trade and Communication between Nepal and neighboring countries.	Very high	Major	Critical beneficial	Implementation of the ESMP and RAP to mitigate impacts associated with the construction of the project	Critical beneficial
2. Clearance of about 28 ha of forest trees along 15.2 km of road (located in the forest areas) 9386 trees will be felled from community forests collaborative forest, government managed forest and public land/settlement area (7186 forest trees and 2200 trees in other sections of ROW)	Medium	Major	Moderate adverse	• Compensation for the Department of Forests for replantation of trees in the same areas (at a ratio of 10 new trees per each tree cut. • Plantation of trees in the median of the road by the contractor (about 16,000 trees) • Provision of a budget of USD 0.6 million for the above plantation programs	Minimal adverse
3. Impact on existing public utilities such as drinking water supply pipelines, electrical poles, power lines and telephone lines, resting places, tube wells, access roads to some villages	Very high	Major	Critical adverse	• Tube wells - new tube well before demolishing the existing one • Water supply lines – contractor will relocate the pipelines beyond the ROW – provision in the engineering costs • Electric poles and power lines – coordination with Nepal Electricity Authority for relocation • Telephone lines – Communication Department • Resting places – Coordination with local government. These resting places are around the trees • Access roads – Realign the roads before demolition of the existing roads	Minimal adverse
4. Impact on Wildlife	High	Minor	Moderate adverse	• Existing Fencing of Saljhandi-Pipara forest that will be affected by the road widening will be relocated and upgraded to a predator-proof standard.	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
				• Installation of fencing in the Gorusinghe Forest to avoid entry of animals on the road • Conduct daily monitoring of all roadkill incidents over several months to understand the risks to wildlife and identify key locations of roadkill risk. • Design and construction of wildlife-friendly culverts and rains to allow passage of species such as herpetofauna and fish. • Construction of under passes to allow freedom of movement for large carnivore species in the areas of risk • Searches conducted by trained ecologists to check for fauna prior to vegetation clearing and ground-breaking works. • Workers induction and awareness programs will emphasize the need to protect biodiversity. • Faunal construction hazards (pits and trenches) to be mitigated and checked by appropriately trained staff. • Speed limits for construction vehicles in the forest areas (limit to 40 km per hour) with warning sign boards	
5. Impacts on the Terai Arc Landscape (TAL)	High	Moderate	Moderate	• Engagement with local TAL management authorities to understand their concern's potential impacts and develop agreed approaches. • Collaboration with TAL authorities in wildlife monitoring, including their participation and/or sharing of findings and lessons learnt.	Critical beneficial
Social impacts due to Project siting					
6. Partial Impact on 88 residential and commercial structures (mainly in verandas/front portions of structures) and full impact on 34 commerical and residential structures No land acquisition in the ROW	Very high	Major	Critical adverse	• Adequate compensation for affected households as per the entitlement matrix in the RAP. • Implementation of income and livelihood restoration activities • Implementation of a social development plan, including IPPF where relevant.	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
Environmental impacts and risks during construction					
1. Generation of spoils from excavation works for road widening and removal of road material from existing damaged roads(0.27 million cubic meters of cut material)	Minor	Minimal	Minimal adverse	• Existing excavations will be reused for filling purposes. The filling volume is required is 1.17 billion cubic meters	Minimal adverse
2. Generation of construction waste including hazardous waste Unused bitumen and concrete Lubricants, used oils,	High	Moderate	Major adverse	• Containers of adequate size and numbers in place for collection of various types of wastes (metal, rubbers, used fuels, batteries, etc.) • Procurement of services of a waste management contractor for transport and treatment of recyclable and hazardous waste • Empty containers will be returned to vendors	Minimal adverse
3. Generation of solid waste from campsites and offices (about xx kg per day). 500 workers per day - 200 from local community and 300 from outsiders, who reside in camps.	Very High	Moderate	Major adverse	• Implementation of the waste management plan • Segregation of solid waste into kitchen waste (organics), paper and plastic (recyclable) and garbage (non-recyclable). Placement of containers with adequate size and numbers. • Organic waste will be treated through on site composting, in-vessel composters • Recyclable waste will be compressed through bailers and use services of the vendors • Disposal of the garbage at the local municipal disposal site	Minimal adverse
4. Wastewater discharges from the construction camps, sites, and batching plants	Medium	Moderate	Moderate adverse	• Construction of wastewater treatment facilities at the campsite (e.g., septic tank and soak pit) and at the worksites (sedimentation tanks for batching and crushing plants and discharges from site drainage) • Monitoring of wastewater quality to ensure compliance with World Bank EHSGs	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
5. The potential risk of soil and water pollution by construction works	Medium	Moderate	Moderate adverse	• Storage of fuels and chemical in contained facilities • Availability of spill kits and trained personnel for immediate cleanup of any oil spills	Minimal adverse
6. Air and noise pollution from construction and traffic	Very High	Moderate	Major adverse	• Air and noise pollution control measures at the worksites and regular monitoring of ambient and noise quality to ensure compliance with National Ambient Air Quality Standards and Noise Standards • Compliance with Nepal Vehicle Emission Standards 2012 on vehicle and machinery emissions	Minimal adverse
7. Sourcing of borrow material (about 1.17 million cubic meters) for earth embankment and aggregates (about 2.2 million cubic meters) for the road (including base and subbase) and bridge works	High	Moderate	Major adverse	• Reuse of excavated material to the extent feasible • Use of licensed quarry sites • Use of river bed sediments from the licensed borrow sites, sourced away from the active channels and during no or low flow seasons	Minimal adverse
8. Impact on river habitat due to quarrying and bridge construction (Banganga River, Tinau River, Dano River, Kanchan River)	High	Moderate	Major adverse	• Control of wastewater and sediment releases to the river • Using dry river beds for excavation • Using licensed quarry sites • No quarrying during the rainy season or high flow seasons • Restoration of the borrow sites after completion of the works	Minimal adverse
9. Impacts on flora, including community forests	High	Minimal	Minimal adverse	• No siting of any temporary facilities with the forest areas • Use of non-wood fuel for cooking and heating • Code of conduct for workers and employee's protection of flora and fauna and a ban on tree cutting and hunting. Any violation of code of conduct leads to strict punishment, including termination of employment • Awareness-raising to workers on the wildlife • Spread of invasive alien species	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
10. Spread of Invasive Alien Species	Moderate	High	Moderate	• Construction vehicles will be brought into the site in an as-clean-as-new condition to ensure that invasive plant material and seed-bearing soil are not introduced. • All vehicles will be cleaned on a regular basis. • Invasive alien species will be regularly controlled in construction vehicle parking areas. • Construction sites will be rehabilitated at the earliest opportunities, and rehabilitation plans will IAS control measures appropriate to the IAS risks prevailing in the project area.	Minimal adverse
11. Impact on fauna, including wildlife movement	High	Moderate	Moderate adverse	• Installation of fence and culvert at forest areas • Additional ecological survey on mammals and herpetofauna during detailed design • Capacity building and awareness raising of forest communities • Compensatory tree plantation using locally indigenous species • Continuous monitoring of animal crossing and road kills in the forest areas • Avoiding contractor facilities within or near the forest areas	Minimal adverse
12. Illegal wildlife trade	High	Moderate	Moderate adverse	• All bidding documents and construction contracts are to include specific provisions forbidding hunting or collecting natural resources of workers. • The PCU will provide a safe and anonymous line for reporting activity for workers, communities or any stakeholders whereby they are safe from retribution from other community members, organized crime or government officials	Minimals adverse
Occupational Health and Safety Risks					
13. Occupational safety risks on workers due to hazards associated with the construction activities	High	Moderate	Moderate adverse	• Development and implement occupational health and safety plan	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
(instream, mountain slopes, working on heights and trenches, cold weather, etc.)				• Regular training program for workers on occupational health safety (monthly training and daily toolbox talks) • Incident investigation and reporting • Conduct a 'job hazard analysis' at the new construction site to identify potential hazards and implement necessary control measures. • Use of relevant personal protection equipment at all times • Availability of firefighting, fully equipped ambulance, first-aid and rescue facilities at the site	
14. Potential health risks due to inadequate facilities in the campsites (about 300 non-locals, live in construction camps)	High	Moderate	Moderate adverse	• A construction camp will be built with all adequate facilities (safe drinking water and sanitation, kitchen, rest areas, recreation) for labor. Cleaning of the campsite on a daily basis. • The Contractor shall establish a mechanism to collect the complaints from the workers and address those complaints by the approved GRM plan • Drinking water complying National Drinking Water Quality Standard 2005	Minimal adverse
Social Impacts and risks during construction					
15. impact on traffic from road construction and temporary traffic diversion. Increased traffic congestion and safety hazards due to increased traffic on local roads especially for children and elderly people	High	Moderate	Major adverse	• Implement a traffic management plan (e.g., avoiding school hours, following sped limits, hiring licensed drivers, etc.), including awareness-raising and safety measures • Carry out road safety campaigns along the RoW	Minimal adverse
16. Community exposure to work hazards and communicable diseases such as HIV/AIDs, COVID-19 (about 19	Very high	Moderate	Major adverse	• Barricade the work areas (near the settlements) with hard fencing to prevent the entry of community in the construction areas.	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
villages and bazars along the project road)				• Placing adequate signboards and flagmen to divert the community away from the construction works. • Community awareness programs on construction-related hazards, including awareness programs in schools	
17. Dust from earth works and construction vehicular movement and construction equipment	Very high	Moderate	Major adverse	• Frequent sprinkling as per weather requirements of water on the local roads and worksites to control dust emissions • Dust control measures at the worksites	Minimal adverse
18. Employment generation for the local community (mostly construction related jobs)	Very high	Moderate	Major beneficial	• The hiring of the local community during construction works (about 300 workers on average regularly and about 500 during peak construction for five years) • Implement a labor management plan • Formal contracts to be signed with labor.	Major beneficial
189. Risk of child labor	High	Minimal	Minimal adverse	• No hiring of workers less than 18 years of age	Minimal adverse
20. Impacts from labour influx and potential cultural conflicts between communities and workers	High	Moderate	Moderate adverse	• The contractor's code of conduct shall cover a program to promote awareness to the construction workers on respecting the local community. • Construction camps will be built in the designated areas, located away from the local settlements • The Contractor's monthly training program will cover topics related to respectful attitude while interacting with the local community • Follow COVID-19 protocols.	Minimal adverse
21. Risk of gender-based violence (GBV), sexual exploitation and abuse (SEA), and sexual harassment (SH)	High	Minimal	Minimal adverse	• Community sensitization. • Socio-economic development of women. • Orientation to labour force. • Code and conduct to guide the workers on how to relate with the community. • Orientation of Supervision Consultant and Contractors on GBV	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
				• Mapping of GBV service providers for prevention and response. • Develop and implement a GBV Action Plan.	
22. Chance finds during construction	High	Minimal	Minimal adverse	• Inclusion of chance find procedures in the ESMP and bidding documents	Minimal adverse
Environmental and Social impacts during Operational stage					
1. Workers health and safety during maintenance	High	Moderate	Moderate adverse	• Establishment of work zones to separate workers on foot from traffic and equipment • Reduction of vehicle speeds in construction areas • Training of workers	Minimal adverse
2. Community health and safety during maintenance	Very high	Minor	Moderate adverse	• Provision of safe corridors for pedestrian movement • Traffic calming measures • Road safety signs	Minimal adverse
3. Impact on Flora and Fauna	High	Minimal	Minimal adverse	• Recording the road kill at three forest blocks in coordination with divisional forest offices • Monitoring the use of culverts by wildlife species, especially snakes and other reptiles • Assessment of need of additional culvert/wildlife crossing structures along the road based on the monitoring result • Compensatory plantation (including monitoring and maintenance of saplings) • Regular cleaning/ clearing and maintenance of all culverts to reduce the chances of failures and blocking • Regular inspection and maintenance of fencing installed/maintained in the forest areas • Maintain speed limits and sign boards	Major beneficial

5.3 Environmental Issues Mainstreamed in the Project Design

Environmental and social aspects have been considered in the planning and design of the Project facilities. These include:

- Road safety has been considered all along the road, especially at the major and intersections with the local roads and near the major villages and market areas. These measures include:
- Raised pedestrian footpaths and cycle lanes in urban areas
- Installation of traffic lights in all major intersections along with zebra crossings and road humps
- Footbridges at six locations at intersections where schools, colleges and hospitals are located
- Other safety measures such as provision of road signs, delineators, barriers and pavement markings, minor realignment at identified black spots, including pedestrian footpaths in market areas.
- Universal access measures for disabled and elderly for accessing the footbridges and road crossings.

- Protection of landslides and river banks from erosion
  - Implementation of Bioengineering and retaining structures, specifically RCC Modified Wall, Geo-Grid Wall and Semi-Flexible 3D Galvanized Steel Mat. Other measures such as terracing and weep holes to maintain sub-surface drainages etc. will also be implemented
  - Avoid haphazard excavation of slopes.
  - Bank protection works near the proposed bridge sites
  - Stabilizing the excavated slopes and river banks with retaining structures
- Impact on wildlife movement
  - Reinstallation of existing barbed wire fences affected by widening in Saljhandi-Pipara forest.
  - Construction of barbed wire fence in the forest areas near Gorusinghe
  - Speed limits in the forest areas (limit to 40 km per hour) with warning sign boards
  - Box culverts for snake and turtle crossing (last one kilometer section)
  - Developing Underpass structures under Kothi river in Saljhandi-Pipara forest
- Further, the Green Resilient Highway Concept of the overall BBIN 1 program (under Component 2c) will support the development and approval of an integrated strategy, concept and action plan that balances equitable transportation functionality and ecological sustainability at the landscape level. The concept, strategy and action plan will be developed based on an in-depth risk assessment of the entire East West Highway corridor and its adjacent area beyond the right of way. The strategy and action plan will provide a road map for the implementation of demonstrative incremental interventions beyond measures financed under the ESMP, for later scaling up at country and regional levels, such as:
  - providing wildlife with adequate crossing points and maintaining habitat connectivity to reduce road kills using Nepal's newly developed wildlife friendly guide for linear infrastructure;
  - restoring watersheds for reduced erosion, enhancing drainage, river bank protection and flood control;

- identification of lands for incremental afforestation interventions with support of provincial ministries (e.g., using silvicultural principles, natural and artificial regeneration, and through forest awareness raising and planning);
- investing on wildfire management through forest fire detection and monitoring systems (e.g., use of Moderate Resolution Imaging Spectroradiometer (MODIS) data to detect, locate, characterize, and monitor forest fires); and improving slope stabilization through bioengineering and Nature-based Solutions (NbS) principles. Other considerations include the installation of fencing, speed breakers, display boards, NbS noise barriers along the corridor, and creation of a roadkill recording system, integrated land use mapping system, and riverbed scour protection

5.4 Impacts from Project Siting

5.4.1 Environmental Impacts from project siting

5.4.1.1 Improvement of Trade and Communication

The proposed road upgrading works will improve the connectivity on the East-West High and the trade with the neighboring countries. The road is located (within 20km) close to three border crossing points (Belhiva, Kanuwa and Krishnanagar) with India. The road provides quick access to the Butwal city, and its educational, medical and other emergency facilities. The implementation of proposed project will address the existing environmental problems along the proposed alignments, such as landslides, dust pollution and waste management. The life of vehicles will be increased due to the improved road conditions. The price of adjacent lands after the improvement of transportation corridor will increase significantly, especially in the places with fertile soils and scenic landscapes due to increase in economic activities. The land owners will be benefited directly from the increment in the price of land. More shops, hotels and other economic activities will be developed along the new proposed highway alignment. The poor people will be benefited indirectly through the growth of demand in jobs such as services, agriculture and industry.

5.4.1.2 Loss of Forest Vegetation

The road alignment of the project falls in the tropical zone with the forest dominated by Shorea robusta (Sal) forest and patches of Dalbergia-Acacia forest along the riverine sections. The major blocks of forest area are distributed from the chainage KM 611+870 to KM 617+730 (5860m) in the Rupandehi district. The other major forest zones are KM 626+970 to KM 635+200 (8130m) and KM 637+720 to KM 639+000 (1280m) in the Kapilbastu district. The proposed road widening in this 15.2 km road length require clearing of about 28 of forest and felling of 7186 forest trees. In addition, 2200 road side trees from other sections of the road will also be removed. The affected trees in the forest are mainly wood trees. The trees along the other sections of the road are also wood and ornamental trees.

Details of affected trees are given in Table 5.5. Out of 9386 trees, 5,517 are trees, 1,691 are pole size and 2,255 are saplings. From forest 7,109 number and from public land total 2,277 number will be loss. As shown in the table, maximum number of trees will be removed from Tilaurakot collaborative forest whereas minimum tree loss will be Mayadevi community forest. This shows that due to road construction causes significant loss of tree volume and biomass. The project will apply the mitigation hierarchy to avoid, minimize, mitigate and compensate for damage to forests and trees needing to be cut.

Table 5-5: Total Number of Tree Loss In terms of Land Ownership from RoW of BG Road

Land ownership	Number of Trees			
	Sapling	Pole	Trees	Total
Majhaula Community Forest	36	23	2	61
Nabajagriti Community Forest	9	96	103	208
Pragati Community Forest	107	16	178	301
Saljhandi Community Forest	46	33	164	243
Shanti Community Forest	34	109	133	276
Tilaurakot Collaborative Forest	1648	478	1283	3409
Butwal Community Forest	0	4	405	409
Jiteshowr Community Forest	1	0	214	215
Mayadevi Community Forest	2	0	32	34
Mayadevi Collaborative Forest	90	19	1566	1675
PiprakotMahila Community Forest	1	0	21	22
Siva mandir Community Forest	0	0	16	16
Government Forest	44	134	139	240
Public land/Settlement	237	779	1261	2277
Total	**2255**	**1691**	**5517**	**9386**

2,136 number of *Shorea robusta(Sal)* tree will be loss from all type of forest during road upgrading, which is highest number in terms of species loss. Sal is one of the most important sources of hardwood timber in Nepal. 70 numbers of *Ficus religiosa (Pipal)* will be loss which is used by local people for resting places along the settlement area. 4 numbers *Pterocarpus marsupium(*Indian kino*)* will be loss which is important as per conservation.

Mitigation

DoR will implement the following compensation and enhancement measures as per RAP

- The loss of vegetation from forests will be compensated through cash compensation to the Forest Department for the loss of trees and replantation of trees (a mandatory requirement of planting 10 new trees of indigenous species per each tree cut).
- The project will develop tree plantation in the median of road. About 1,000 locally indigenous tree and shrub species will be planted all along the median and rehabilitated sites (suggested distance between each tree is 3m but may be adjusted to be appropriate for the species being planted). The tree plantation will be carried out by the contractor and will be later maintained by DOR
- A budget of USD 600,000 has been allocated in the project budget for the above measures. Details of activities to be implemented under this budget will be worked out during the project implementation by the E&S staff of DCID in consultation with the forest and wildlife departments, and the final list of activities will be shared with the World Bank prior to their implementation.

With the above compensation and enhancement measures, the residual impacts of vegetation clearance have been assessed as minimal.

5.4.1.3 Impact on Public Utilities

The proposed widening works Impact on existing public utilities such as drinking water supply pipelines, electrical poles, power lines and telephone lines, resting places, tube wells, access roads to some villages. These affected utilities are

- Solar street lights – 55
- Tap – 46
- Telephone pole – 328
- Transformers – 67
- Electric pole (concrete) – 1646
- Electric pole – steel – 163
- LT line – 53

If the public utilities are not located prior to construction works, there will be significant impacts on the public services provided to the local communities.

The DOR will take the following actions to address the utilities relocation. These works will be carried out through the road contractor prior to the start of main construction works. The DOR will coordinate with the relevant agencies for utility relocations.

- Tube wells - new tube well before demolishing the existing one
- Water supply lines – contractor will relocate the pipelines beyond the ROW – provision in the engineering costs
- Electric poles and power lines – coordination with Nepal Electricity Authority for relocation
- Telephone lines – Communication Department
- Resting places – Coordination with local government. These resting places are around the trees
- Access roads – Realign the roads before demolition of the existing roads
-

1.1.1.1 Impact on Wildlife including critical habitat species

The project road is not passing through any documented wildlife corridors. However, some road kills are reported in the three forest zones that road crosses which provide habitat for some mammals (not threatened species). Road kills of some animals such as jackal and jungle cats, are reported in the Gorusinghe Forest area and there is therefore some fragmentation of wildlife populations occurring, particularly for small predators. Widening of the road corridor will increase this impact. Road kills of snakes and frogs are reported in Bodhi forest zone. No road kills are reported in Saljhandi-Pipara forest block since it already has a fencing on both sides of the road. However, the existing fence is barbed barbwire fence may injure the animals during the night. The existing box culverts and bridges in the highway, primarily at the forest areas, are serving at the underpass for wildlife movement; installation of wider box culverts will further minimize the wild mammal road kill. The proposed road improvement works may pose more risks to the animals, and these impacts area assessed as moderate.

Mitigation

Following measures will be implemented to address road kills of mammals

- Select the design and location of predator proof fencing with mesh wire, the base dug into the ground and sufficient height, for the road alignment through the forest blocks
- Identify the best locations for wildlife crossings along the road alignment through monitoring of road kill locations, assessment of forest habitats and wildlife modelling to allow freedom

of movement for species up to the size of large carnivores occurring in the area (hyaena and leopard)
- Identify the most appropriate designs for underpass wildlife crossing infrastructure that is sufficiently large to accommodate large carnivores, and incorporate the recommended wildlife crossing locations and structures into the detailed road design
- Selection of compensatory planting location considering ecological connectivity and potential wildlife movement
- Bridge foundation design considering terrestrial and aquatic species movement and habitat
- Conduct additional field surveys/monitoring to better capture the mammal movement/roadkill in the forest blocks

Following measures will be implemented to address road kills of reptiles

- Conduct additional field survey/monitoring to better capture the risks on herpetofauna species due to the current road operation and potential impacts due to the road upgradation especially at three forest blocks. Survey should be conducted before the completion of detailed design for the road upgradation.
- Identification of suitable location for reptile-proof fencing and installation of appropriate culvert/tunnels.
- Two hotspots for snake road kill (83.009863°E 27.657455°N; mileage-638+760 and 83.003008°E 27.656003°N; mileage-639+450) was recorded in Badhare forest block during the field survey. While the forest block is degraded, it is in the process of restoration after being transferred as community forest. The forest block extends for 1.28 kilometers (Mileage from 637+720 to 639+000). Two herpetofauna tunnels in the Badhare forest block will be installed to minimize the snake road kill.

1.1.1.2 Impacts on Terai Arc Landscape

The East-West Highway traverses through the Terai Arc Landscape (TAL) and has been identified as one of the major threats to this area. The TAL Strategy and Action Plan (2015 to 2025) identifies the operation of the road (referred to as the Hulaki Road) as a primary to the TAL through the intersection of wildlife corridors obstructing the movement of wildlife. Improved protection and conservation of TAL provides opportunities for compensating impacts to biodiversity to achieve no net loss and net gain outcomes required by ESS6.

Mitigation

- Ongoing engagement with local TAL management authorities will be maintained during project design, construction and operations to understand their concerns potential impacts and identify opportunities for collaborative approaches to alleviate adverse impacts of the project and improve the protection and management of the TAL.
- Establish collaboration with TAL authorities in wildlife monitoring, including the participation of TAL staff and sharing of findings and lessons learnt.

1.1.1.3 Impacts on Critical Habitat Features

Where critical habitat features are subjected to project impacts, ESS6 requires net gain to be demonstrated for the biodiversity values for which critical habitat was designated. Net gains are defined within ESS6 as additional conservation outcomes that can be achieved for the biodiversity values for which the natural or critical habitat was designated and may be achieved through the implementation of additional programs *in situ* to enhance habitat and protect and conserve biodiversity.

An assessment of critical habitat identified three faunal species, namely Fishing Cat (*Prionailurus viverrinus*), Striped Hyaena (*Hyaena hyaena*) and Elongated Tortoise (*Indotestudo elongata*), that qualify under ESS6 critical habitat Criterion (a) and are potentially impacted by the project. These species are threatened by poaching, direct persecution and illegal trade. There is no evidence of direct impact to these species due to the project, however these species are potentially adversely impacted through road kills or disturbance by construction activities.

Data is not available to quantify impacts to these species, however impacts are expected to be minimal as these species are rare, and limited forest habitat exists on the south side of the project road providing limited incentive for tortoise and hyaena to cross the road. Fishing cats are strongly associated with wetland and river habitats. Large bridges are installed at river crossings that allow movement along rivers and these cats have minimal incentives to cross the road.

Mitigation included within the ESIA to address impacts to these species include:

- Installation of predator and reptile proof fencing to keep animals off the road,
- Provision of wildlife crossings, for which the locations and design of crossings will be optimized through further studies during the design phase,
- Measures recommended by the World Bank Paper[7] to address illegal wildlife trade at the project level shall be implemented. These include requirements on contractors to implement induction and awareness programs for staff and workers to highlight the importance of biodiversity and provide the basis for enforcement of policies that prohibit the killing of animals, taking of pets and any engagement in consumption or trade in wildlife products.

Many additional measures provided within this ESIA to address environmental, biodiversity and social impacts will indirectly benefit these critical habitat species.

Residual impacts similarly cannot be quantified, however the residual impact to these species is expected to be minimal. Limited measures are therefore needed to demonstrate net gain required under ESS6.

This project is an early phase of the wider development of the East West Highway that traverses the full length of the Terai Arc Landscape (TAL) and impacts to the TAL are identified among the cumulative impacts. The TAL Strategy and Action Plan (2015 to 2025) includes a broad set of actions for improved management and conservation of the TAL. These include strengthening the surveillance and monitoring capacity. This ESIA includes requirements to develop wildlife crossings and to monitor their use by wildlife. Collaboration with and involvement of TAL management staff in the design, location and development of crossings provides an opportunity to improve their capacity for addressing similar cumulative impacts associated with the East-West Highway. Collaboration with and involvement of TAL field staff in monitoring the use of wildlife crossings is also proposed to grow capacity at the grassroots level.

Improved protection prey populations will contribute towards improved conservation of carnivores, and collaboration actions with TAL authorities proposed here will exceed the expected impacts to critical habitat species and contribute towards their net gain.

[7] World Bank Paper - Illegal Logging, Fishing, and Wildlife Trade : The Costs and How to Combat it. (https://openknowledge.worldbank.org/handle/10986/32806)

5.4.2 Social Impacts from Project Siting

5.4.2.1 Land acquisition and Resettlement

The project will partially affect a total of 122 private structures from 120 households and all these affected structures have been constructed by encroaching the right of way of the existing road. Therefore, these structure owners are non-title holders. Among the 122 total affected structures, 88 strcutures will be partially affected and 34 structures will be fully affected. The fully affected structures include 15 residential structures, 6 residential structures, 3 residential cum commercial structures and 9 secondary structures associated with the residences such as cattlesheds. . Further, structures belonging to 5 private institutions (such as boundary walls of schools) will be partially affected. Additionally, 206 public structures (such as bus shelters and resting places around the trees) will be impacted and need to be shifted beyond the RoW . The details of the affected private structures are given in Table 5.6.

Table 5-6:: Resettlement Impacts of the Project

Affected Structures	Partially Affected Structures	Fully Affected Structures	Total Affected Structures	Households Affected	Affected Persons
Residential Structures	34	16	50	50	275
Commercial Structure	9	6	15	15	83
Residential cum commercial structure	42	3	45	44	242
Associated structures	3	9	12	11	60
Total	**88**	**34**	**122**	**120**	**660**

Source: Loss Inventory Survey Jan 2022

Details of fully affected structures are further eloborated in Table 5.7.

Table 5-7:: Details of fully affected private structures

Types of Structures	Fully affected	No of HHs	No of Persons	Remarks
Residential Structures	16	16	88	Physical displacement
Residential cum commercial structure	3	3	16.5	Physical displacement
Commercial Structure	6	6	33	No physical displacement
	19	**19**	**138**	

Details of public structures affected by the road widening are given in Table 5.8. Most of the structures are roadside bus shelters (for waiting and resting of travelers and locals) and sitting platforms around the pipal and banyan trees (locally called as *Chautaro*).

Table 5-8:: Details of Public Affected Structures.

S. N	Types of Structures	Number
1	Chautara	105
2	Passenger Waiting shed	65
3	Temple's stairs or outsiders sitting areas	14
4	Public Toilet	2
5	Public Water Tank, Water Taps.	4
7	Public figure statue & Notice Board	3
8	Schools / Hospitals	3
9	Police check post, entrance gate, Traffic direction post	10
	Total	**206**

Source: Loss Inventory survey 2022

Mitigation

A Resettlement Action Plan (RAP) will be prepared to address and mitigate the impacts on the affected households. The objective of the plan is to improve or at least restore the income and livelihood conditions of the people to at least the pre-project level. The households affected will not only receive cash compensation for land and other assets at prevailing rates for full replacement cost, but also additional assistance will be given for relocation and livelihood restoration. Overall, the RAP presents (a) socio-economic profile of the affected settlements; (b) type and extent of loss of assets; including land, structures, and trees; (c) principles and legal framework applicable for mitigation of these losses; (d) the entitlement matrix; (e) income and livelihood restoration program; (f) relocation and resettlement budget; (g) institutional framework for the implementation of the plan, including monitoring and evaluation.

The livelihood impacts on the affected businesses and

- Compensation will be paid to the affected households for lost income from businesses and trees in accordance with RAP. Additional cash compensation will be paid to vulnerable households.
- Livelihood restoration measures will also be implemented in accordance with the RAP
- Provision of temporary employment in the construction works

With the above mitigation measures, the residual impacts on resettlement and livelihood have been assessed as minimal.

5.5 Environmental Impacts and Risks during Construction

5.5.1 Generation of spoils

Excavations for earth works for road widening and drainage structures and removal of road material from the damaged sections of existing roads will generate about 0.27 million cubic meters of cut material. Most of the cut material can be used as fill material for embankment construction and road material can be used as the base or subbase or for retaining structures provided the fragmented rock meets the quality standards needed for the work. Disposal of spoils is not anticipated due to potential use of all cut material.

Mitigation

The contractor will implement the following mitigation measures to minimize the generation of spoils:

- Minimize the generation of spoils by reusing it for construction of road embankment
- recycling the excavated road material to the maximum extent possible by using them as the aggregate material in the base subbase, concrete works, and filling of embankments and retaining structures
- If spoil disposal is needed, the borrow sites developed for the project will be used as spoil disposal sites. The spoils will be used for the restoration of the borrow sites.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.2 Generation of Construction and Hazardous Waste

The construction works generate large quantities of excess materials from construction sites (concrete, discarded material, etc.) and wastes from workers camps and construction yards, including other debris. In addition, small quantities of hazardous waste will also be generated mainly from the vehicle maintenance activities (liquid fuels; lubricants, hydraulic oils; chemicals, such as anti-freeze; contaminated soil; spillage control materials used to absorb oil and chemical spillages; machine/engine filter cartridges; oily rags, spent filters, contaminated soil, etc.). It is imperative that such waste is responsibly disposed of to avoid adverse environmental and human health impacts.

Mitigation

The following mitigation measures will be implemented:

- Before commencing the construction activities, the contractor will be required to prepare a Waste Management Plan, including hazardous waste management and submit it to the PCU for their review and approval. The plan will cover - manage hazardous material use, storage, transport, and disposal.
- The contractor will place containers of adequate size and numbers in place for the collection of various types of wastes (metal, rubbers, used fuels, batteries, etc.) from the worksites, and transport these wastes regularly to a centralized facility.
- The contractor will return the empty containers to the suppliers.
- Handling chemicals properly. Storage of chemicals 100 meters away from any water sources.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.3 Generation of Solid Waste

Solid waste will be generated from the construction camps and offices, which include food waste, paper and plastic, and garbage. About 300 workers live in the construction camp and the average solid waste generation per worker is 0.5kg per day. Thus, the total quantity of waste generated from the camps will be 100 kg per day. Most of these wastes will be food waste. If these wastes are not properly managed, they may harm the environment and health of workers and nearby communities.

Mitigation

The following mitigation measures will be implemented by the contractor:

- Before commencing the construction activities, the contractor will be required to prepare a Waste Management Plan and submit it to the PCU for their review and approval.

- Collection and segregation of solid waste into kitchen waste (organics), paper and plastic (recyclable) and garbage (non-recyclable). Three kinds of waste bins (with different colors) with adequate numbers and capacities will be placed at the campsite (kitchen, offices, rooms) for the segregation of the waste at source.
- Organic waste will be treated through onsite composting
- Procure the services of waste management contractors for the collection and management of recyclable waste. Recyclable waste will be compressed through bailers to minimize the volume of waste to be stored and transported.
- Local municipal waste disposal sites will be used for the disposal of garbage. No disposal sites will be established by the contractor.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.4 Wastewater Discharges from Construction Sites

The potential sources of waste water generation in the construction sites are batching plants, crusher plants, construction yards and workers camps. The wastewater discharges from the batching plants contain high sediment loads and high pH value. The wastewater used in the crushing plants also generate high sediment yield. These discharges will impact the soil and groundwater quality and aquatic environment if they are discharged into rivers and streams without any prior treatment. The groundwater located within the river bed would be affected by the wastewater discharges. Other wastewater discharges from the construction sites include sanitary effluents from workers camp, and vehicle and machinery washing facilities.

Mitigation

The following mitigation measures will be implemented:

- Sedimentation ponds, of adequate size and capacity, will be built for the treatment of discharges from the batching plants and the crushing plants to allow the sediments to settle. Final discharges from the sedimentation ponds shall comply with World Bank EHSG standards for wastewater standards. The settled sediments will be periodically removed and will be disposed of at the designated spoil disposal sites.
- Construction of wastewater treatment facilities at the campsite (e.g., septic tank and soak pit) and site drainage)
- The contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the water
- Quarterly monitoring of wastewater quality to ensure compliance with the standards.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.5 Risk of Soil and water pollution from Construction Works

During construction, there is a high risk of accidental spills and leakages from fuel and oil tanks, vehicles, machinery and stored chemicals that are used in construction areas, yards, batching plants, worker camps, and storage sites. Earthworks for site preparation and foundation during rainy periods may carry the sediment load to the nearby water bodies. Other potential sources of soil and, surface water and groundwater pollution are improper storage and handling of materials, including hazardous materials, discharges from the construction sites and material storages, lack of proper drainage facilities, spillage of fuels, erosion from material stockpiles, etc.

Mitigation

The following mitigation measures will be carried out by the contractor to minimize soil and water pollution.

- Storage of fuels and chemicals in contained facilities and take appropriate measures to avoid and contain any spillage
- confine the contaminants immediately after such accidental spillage and cleanup of oil spills using spill kits.
- Collect contaminated soils, treat and dispose of them as a hazardous waste
- Topsoil from cultivated lands in the construction areas to be stripped and stockpiled where practical for later use for restoration of spoil disposal sites.
- Temporary stockpiles to be protected from erosion.
- Contractor will develop pollution prevention and emergency response plan as part of C-ESMP and submit for PCU approval. The plan will details procedures to minimize and address risk of soil and water pollution.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.6 Air and Noise Pollution from Construction

During construction, air and noise emissions from the construction activities will cause temporary nuisances to the residents along the ProJect road. Due to ribbon development along the project road, many residences and businesses are located adjacent to the road and will be subjected to air and noise pollution from construction activities. Major sources of air and noise pollution are earth works, emissions from construction-related traffic and equipment. The construction activities will also generate airborne dust and particulate matter. The dust raised from the above activities will have impacts on crops, animals and public health.

Mitigation

The following mitigation measures will be implemented;

- Construction equipment and vehicles will be well maintained so that emissions are minimal and comply with emission standards of Nepal Vehicle Emission Standards 2012.
- Crushing and batching and asphalt plants will be located a minimum 500 m away from residential areas and will have appropriate dust/emission suppression mechanisms such as wet scrubbers
- Dust generation from construction sites would be restricted as much as possible, and water sprinkling would be carried out throughout the construction period.
- Construction activities near the settlements will be limited to daytime only
- High noise-producing equipment will be provided with mufflers or acoustic enclosures.
- A GRM will be put in place to receive complaints from the public on various aspects of environmental issues, including noise pollution. These grievances will be addressed by the contractor by adopting the necessary measures.
- Quarterly air and noise quality monitoring will be carried out in the project area to ensure compliance with national on ambient air and noise quality.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.7 Impacts from Quarry and Borrow Activities

About 2.2 million m^3 of aggregates and 1.17 million cubic meters of fill (borrow) material will be required for construction activities. Improper siting and extraction of these construction materials will have significant impacts on the physical and biological environment on the quarry and borrow areas. Locations

of potential borrow and quarry sites and estimated quantity of materials available at these sites are give in Table 2.8.

Mitigation Measures

The following mitigation measures will be implemented:

- The contractor will develop quarry and borrow areas procurement and management plan submit it for approval of PCU.
- The contractor shall use the government-approved quarry sites for the procurement of aggregates.
- Reuse of excavated material from the construction sites to the extent feasible.
- Source the river bed sediments from the licensed borrow sites, sourced away from the active channels and during no or low flow seasons and non-perennial streams.
- Although the material is widely available, the quarrying/mining activities will be limited to fewer areas to reduce the area of extent affected by quarrying activities. If any mining activities are to be carried outside the project area, they should be not be located in any sensitive areas.
- Maintain a buffer zone of 5 to 10m between the low flow channel and the mining operations to minimize the downstream impacts and limit the excavation activities to the low flow season 9non-monsoon).
- Borrow sites will be restored after completion of the works

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.8 Impact on River Habitat due to Instream Construction Activities

Construction activities in the river, for bridges and bank protection works have the potential to adversely affect aquatic biota by the release of high concentrations of sediment during the construction of cofferdams, erosion/run off from river bank and accidental spillage of fuels. Quarrying activities for procurement of material from rivers also generate high sediment load impacting the water quality. Potential quarry sites in the project area that can be used during construction are Banganga River, Tinau River, Dano River, and Kanchan River. Government approved existing quarry sites are located near these rivers.

Mitigation

The following mitigation measures will be implemented:

- Contractor will use the existing quarry sites operated with the government licenses.
- No new sites will be established by the contractor. If any new sites to be developed, contractor will develop quarry and borrow pit operation plan and obtained approval from supervision engineers prior to operation of quarry.
- Avoid haphazard quarry along the riverbank and hills. Permanent barricade at quarry location for safety, established safety signage boards, and installed noise barrier.
- Control of wastewater and sediment releases to river
- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into the River.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil and lubricants, and grease.
- Machinery leaking fuel, lubricants, hydraulic fluids, or solvents shall not work within the river.

- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use.
- Restoration of the borrow sites after completion of the works

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.9 Impact on Flora

The potential impacts on flora during construction include cutting of the trees by worker for fuel, and clearing of vegetation for establishing the temporary construction facilities such as workers camps, material storage sites and other facilities.

Mitigation

The following mitigation measures will be implemented:

- The contractor's code of conduct for workers will include conditions on the protection of flora and fauna and ban on cutting of trees and ban on hunting and poaching of wildlife. Employees found violating would be subject to strict actions including fines and termination of employment.
- Use of non-wood fuel for cooking and heating.
- No temporary construction facilities will be establish in the forest areas
- Awareness-raising to workers on the protection of flora and fauna
- Compensatory plantation of locally indigenous trees and shrubs (mainly, identification of location, selection of appropriate species, preparation of nursery and availability of horticultural skills)

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.10 Spread of Invasive Alien Species

Invasive alien species (IAS) present a significant risk to biodiversity and are easily spread by linear projects unintentionally or intentionally through lack of awareness of the risks. Measures are therefore required to not intentionally introduce any new alien species (not currently established in the country) unless this is carried out in accordance with the existing regulatory framework for such introduction. Species with a high risk of invasive behavior must not be introduced regardless of whether such introductions are permitted. Measures will be implemented to avoid the potential for accidental or unintended introductions including the transportation of substrates and vectors (such as soil and weed-infested machinery) that may harbor IAS. Where IAS are already established in the region of the project, efforts are required to reduce spreading them into areas in which they have not already become established.

Mitigation

- All introductions of alien species (for example, as part of a rehabilitation program) will be subject to a risk assessment to determine the potential for invasive behavior with consideration of the Nepal regulatory framework for species introduction.
- Construction sites will be rehabilitated at the earliest opportunities, and rehabilitation plans will IAS control measures appropriate to the IAS risks prevailing in the project area.
- Construction vehicles will be brought into the site in an 'as-clean-as-new' condition to ensure that invasive plant material and seed-bearing soil is not introduced.
- All vehicles will be cleaned on a regular basis to prevent the unintentional spread of IAS withing the project area.
- IAS will be regularly controlled in construction vehicle parking and operational areas.

5.5.11 Impact on Fauna

Impact on Mammals. The tree clearance within RoW in the forest blocks without well-planned compensatory plantation would degrade wildlife habitat. If the existing barbwire fence in the Saljhandi-Pipara forest block were damaged/removed, this would increase the wildlife roadkill and/or human-wildlife conflict. The construction workers living in the camps are likely to use fuel wood for cooking and also, to some extent, in the winter season for heating purposes. Wildlife poaching would be possible without proper awareness-raising. Accidental spillage of oil and lubricant from construction equipment/vehicle and waste dumping in the forest areas, particularly from camp sites, would cause negative impacts on wildlife.

Impact on Birds. Construction phase will have limited impacts on the avifauna. Tree clearance within RoW will slightly reduce bird habitat, foraging and roosting trees. Increased people mobility and noise during construction might disturb the bird species and affect their behaviors. Dumping of wastes/chemicals and accidental spillage in springs, rivers and wetlands could affect the bird habitat at site specific level.

Mitigation

Following mitigation measures will be implemented to address the impacts on mammals:

- For road widening, the dense vegetation will only be cleared once it has been established that any individuals present have fled. Surveys will be conducted by trained ecologists before and during vegetation clearance or tree felling and major ground-breaking activities to check for active burrows, tortoises, snakes and lesser fauna. Any animals found will be removed and released to appropriate and predetermined safe locations. There should be no burning of natural vegetation. The borrow animals, if found during excavation, shall also be transported to a safe place.
- No workers camps and construction facilities should be constructed in or adjacent to the forest areas
- Rehabilitation of existing barbwire fence in Saljhandi-Pipara forest considering wildlife protection and designs appropriate to the affected wildlife species
- Installation of an appropriate fence in Gorusinghe forest block considering wildlife conservation and effectiveness
- Culvert/tunnel installation in the forest blocks based on the additional study on mammal movement/roadkill, location and design assessments
- Installation of traffic signs alerting speed limit
- Installation of wildlife crossing information/display board at 1km span and speed breakers in the forest blocks
- Pits and trenches during construction present faunal hazards and will be avoided where possible, capped and/or provided with escape route for small fauna. Unavoidable hazards will be regularly checked for small fauna by appropriately trained staff.
- A staff member trained as a snake handler and equipped to capture and translocate dangerous snakes and other reptiles without harm shall be available during vegetation clearing, ground-breaking activities and major construction works.
- Awareness-raising workshops with the forest user groups at the forest blocks regarding wildlife behaviors, road kills, wildlife poaching, human-wildlife conflict and traffic regulations
- Induction programmes and provision of regular training to workers on the potential impacts from their behavior and emphasize the need to protect biodiversity, abstain from wildlife poaching, avoid habitat degradation/ pollution and outline procedures and penalties that prohibit killing of fauna and/or any form of trade in bush meat or wildlife products.

- Inclusion of wildlife protection clauses in the code of conduct for contractors
- Construction site should be fenced to prevent the wildlife entry to the construction site
- Regular visual inspection of wildlife will be conducted by ecologist appointed in the contractors.
- Spill kits should be provided at each construction site where oils and chemicals are used.
- Regular maintenance of construction equipment and vehicle will be undertaken
- Oils and chemicals should be stored at designated storage with proposed spill/accident prevention and response measures such as the provision of secondary containment, MSDS and spill kit
- The organic waste should be properly stored and composted.

Following mitigation measures will be implemented to address the impacts on avifauna and snakes:

- The construction materials and their by-products should be stored away from watercourses. Especially, during summer/monsoon time, good care should be taken.
- No construction activities during the night time
- Large sapling plantation at road side should be carried as soon as the construction work completed. This will increase bird habitat, foraging and roosting trees specially in semi urban and rural area
- Road side plantation be made of the species which bear seed/fruit and have open/light canopy like simal (Bombax ceiba), etc.
- Ensure use of machines those produced low noise where feasible.
- Unnecessary noise generation during the construction work and post construction should be avoided through regular awareness and traffic no-horn zones.
- Training provision to workers on the potential impacts from their behavior including wildlife poaching and habitat degradation/pollution
- Inclusion of wildlife protection clauses in the code of conduct for contractors

5.5.12 Potential risks associated with an illegal wildlife trade

The project is located within an area that supports exceptionally rich biodiversity, which includes many threatened species. Annex 2 highlights the large number of Critically Endangered and Endangered species potentially present although many more species have a lesser threatened status. One of the primary reasons for species to be threatened is an ongoing illegal trade in wildlife and natural resources.

Road projects have the potential to exacerbate such threats through increasing access to natural areas, which without adequate protection can greatly increase hunting and collection pressure on sought-after species. Species groups of highest concern include medicinal and health products, turtles, raptors, pangolins, orchids, illegal timber and others). The influx of labor can be a major source of poaching. Construction workers are often mobile, well-resourced, and coming from far away, often with little incentive to conserve local resources. Demand for timber for construction work can be a driver of deforestation and traceability of such timber can be difficult.

Mitigation

- All bidding documents and construction contracts are to include specific provisions forbidding hunting or collecting natural resources of workers. Contracts can also include articles that require use of access controls/checkpoints, zero tolerance of any illegal biodiversity resources in worker

camps (such as wildlife products sold to construction workers; products of illegal hunting along access roads; pets taken from the wild) and offer workers appropriate food/canteen options that will reduce demand for seeking local food options.

- The PCU will provide a safe and anonymous line for reporting activity for workers, communities or any stakeholders whereby they are safe from retribution from other community members, organized crime or government officials.
- If a crime is committed, national authorities need to be alerted immediately. In addition, sometimes, live animals can be rehabilitated, and the appropriate national authorities or non-government organizations need to be contacted to collect the animals to avoid risks of harm to people and the animal(s).
- Contractors shall be responsible for demonstrating that timber procurement is limited to those suppliers that can demonstrate that timber is legitimately sourced and does not contribute to significant conversion or degradation of natural or critical habitats.

5.6 Occupational Health and Safety Risks during Construction

5.6.1 Occupational Safety Risks in Construction

Some of the Occupational Health and Safety risks which are likely to arise during the construction phase are typical to many large construction sites, which include: exposure to physical hazards from use of heavy equipment including cranes; working at height and electrical equipment; working on water, trip and fall hazards; exposure to dust, noise and vibrations; falling objects; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery.

Mitigation

The following mitigation measures will be implemented:

- The contractor will be required to prepare, obtain approval of, and implement an occupational health and safety (OHS) plan. These plans will be prepared in compliance with the World Bank Group's EHSGs and national regulations. If these guidelines cannot address any specific aspect of OHS, international good practices such as OSHA and ILO will be applied. OHS Plan should contain general guidance for all identified hazards under each work activities, and site-specific OHS hazard and risks during construction, and control and preventive Measures proposed by the Contractor. The Plan shall be reviewed and updated if there any changes in the construction methodologies.
- OHS Plan should contain general guidance for all identified hazards under each work activities and they should be presented in three discrete headings, (a) Contractor's Standards on the identified hazard management, (b) Expected Site-specific OHS hazard and risks during construction, and (c) Control and Preventive Measures proposed by the Contractor.
- The OHS plan will be reviewed and approved the Construction Supervision Consultant and the World Bank
- Conduct a 'job hazard analysis' at the new construction site to identify potential hazards that may arise from the proposed works or working conditions to the project workers and implement necessary control measures. The job hazard analysis should be part of the contractor's method statements, which will be reviewed and approved by the supervision consultants. The specialists of the supervision consultant will also visit the construction sites, prior to the start of construction, to ensure the control measures are in place.

- Regular site inspections and safety audits by the construction supervision team, both by the OHS specialist and the site engineers. Since the site engineers will present at the worksites all the time, they will be trained by their OHS team on monitoring safety aspects of the construction works.
- Regular training program for workers on occupational health safety (monthly training and daily toolbox talks). Special attention will be focused on safety training for workers to prevent and restrict accidents and on the knowledge of how to deal with emergencies.
- Incident investigation and reporting, including a complete record of accidents and near misses, will be maintained.
- In order to protect all project personnel and visitors, the Contractor will provide personal protective equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, body harness, protective clothing, goggles, fully face eye shields and ear protection. The contractor will also provide training to workers on how to use them and maintain them in a sanitary and reliable condition and replace the damaged ones immediately with the new ones.
- Availability of firefighting, ambulance, medical and rescue facilities at the site for implementation of an emergency response plan
- Adequate water supply and mobile toilets, medical and first aid care facilities at the worksites
- Contractors will have dedicated and qualified staff for ensuring compliance with the OHS Plan
- Awareness-raising material will be used, including posters, signage, booklets, and others at the worksites
- A complete record of accidents and near misses will be maintained.
- First aid facilities will be made available at the worksites and in the camps. The contractors will engage qualified first aider(s).

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.6.2 Occupational Health Risks in Construction

Potential health issues on workers are associated with the use of temporary accommodation sites include those relating to sanitation, disease, fire, cultural alienation, sleeping space, quality and quantity of food, personal safety and security, temperature control and recreation, amongst others.

Mitigation

The following mitigation measures will be implemented:

- The contractor will develop and implement a camp management plan
- The construction camp will be built with all adequate facilities (safe drinking water and sanitation, kitchen, rest areas, etc.) including entertainment facilities, so that there will be minimal interaction between them and local communities
- Separate facilities will be provided to men and women workers
- The Contractor shall establish a mechanism to collect the complaints from the workers and address those complaints by the approved GRM plan

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7 Social Impacts and Risks during Construction

5.7.1 Safety Hazards due to Increased Traffic

The road widening activities will affect the normal traffic on the highway and local traffic, and could lead to traffic congestion. The construction activities can potentially impact the residents of settlements along

project Road, particularly the movement and safety of school children and elders. Due to the increased use of trucks and other vehicles on the narrow roads in the project area, pedestrians, particularly elderly people and children will be more exposed to dangerous situations, leading to traffic accidents.

Mitigation

- The contractor will develop and implement a traffic management plan with adequate measures such as proposing traffic diversion measures, alternate routes for local traffic, avoiding school hours, following speed limits, hiring licensed drivers, etc.). The plan will be implemented with the aim of ensuring access to residential areas and preventing unsafe situations, especially near schools, housing areas, construction areas
- The road should not be stopped for existing traffic. The contractor will maintain the traffic on both sides of the highway by placing appropriate control measures and flagmen.
- Road signage will be fixed at appropriate locations to reduce safety hazards associated with project-related vehicular traffic.
- Liaison with traffic police will be maintained
- Project drivers will be trained in defensive driving.
- Ensure that all construction vehicles observe speed limits on the construction sites and on public roads
- Provide adequate signage, barriers, and flag persons for traffic control.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7.2 Community Exposure to Work Hazards, communicable diseases

Communities will be exposed to construction-related hazards due to excavation, heavy vehicular movements. These risks will be more at the construction works located close to the existing settlement (near 19 major villages and bazars)

Mitigation

The following mitigation measures will be implemented:

- Barricade the work areas with hard fencing to prevent the entry of community in the construction areas.
- Placing of adequate signboards and flagmen to divert the community away from the construction works.
- Implementation of traffic management plan near the construction sites
- Community awareness programs on construction-related hazards, including awareness programs in schools Construction activities such as blasting and excavation, particularly at the borrow areas, may pose safety risks to the nearby population.
- First aid medical facilities will be made available at the worksite.
- Campaigns on STIs and communicable diseases (e.g. HIV/AIDs, COVID-19)

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7.3 Dust from Construction Activities

The construction activities, particularly earthworks will generate airborne dust and particulate matter. In addition, vehicular movement along the local roads, for transport of quarry and borrow material, will also generate a lot of road dust. The dust raised from the above activities will have impacts on crops, animals and public health. The generation of dust will be a major issue in the construction.

Mitigation

Following measures will be implemented

- Dust generation from construction sites will be restricted as much as possible and water sprinkling will be carried out as appropriate, especially at those places where earthmoving, excavation will be carried out.
- Frequent sprinkling of water on the local roads and worksites to control dust emissions. The contractor has to mobilize adequate water sprinkling trucks.
- A GRM will be put in place to receive and address complaints from the public on various aspects of environmental issues, including dust pollution.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7.4 Employment Opportunities in Construction Activities

About 300 skilled and 200 unskilled workers will be required during construction on a continuous basis for about five years. During the peak construction period, the requirement of unskilled labour will be about 500. The project offers good opportunities for local residents to apply for employment as unskilled and skilled construction workers. The local communities during the stakeholder consultations have shown great interest to work in the construction activities. The contractor will be recommended to employ local workers and technicians to the extent possible. In addition to maintaining good relations with the local communities, maximizing local employment may also be cost-effective since engaging the workforce from other parts of the Country could be costlier. All these new opportunities for work for local residents could boost employment and improve the social and economic position of the population for a short time. This will be a major and significant positive impact of the project.

Mitigation

The contractors will be required to formulate a labour management policy to ensure equitable availability of employment opportunities to all communities within the project area, particularly the project affected persons.

The contractor will adopt the following Labor-Management Guidelines while preparing the labour management policy:

- encourage to engage local workers/laborers with the same terms and condition of outside workers/laborers;
- integrating provisions to redress labour related grievances in the Grievance Redress Mechanism (GRM) which should be well known to the laborers/workers and accessible;
- prohibition of child labor;
- no engagement of forced and bonded labor;
- provision of a safe and healthy working environment to workers; and
- taking steps to prevent accidents, injury, and disease and appropriate treatment for those suffering from occupational injuries/diseases; and encourage for insurance facility for workers.

5.7.5 Impacts from Labour Influx

For the proposed project activities, the average labour requirement per day is 500. Unskilled workers will be hired locally; however, the skilled works will be brought by the contractor from other parts of Nepal or abroad. It is estimated that about 200 migrant workers work in this project. labor influx may lead to negative impacts on the host community. Pre-existing social issues in the host community can easily be worsened by the influx of labor. The potential risks associated with labour influx are social tension arise

between the local community and the construction workers, which may be related to differences due to competition for local resources, increase the rate of crimes and/or a perception of insecurity by the local community, increased burden on and competition for public service provision, and influx of people may bring communicable diseases to the project area, including sexually transmitted diseases (STDs), infectious diseases such as COVID19, or the incoming workers may be exposed to diseases to which they have low resistance. The presence of workers in local communities can also result in intimate relations as well as sexual exploitation and abuse and sexual harassment.

Mitigation

The following mitigation measures will be implemented:

- This situation will be addressed by an awareness campaign implemented at the beginning of the construction phase. The Contractors will be aware of the possibility and risks of miscommunications between local residents and workers, which easily could lead to conflicts. This will be prevented by raising awareness and implementing a Code of Conduct for the workers. The Contractor shall develop a Worker Code of Conduct to govern the behavior of workers on-site, in camps, and in local communities.
- The awareness campaign will also be aimed at the risk of interaction between the resident population and the construction workforce, including the spreading of sexually transmitted diseases such as HIV/AIDS.
- The contractor will prepare a labour management plan prior to construction works for approval of PCU.
- The contractor's code of conduct shall cover the program to promote awareness to the construction workers on respecting the local community.
- Construction camps will be built in the designated areas, located away from the local settlements
- The contractor will ensure local water usage will not be affected by the project water usage by the project or compete with water requirements of the local community
- The Contractor's monthly training program will cover topics related to respectful attitude while interacting with the local community
- COVID-19 protocol measures, specified in the national and WHO guidelines, will be complied with.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7.6 Risk of Gender-Based Violence

The interaction between the Project construction labor force and the communities, and especially on the women workers, may lead to Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH)

Proactive/Preventive Measures

Commensurate with this risk level and also to be proactive, the Project has proposed several proactive measures. SEA/SH Action Plan will be designed and implemented and will include the following measures:

- Inclusion of clause on GBV/SEA/SH behavior obligations in the employment contracts of all employees and construction workers aimed at strengthening measures to address and prevent SEA/SH in the workplace and construction areas.
- Awareness training of DRO, CSC, contractor, sub-contractor and service providers staff to sensitize them about SEA, and SH, and their responsibilities to prevent
- Posting of CoC standards in public spaces at contractor's work camps and living areas, and village information centers and public places of adjoining/neighboring communities in the Nepali language

- Raising awareness that SEA/SH is prohibited
- Awareness to explain suspicious situations and the signs of SEA/SH;
- Provide information on the use of GRM to report cases of SEA/SH, Code of Conduct breaches and assist victims of SEA, if signs of SEA are identified/a victim approaches them to complain about SEA;
- Awareness to communities, particularly women, and male and female children to understand risks of SEA and SH and the roles and responsibilities of parties involved in project implementation on SEA and SH prevention, processes for reporting incidents of project-related SEA/SH, and the corresponding accountability structures.
- Strengthen the Contractors' obligations and capacity to public health and safety risks and ensure contractor supervision capacity to monitor the mitigation of these risks.
- Proactive GBV/SEA prevention measures will be put in place, such as GBV/SEA related training to sensitize workers and local population along the project implementation area and ensuring that GRM for the project will also take care of GBV related issues if any.
- There will be adequate mechanisms in place to protect the local vulnerable population, especially women and minors from risks associated with the influx of workers (harassment, underage sex). This mechanism will ensure the sensitization and enforcement of code-of-conduct by the Contractor employees and workers and all other parties that are involved in the project implementation.
- Additionally, the Contractor will employ their skilled staff and apply unskilled construction labor from the local population as far as possible to minimize an influx of outsiders into the communities.

5.8 Environmental and Social impacts during Operational stage

5.8.1 Workers Health and Safety during O&M

The potential OHS risks associated with the O&M stage mainly result from the routine maintenance works and they include (i) exposure to higher levels live traffic because of working in proximity to live traffic, and (ii) exposure to high noise levels from the traffic.

Mitigation

The following mitigation measures will be implemented

- Establishment of work zones to separate workers on foot from traffic and equipment by:
    - Routing of traffic to alternative roads when possible
    - Closure of lanes and diversion of traffic to the remaining lanes if the road is wide enough (e.g.
    - rerouting of all traffic to one side of a multi-lane highway)
    - Where worker exposure to traffic cannot be completely eliminated, use of protective barriers to shield worker from traffic vehicles, or installation of channeling devices(e.g. traffic cones and barrels) to delineate the work zone
    - Regulation of traffic flow by warning lights, avoiding the use of flaggers if possible
    - Design of the work space to eliminate or decrease blind spots
- Reduction of maximum vehicle speeds in work zones;
- Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles; and safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space (while controlling glare so as not to blind workers and passing motorists).

5.8.2 Community Health and safety during O&M

The potential risks to the community, during routine maintenance works will be, among others, dust, noise, and vibration from construction vehicle transit, and communicable disease associated with the influx of temporary construction labor. Significant community health and safety issues associated with road projects may also include pedestrian safety and traffic safety. Pedestrians and bicyclists are at greatest risk of serious injury from collisions with moving vehicles. Children are generally the most vulnerable due to lack of experience and knowledge of traffic related hazards, their behavior while at play, and their small size making them less visible to motorist. Collisions and accidents can involve a single or multiple vehicles, pedestrians or bicyclists, and animals. Many factors contribute to traffic accidents. Some are associated with the behavior of the driver or the quality of the vehicle, while others are linked to the road design, or construction and maintenance issues.

Mitigation

The following mitigation measures will be implemented

- Provision of safe corridors along the road alignment and construction areas, including and bridges (e.g. paths separated from the roadway), and safe crossings (preferably over or under the roadway) for pedestrians and bicyclists during operation. Crossing locations should take into account community preferences, including those related to convenience or personal safety (e.g. the prevalence of crime at potential crossing point locations).
- Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the roadway except at designated crossing points;
    - Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas;
    - Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways
- Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions;
    - Setting of speed limits appropriate to the road and traffic conditions
- Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross; construction of animal crossing structures; installation of fencing along the roadway to direct animals toward crossing structures; and use of reflectors along the roadside to deter animal crossings at night when vehicles are approaching)
- Implementation of No Blowing of Horn Zones particularly in settlement areas
- Installation of Signages
- Monitoring noise level maintained at national standard
- The detailed design of BG road improvements integrates the findings and recommendations of the road safety audits undertaken in multiple stages
- Road safety will also be undertaken post completion works
- Road safety awareness
- Speed control and regulations (especially in populated areas, near schools and other public places).
- Road crossing infrastructures incorporating principal of universal access.
- Speed control mechanisms at place such as zebra cross, speed breakers, speed limits at crowded places etc.

- Establishment of traffic signals, GPS tracking and CC cameras for speed control for public buses plying the highway.
- Vehicle maintenance and inspection. Control loud horns to avoid sound pollution.
- Training of first-aid services in the case of accident.
- Manage temporary bypass while constructing the road.
- Road safety awareness trainings to general public.
- Capacity enhancement for traffic police and locals.

5.8.3 Impact on Flora and Fauna

There will be no significant impacts on the flora during maintenance works. The proposed compensatory plantations and tree plantation along the medians need to be maintained with adequate watering and maintenance. The fences established in the forest areas and culverts proposed for guiding wildlife and reptile movement towards crossing structures should be maintained regularly to ensure their proposer use. The improved vehicle speeds due to improved road conditions may lead to road kills. The increased mobility of traffic in the wide road is likely to generate higher noise and speed. Birds when flying at the low to ground level could be collided with the traffic but this is considered as occasional incident based on the past experiences and studies.

Mitigation

Following mitigation measures will be implemented

- Regular recording the road kill at three forest blocks in coordination with and reporting to divisional forest officers
- Monitoring the use of culvert by wildlife species, especially carnivores, snakes and other reptiles and to ensure these facilities are not used opportunities for wildlife poaching or reptile harvesting
- Assessment of need of additional culvert/wildlife crossing structures long the road based on the monitoring result
- Compensatory plantation (including monitoring and maintenance of saplings)
- Regular cleaning/ clearing and maintenance of all culverts to reduce the chances of failures and blocking
- Regular inspection and maintenance of fencing installed/maintained in the forest areas. Any loss of wildlife or lesser fauna as a result of fences will be recorded and reported to divisional forest officers.
- Installation of signboard to raise awareness to reduce waste dumping from vehicles in the forest blocks.
- Holding workshops for awareness-raising on wildlife protection such as prevention of waste dumping from vehicles, speed limit, potential collision with animals.
- Introduction of no-horn zone in the forest blocks
- Installation of traffic signs alerting speed limit
- Installation of wildlife crossing information/display board at 1km span and traffic calming measures in the forest blocks
- Follow-up control of invasive alien species where occurrence may be the result of construction activities.

5.8.4 Carbon Emission Savings/Reduction in GHG emissions

Improved road surface with 4/6 lane paved shoulder conditions will result in increased travel speed and fuel reduction for the motorized vehicles using the project highway sections. This reduction in the fuel consumption will lead to reduction in carbon emission into the atmosphere and will eventually result in net carbon emission savings and ultimately will have a positive impact in terms of reduced Green House Gas (GHG) emissions. The net project emissions are estimated as minus 3.58 tonnes per year (see Table 5.9).

Table 5-9: Estimate of Carbon Emission (2022 - 2055)

Details	Annual Vehicle km in million(2022-2055)	Annual Carbon emission - (2022 - 2055) Tonnes	Annual Carbon emission - (2022 - 2055) Tonnes/Million vehicle km
1. Without Project	30,458	580,543	19.06
2. With Project	30,458	471,363	15.48
3. Savings		109,180	3.58

5.9 Cumulative Impacts

Nepal is a landlocked and mountainous country, and depends heavily on road transport for moving commercially traded goods. The Government of Nepal (GoN) recognizes road infrastructure development as pivotal to economic development. An improved road network is key for fostering regional trade and the economic development of Nepal.

The Butwal-Gorusinghe Road, which is a part if the East West Highway (EWH), extends from the eastern to the western boarder of Nepal, is the main trade and physical mobility corridor that connects Nepal to India and Bangladesh. The overall accessibility and economic activities of Nepal are determined by this highway. The total length of the highway, which was constructed 50 years ago, is approximately 1,028 km with a single lane bituminous carriageway. It has been rehabilitated and upgraded to a double lane highway during the period 1998-2005. The existing condition of the highway is poor and the majority of the bridges (most of which are more than 40 years old) require replacement. With an increase in the country's population, there has been an associated increase in the number of vehicles and frequency of travel. Therefore the Department of Roads (DoR) is proposing to upgrade the EWH into a four-lane standard road in a phased manner with funding support locally and from other International Financing Institutions such as the World Bank, the Asian Development Bank, and the Japan Bank for International Cooperation.

Cumulative Developments on the East-West Highway

The World Bank is thus supporting the Government of Nepal to address infrastructure and non-infrastructure constraints to improved regional trade under the ongoing Nepal-India Regional Trade and Transport Project (NIRTTP) and the Strategic Road Connectivity and Trade Improvement Project (SRCTIP). Under the NIRTTP, the improvement of the 2-lane 33-km Narayanghat-Mugling (i.e., N-M) road was supported while SRCTIP will support the improvement of the 2-lane 94.7-km Nagdhunga – Naubise – Mugling (NNM) Road on the pivotal north-south (N-S) trade corridor connecting Kathmandu and Birgunj

(both NM and NNM Roads do not involve any widening or upgrading to 4-lane) and the widening of the 130-km Kamala – Dhalkebar – Pathlaiya Road (KDP) of the East West Highway into a four-lane road.

Other improvements of other sections of the East West Highway are either ongoing, or will commence soon with funding from the Asian Development Bank under the South Asia Sub-Regional Economic Cooperation (SASEC) Highway Enhancement Project:

- Kanchanpur-Kamala, 87 Km (ADB - Expected completion: December 2023)
- Narayanghat- Butwal, 115 Km (ADB - Expected completion: January 2022)
- Nagdhunga Tunnel on NNM road, 5.05 Km (JICA - Expected completion: December 2022)
- Mugling-Pokhara Road, 81 Km (ADB - Expected completion: December 2025)

Environmental Sensitivity of the East-West Highway

The East West Highway and North South Road network traverse environmentally and socially sensitive areas, wetlands, and different types of forests that harbor important biodiversity resources and species of global and national significance, such as important bat roosting areas, etc. Between Pathlaiya and Narayanghat, the road passes through several protected areas, including the Chitwan National Park (a UNESCO World Heritage Site), Parsa Wildlife Reserve, and Bharandabahar Forest, as well as other areas of natural forest habitat not currently under formal protection. Habitats not under formal protection are important for maintaining viable meta-populations of large wildlife species such as tiger, rhino and elephant that cannot be effectively conserved within the available protected area network of Nepal. Important wildlife corridors have been identified within the TAL, some of which are intersected by the East-West Highway (Figure 4.15), and full operation of the road is identified as a major risk to the TAL (Strategy and Action Plan 2015 to 2025). Areas of particular sensitivity include the approximately 10km stretch from Pathlaiya to Ahmaleckganj (between Birgunj and Hetauda, in the buffer zone to the Parsa Wildlife Reserve) is a critical area for biodiversity and reportedly part of a wildlife corridor for elephants and rhinos that migrate seasonally from the Reserve to the Bagmati River. There are regularly reported road crossings as well as traffic-related wildlife fatalities along this stretch involving these and other important species such as tigers, leopards and wild boar. The approximately 4.5 km Tikauli Forest stretch through Bharandabahar Forest -- which links Chitwan National Park with forest to the north of the road in the Mahabharat hills -- is another reported hotspot for wildlife migration and movement. Tigers and rhinos reportedly cross here, mostly in late summer. On the other hand, while the Fast Track and Tunnel Road alignments would both divert traffic away from at least some of the protected areas and known sensitive zones for wildlife movement, all identified alignments would still cross through some portion of an important elephant and rhino migratory corridor that extends from the Parsa Wildlife Reserve eastward towards the Bagmati River.

Table 5-10:: Valued Environmental Components (VECs)

VECs	Relevance
Forest cover	Total forest area lost (directly or from induced land use change) Reduction in measurable associated forest-based ecosystem services (such as slope stability / erosion control, provision of non-timber forest products to local communities, etc.)
Terai Arc Landscape and associated key wildlife species	Long-term health and population viability of large wildlife species (tiger, rhino, elephant and others) that have a major ecological role in the health of national parks and their economic viability require the maintenance of wildlife corridors that are threatened by ongoing development of the East-West Highway.

VECs	Relevance
Geomorphology and landscape	Number of landslide events Total area affected by soil erosion/landslides and slope instability Kilometers of road affected by landslides/slope instability, and number of days (or time) roads are obstructed (no traffic movement)
Water and watershed condition	Surface water and ground water condition Changes in streamflow Increase or reduction in irrigated area Increase or reduction in consumptive water use
Human Health and Safety	Traffic related fatalities, number of wildlife collisions, damage costs
Land and Property	Value of assets lost including agriculture land and structures (residential and commercial) that may be affected Number of people affected by the loss of assets

Cumulative Impacts

Development of all these projects will have a significant cumulative impacts on the identified VECs. The World Bank has initiated a Strategic Environmental and Social Assessment (SESA) study to support the Government of Nepal (GoN) in enhancing the overall performance of selected critical roads sections of the East West Highway, and the capacity of the DOR for better planning, management and improved transport efficiency of the country's Strategic Road Network. The study is expected to be completed by November 2022. The detailed objectives of this study are:

- To provide a basis for DoR to factor in priority environmental and social considerations and key stakeholder perspectives into upstream strategic decision making about the improvements/upgrading of the East West Highway (KDP) and North South (NNM) -- alongside financial, technical and social considerations;
- To assess the cumulative impacts of proposed highway projects together with other past, ongoing and planned development interventions within the KDP Road section of the East West Highway and the NNM Road within the North South Road Network identified and prioritized Valued Environmental and Social Components (VECs);
- To contribute towards embedding good practices on greening the road sector, biodiversity conservation and protection, building resilience and overall environmental and social management into road sector development in Nepal generally, as well as specifically into the updated feasibility studies, ESIAs, engineering designs and implementation of selected specific corridor investments along East West Highway and North South Road Network. All of these will be embodied in a Strategy/Road Map for Greening the Selected Corridor of the East West Highway and North South Road Network.

6 Environmental and Social Management Plan

This chapter describes the proposed institutional mechanism, mitigation and monitoring plans for management of environmental, social, safety and health issues of the Project, and inclusion of mitigation and monitoring measures in contractors bidding documents

6.1 Objectives of ESMP

The basic objective of the ESMP is to manage the adverse impacts of project interventions in a way, which minimizes the adverse impact on the environment and people of the project area. The specific objectives of the ESMP are to:

- Facilitate the implementation of the mitigation measures identified during the present ESIA and discussed earlier in the document;
- Draw responsibilities for DOR, contractors, consultants, and other members of the Project Team for the environmental and social management of the Project;
- Define a monitoring mechanism and identify monitoring parameters in order to:
    - Ensure the complete implementation of all mitigation measures,
    - Ensure the effectiveness of the mitigation measures;
- Implement environmental training programs for the implementation staff.

6.2 Inclusion of ESMP in contract documents

In order to make the Contractors fully aware of the implications of the ESMP and responsible for ensuring compliance, technical specifications in the tender documents will include compliance with mitigation measures proposed in ESMP. The Contractor will be made accountable through contract documents for the obligations regarding the environmental and social components of the project.

PCU will include the following Environmental, Social, Health and Safety (ESHS) Conditions in the bidding documents:

- Past performance of the Contractor on ESHS aspects including sexual exploitation and abuse and gender-based violence;
- ESHS Staff with the Contractor;
- Performance Security;
- Mitigation measures to address construction impacts;
- Payments for implementation of ESHS measures;
- Code of conduct of Contractor's Personnel;
- Management Strategies and Implementation Plans (MSIP) to manage the ESHS Risks.

Each of the above conditions is elaborated in **Table 6.1**.

Table 6.1: ESHS Conditions in the Bidding Documents

(DOR include this table in the bidding documents)

Condition	The rationale for the inclusion of this Condition in the Contract	Specifications to be included in the Bidding Documents	Responsibility	
			Bidders	PCU
1. Past performance of the Contractor on ESHS is one of the eligibility criteria for	The Contractor's past performance on compliance with ESHS is an indicator of the Contractor's commitment and capability for	The Bidder shall "declare any civil work contracts that have been suspended or terminated and/or performance security called by an employer for reasons related to the non-compliance of any	Bidder to make the Declaration	PCU use this information to seek further information or clarifications in

Condition	The rationale for the inclusion of this Condition in the Contract	Specifications to be included in the Bidding Documents	Responsibility	
			Bidders	PCU
the shortlisting process	implementation of the ESMP	environmental, or social (including sexual exploitation and abuse (SEA) and gender-based violence (GBV) or health or safety requirements or safeguard in the past five years".		carrying out its due diligence
2. Contractor shall propose adequate ESHS Specialists in his team (Environmental Specialist, OHS specialist, Social specialist, site supervisors)	The Contractor's staff should include adequate ESHS specialists who are responsible for the implementation of all mitigation measures on ESHS risks and compliance with ESMP	The Bidder shall propose an Environmental, Social, Health and Safety (ESHS) Specialist as the Contractor's Key Personnel at the Site. The Bidder shall provide details of the proposed ESHS specialist including academic qualifications and work experience. The ESHS Specialist should have a minimum bachelor's degree in engineering or a master's degree in sciences related to environmental management. The Specialist should have 5 years of experience working on monitoring and managing ESHS risks related in infrastructure projects.	The bidder to submit the CV of proposed ESHS Specialist	PCU will review and approve
3. Contractor shall submit ESHS Performance Security for compliance with ESHS obligations	The Contractor should have a financial implication if he could not comply with ESHS requirements. Hence performance security will be collected from the Contractor	The Bidder shall submit the ESHS Performance Security in the form of a "demand guarantee" in the amount of three percent (1-3%) of the Contract Amount.	The bidder will submit a Performance Security	
4. Implement Mitigation Measures to Address Construction-Related Impacts given in ESMP	The mitigation measures to address potential ESHS risks and impacts should be included in the bidding documents. The Contractor shall be made responsible for the implementation of the mitigation measures through the necessary conditions in the contract.	PCUs will ensure the ESMP in the General Specifications of the Bidding Document, and the reference to this document will be provided in the Conditions of the Contract as follows: • The Contractor shall implement the mitigation and monitoring measures given in the ESMP to address ESHS risks associated with the construction works. The Consultant shall refer to the ESIA of the Project, which is available on the PCMU website for further guidance. • The Contractor shall comply with the World Bank Group's General Environmental Health and Safety		PCU will include this condition in the bidding document

Condition	The rationale for the inclusion of this Condition in the Contract	Specifications to be included in the Bidding Documents	Responsibility	
			Bidders	PCU
		Guidelines, and applicable sector specific guidelines		
5. Payments for implementation of ESHS Mitigation and Monitoring Measures	BOQs on ESHS implementation are included in the Bidding Documents	A lumpsum budget will be allotted for the preparation and implementation of C-ESMP (including OHS plans), environmental monitoring, etc.	Bidder will quote for the ESHS Management	
6. Code of Conduct for Contractor's Personnel	All workers hired by the Contractor should sign a code of conduct to ensure compliance with ESHS obligations of the Contract	The Bidder shall submit the Code of Conduct that will apply to the Contractor's employees and subcontractors. The Code of Conduct will state that the workers will comply with the following ESHS requirements: • Wearing of Personal Protective Equipment (PPE's) in the workplace at all times • Non-discrimination in dealing with the local community by race, ethnicity, gender, religion, disability, sexual orientation, gender identity, social, or health status • Respectful attitude while interacting with the local community • Prohibit sexual harassment particularly towards women and children • Prohibit violence, including sexual and/ or gender-based violence • Respecting the reasonable work instructions • Protection and Proposer use of the property The suitability of the Code of Conduct can be assessed and discussed as part of the Bid/Proposal evaluation and negotiations The successful bidder is required to implement the agreed code of conduct upon contract award	Bidder shall submit code of Conduct with the bid documents	
7. Contractor's Management Strategies and Implementation Plans (MSIP) to manage the ESHS Risk	The Contractor proposal should include his understanding of the ESHS requirements of the project and the proposed strategies to manage the ESHS risks	The Bidder shall submit Management Strategies and Implementation Plans (MSIP) to manage the following key ESHS risks: • Strategy for the protection of workers and community from the construction-	The bidder will submit MSIP along with the Bid Documents	

Condition	The rationale for the inclusion of this Condition in the Contract	Specifications to be included in the Bidding Documents	Responsibility	
			Bidders	PCU
		related hazards inside the terminal • Borrow area management and restoration plan • Construction Material Sourcing Plan • Pollution prevention (wastewater, air and noise emissions) and management • A waste management plan for proper collection and disposal of waste • Traffic management plan to ensure the safety of local communities from construction traffic • Hazardous material management plan safe storage and handling • Strategy to address labor influx impacts on the local communities • Gender-based violence and sexual exploitation and abuse prevention and response action plan • Emergency response plan and early warning system The Contractor shall be subsequently required to submit (before mobilization) the Contractor's Environment and Social Management Plan (C-ESMP) by the above strategies and Condition 4 of this Table.		

6.3 Environmental and Social Management During Construction

6.3.1 Pre-construction Stage Mitigation Plans

Pre-construction stage will mainly include the mobilization of the contractor and finalization of the following conditions/documentation by the Contractor:

- Contractor's Environmental and Social Management Plan (C-ESMP) with site-specific management plans;
- Labour Management Procedures to be followed for hiring and management of labour;
- The mobilization of ESHS Specialists

Each of the above conditions is elaborated in **Table 6.2**.

Table 6.2: ESHS Conditions in the Pre-Construction Stage

Condition	The rationale for the inclusion of this Condition	Description of the Condition	Responsibility	
			Implementation	Supervision
1. Preparation of Contractor's Environmental and Social Management Plan (C-ESMP)	The Contractor shall submit site-specific management plans to address ESHS risks following the ESMP requirements and MSIP proposed in the bid documents.	The Contractor to submit for approval and subsequently implement their Environment and Social Management Plan (C-ESMP). The C-ESMP should be submitted prior to the commencement of construction works, and no construction activities will be carried out under the project until approval of the C-ESMP. The C-ESMP will include the following site-specific management plans on: • Occupational health and safety management plan • Community health and safety management plan • Camp management plan • Waste management plan • Wastewater discharges management plan • Air and noise emissions management plan • Hazardous material management and spill control plan • Water supply and sanitation management at the worksites and workers' accommodations • Management of labour influx and facilities for the foreign workers • Labour recruitment procedures and labour management • Traffic management plan • Training plan for ESHS risks including HIV/AIDS, sexual exploitation and abuse, and gender-based violence • Emergency Response Plan • Grievance Redress Mechanism • Demobilization plan after completion of works	Contractor	PCU, CSC
2. Mobilization of ESHS Specialists	The ESHS Specialists should be mobilized during pre-construction for	The Contractor shall submit the CVs of following ESHS Specialists for PCU review and approval, and mobilize them • ESHS Manager • Environmental Officer	Contractor	PCU, CSC

Condition	The rationale for the inclusion of this Condition	Description of the Condition	Responsibility	
			Implementation	Supervision
	preparation of C-ESMP	• OHS Officer • Social Officer The ESHS Specialists should be present at the site throughout the construction period.		
3. The hiring of Construction Labour	Hiring procedure for construction workers including the signing of code of conduct	Provisions in labour management procedures (LMP) will be followed. The Procedures will include terms and conditions of employment, including hours of work, wages, overtime, compensation and benefits, holidays, leaves, and so on. The procedures will set out measures to prevent and address harassment, intimidation and/or exploitation. All workers shall sign the code of conduct and they will be terminated from employment if not complied with the code of conduct.	Contractor	PCU, CSO
5. Construction camp and storage facilities	The contractor will need areas for setting up camp and storage areas.	Contractor shall set up camp and storage facilities within sites approved by the PCU with the adequate facilities	Contractor	PCU

6.3.2 Construction Stage Mitigation Plans

Detailed mitigation plans for construction stage impacts have been prepared on the basis of the detailed impact assessment covered under Chapter 5 and presented in **Table 6.3**. These plans are project-specific, and to the extent possible, site-specific, however, contractors will be required to carry out further detailing of the key aspects, to prepare site-specific management plans as part of C-ESMP for review and approval of PCU.

Table 6.3: ESHS Impacts and Risks in Construction and Mitigation Measures

(**Note**: PCU will include this Table in the Contract Specifications of the Bidding Documents)

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
1. Generation of spoils (excess excavation) and their disposal	• recycling the excavated road material to the maximum extent possible by using them as the aggregate material in the base subbase, concrete works, and filling of embankments and retaining structures • If spoil disposal is needed, the borrow sites developed for the project will be used as spoil disposal sites. The spoils will be used for the restoration of the borrow sites.	Contractor	PCU CSC
2. Generation of construction waste including hazardous waste	• Before commencing the construction activities, the contractor will be required to Before commencing the construction activities, the contractor will be required to prepare a Waste Management Plan, including hazardous waste management and submit it to the PCU for their review and approval. The plan will cover - manage hazardous material use, storage, transport, and disposal. • The contractor will place containers of adequate size and numbers in place for the collection of various types of wastes (metal, rubbers, used fuels, batteries, etc.) from the worksites, and transport these wastes regularly to a centralized facility. • The contractor will return the empty containers to the suppliers. • Handling chemicals properly. Storage of chemicals 100 meters away from any water sources	Contractor	PCU CSC
3. Generation of solid waste from worker's campsites and offices	• Before commencing the construction activities, the contractor will be required to prepare a Waste Management Plan and submit it to the PCU for their review and approval. • Collection and segregation of solid waste into kitchen waste (organics), paper and plastic (recyclable) and garbage (non-recyclable). Three kinds of waste bins (with different colors) with adequate numbers and capacities will be placed at the campsite (kitchen, offices, rooms) for the segregation of the waste at source. • Organic waste will be treated through onsite composting • Procure the services of waste management contractors for the collection and management of recyclable waste. Recyclable waste will be compressed through bailers to minimize the volume of waste to be stored and transported. • Local municipal waste disposal sites will be used for the disposal of garbage. No disposal sites will be established by the contractor.	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
4. Wastewater discharges from the construction camps, sites, and batching plants	• Sedimentation ponds, of adequate size and capacity, will be built for the treatment of discharges from the batching plants and the crushing plants to allow the sediments to settle. Final discharges from the sedimentation ponds shall comply with World Bank EHSG standards for wastewater standards. The settled sediments will be periodically removed and will be disposed of at the designated spoil disposal sites. • Construction of wastewater treatment facilities at the campsite (e.g., septic tank and soak pit) and site drainage) • The contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the water • Quarterly monitoring of wastewater quality to ensure compliance with the standards	Contractor	PCU CSC
5. The risk of soil pollution by construction works	• Storage of fuels and chemicals in contained facilities and take appropriate measures to avoid and contain any spillage • confine the contaminants immediately after such accidental spillage and cleanup of oil spills using spill kits. • Collect contaminated soils, treat and dispose of them as a hazardous waste • Topsoil from cultivated lands in the construction areas to be stripped and stockpiled where practical for later use for restoration of spoil disposal sites. • Temporary stockpiles to be protected from erosion. • Contractor will develop pollution prevention and emergency response plan as part of C-ESMP and submit for PCU approval. The plan will details procedures to minimise and address risk of soil and water pollution.	Contractor	PCU CSC
6. Air and noise pollution from construction	• Construction equipment and vehicles will be well maintained so that emissions are minimal and comply with emission standards of Nepal Vehicle Emission Standards 2012. • Crushing and batching and asphalt plants will be located a minimum 500 m away from residential areas and will have appropriate dust/emission suppression mechanisms such as wet scrubbers • Dust generation from construction sites would be restricted as much as possible, and water sprinkling would be carried out throughout the construction period. • Construction activities near the settlements will be limited to daytime only	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	• High noise-producing equipment will be provided with mufflers or acoustic enclosures. • A GRM will be put in place to receive complaints from the public on various aspects of environmental issues, including noise pollution. These grievances will be addressed by the contractor by adopting the necessary measures. • Quarterly air and noise quality monitoring will be carried out in the project area to ensure compliance with national on ambient air and noise quality		
7. Sourcing of aggregates for concrete works and earth for embankment filling	• The contractor will develop quarry and borrow areas procurement and management plan submit it for approval of PCU. • The contractor shall use the government-approved quarry sites for the procurement of aggregates. • Reuse of excavated material from the construction sites to the extent feasible. • Source the river bed sediments from the licensed borrow sites, sourced away from the active channels and during no or low flow seasons and the non-perennial streams. • Although the material is widely available, the quarrying/mining activities will be limited to fewer areas to reduce the area of extent affected by quarrying activities. If any mining activities are to be carried outside the project area, they should be not be located in any sensitive areas. • Maintain a buffer zone of 5 to 10m between the low flow channel and the mining operations to minimize the downstream impacts and limit the excavation activities to the low flow season 9non-monsoon). • Borrow sites will be restored after completion of the works	Contractor	PCU CSC
8. Impact on river habitat due to bridge construction activities and quarrying	• Contractor will use the existing quarry sites operated with the government licenses. • No new sites will be established by the contractor. If any new sites to be developed, contractor will develop quarry and borrow pit operation plan and obtained approval from supervision engineers prior to operation of quarry. • Avoid haphazard quarry along the riverbank and hills. Permanent barricade at quarry location for safety, established safety signage boards, and installed noise barrier. • Control of wastewater and sediment releases to river • Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into the River.	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	• Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil and lubricants, and grease. • Machinery leaking fuel, lubricants, hydraulic fluids, or solvents shall not work within the river. • Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use • Restoration of the borrow sites after completion of the works		
9. Impacts on flora	• The contractor's code of conduct for workers will include conditions on the protection of flora and fauna and ban on cutting of trees and a ban on hunting and poaching of wildlife. Employees found violating would be subject to strict actions including fines and termination of employment. • Use of non-wood fuel for cooking and heating. • No temporary construction facilities will be established in the forest areas • Awareness-raising to workers on the protection of flora and fauna • For road widening, the dense vegetation will only be cleared once it has been established that any individuals present have fled. Before and during vegetation clearance or tree felling, any animals found will be removed and released to a safe place. There should be no burning of natural vegetation. The borrow animals, if found during excavation, shall also be transported to a safe place.	Contractor	PCU CSC
10. Spread of Invasive Alien Species	• All introductions of alien species (for example, as part of a rehabilitation program) will be subject to a risk assessment to determine the potential for invasive behavior with consideration of the Nepal regulatory framework for species introduction. • Construction sites will be rehabilitated at the earliest opportunities, and rehabilitation plans will IAS control measures appropriate to the IAS risks prevailing in the project area. • Construction vehicles will be brought into the site in an 'as-clean-as-new' condition to ensure that invasive plant material and seed-bearing soil is not introduced. • All vehicles will be cleaned on a regular basis to prevent the unintentional spread of IAS withing the project area. • IAS will be regularly controlled in construction vehicle parking and operational areas	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
11. Impact on fauna, including wildlife movement	• For road widening, the dense vegetation will only be cleared once it has been established that any individuals present have fled. Surveys will be conducted by trained ecologists before and during vegetation clearance or tree felling and major ground-breaking activities to check for active burrows, tortoises, snakes and lesser fauna. Any animals found will be removed and released to appropriate and predetermined safe locations. There should be no burning of natural vegetation. The borrow animals, if found during excavation, shall also be transported to a safe place. • No workers camps and construction facilities should be constructed in or adjacent to the forest areas • Rehabilitation of existing barbwire fence in Saljhandi-Pipara forest considering wildlife protection and designs appropriate to the affected wildlife species • Installation of an appropriate fence in Gorusinghe forest block considering wildlife conservation and effectiveness • Culvert/tunnel installation in the forest blocks based on the additional study on mammal movement/roadkill, location and design assessments • Installation of traffic signs alerting speed limit • Installation of wildlife crossing information/display board at 1km span and speed breakers in the forest blocks • Pits and trenches during construction present faunal hazards and will be avoided where possible, capped and/or provided with escape route for small fauna. Unavoidable hazards will be regularly checked for small fauna by appropriately trained staff. • A staff member trained as a snake handler and equipped to capture and translocate dangerous snakes and other reptiles without harm shall be available during vegetation clearing, ground-breaking activities and major construction works. • Awareness-raising workshops with the forest user groups at the forest blocks regarding wildlife behaviors, road kills, wildlife poaching, human-wildlife conflict and traffic regulations • Induction programmes and provision of regular training to workers on the potential impacts from their behavior and emphasize the need to protect biodiversity, abstain from wildlife poaching, avoid habitat degradation/ pollution and outline procedures and penalties that prohibit killing of fauna and/or any form of trade in bush meat or wildlife products. • Inclusion of wildlife protection clauses in the code of conduct for contractors		

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	• Construction site should be fenced to prevent the wildlife entry to the construction site • Regular visual inspection of wildlife will be conducted by ecologist appointed in the contractors. • Spill kits should be provided at each construction site where oils and chemicals are used. • Regular maintenance of construction equipment and vehicle will be undertaken • Oils and chemicals should be stored at designated storage with proposed spill/accident prevention and response measures such as the provision of secondary containment, MSDS and spill kit • The organic waste should be properly stored and composted. Following mitigation measures will be implemented to address the impacts on avifauna and snakes: • The construction materials and their by-products should be stored away from watercourses. Especially, during summer/monsoon time, good care should be taken. • No construction activities during the night time • Large sapling plantation at road side should be carried as soon as the construction work completed. This will increase bird habitat, foraging and roosting trees specially in semi urban and rural area • Road side plantation be made of the species which bear seed/fruit and have open/light canopy like simal (Bombax ceiba), etc. • Ensure use of machines those produced low noise where feasible. • Unnecessary noise generation during the construction work and post construction should be avoided through regular awareness and traffic no-horn zones. • Training provision to workers on the potential impacts from their behavior including wildlife poaching and habitat degradation/pollution • Inclusion of wildlife protection clauses in the code of conduct for contractors		
Illegal wildlife trade	• All bidding documents and construction contracts are to include specific provisions forbidding hunting or collecting natural resources of workers. Contracts can also include articles that require use of access controls/checkpoints, zero tolerance of any illegal biodiversity resources in worker camps (such as wildlife products sold to construction workers; products of illegal hunting along access roads; pets taken	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	from the wild) and offer workers appropriate food/canteen options that will reduce demand for seeking local food options. • The PCU will provide a safe and anonymous line for reporting activity for workers, communities or any stakeholders whereby they are safe from retribution from other community members, organized crime or government officials. • If a crime is committed, national authorities need to be alerted immediately. In addition, sometimes, live animals can be rehabilitated, and the appropriate national authorities or non-government organizations need to be contacted to collect the animals to avoid risks of harm to people and the animal(s). • Contractors shall be responsible for demonstrating that timber procurement is limited to those suppliers that can demonstrate that timber is legitimately sourced and does not contribute to significant conversion or degradation of natural or critical habitats		
13. Workers Safety risks	• The contractor will be required to prepare, obtain approval of, and implement an occupational health and safety (OHS) plan. These plans will be prepared in compliance with the World Bank Group's EHSGs and national regulations. If these guidelines cannot address any specific aspect of OHS, international good practices such as OSHA and ILO will be applied. OHS Plan should contain general guidance for all identified hazards under each work activities, and site-specific OHS hazard and risks during construction, and control and preventive Measures proposed by the Contractor. The Plan shall be reviewed and updated if there any changes in the construction methodologies. • OHS Plan should contain general guidance for all identified hazards under each work activities and they should be presented in three discrete headings, (a) Contractor's Standards on the identified hazard management, (b) Expected Site-specific OHS hazard and risks during construction, and (c) Control and Preventive Measures proposed by the Contractor. • The OHS plan will be reviewed and approved the Construction Supervision Consultant and the World Bank • Conduct a 'job hazard analysis' at the new construction site to identify potential hazards that may arise from the proposed works or working conditions to the project workers and implement necessary control measures. The job hazard analysis should be part of the contractor's method statements, which will be reviewed and approved by the supervision consultants. The specialists of the	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	supervision consultant will also visit the construction sites, prior to the start of construction, to ensure the control measures are in place. • Regular site inspections and safety audits by the construction supervision team, both by the OHS specialist and the site engineers. Since the site engineers will present at the worksites all the time, they will be trained by their OHS team on monitoring safety aspects of the construction works. • Regular training program for workers on occupational health safety (monthly training and daily toolbox talks). Special attention will be focused on safety training for workers to prevent and restrict accidents and on the knowledge of how to deal with emergencies. • Incident investigation and reporting, including a complete record of accidents and near misses, will be maintained. • In order to protect all project personnel and visitors, the Contractor will provide personal protective equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, body harness, protective clothing, goggles, fully face eye shields and ear protection. The contractor will also provide training to workers on how to use them and maintain in a sanitary and reliable condition and replace the damaged ones immediately with the new one. • Availability of firefighting, ambulance, medical and rescue facilities at the site for implementation of an emergency response plan • Adequate water supply and mobile toilets, medical and first aid care facilities at the worksites • Contractors will have dedicated and qualified staff for ensuring compliance with the OHS Plan • Awareness-raising material will be used including posters, signage, booklets, and others at the worksites • A complete record of accidents and near misses will be maintained. • First aid facilities will be made available at the worksites and in the camps. The contractors will engage qualified first aider(s).		
	•		
14. Occupational health risks in construction	• The contractor will develop and implement a camp management plan • The construction camp will be built with all adequate facilities (safe drinking water and sanitation, kitchen, rest areas, etc.) including entertainment facilities so that there will be minimal interaction between them and local communities	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	• Separate facilities will be provided to men and women workers • The Contractor shall establish a mechanism to collect the complaints from the workers and address those complaints by the approved GRM plan		
15. Safety hazards due to increased traffic especially for children and elderly people	• The contractor will develop and implement a traffic management plan with adequate measures such as proposing traffic diversion measures, alternate routes for local traffic, avoiding school hours, following speed limits, hiring licensed drivers, etc.). The plan will be implemented with the aim of ensuring access to residential areas and preventing unsafe situations, especially near schools, housing areas, construction areas • The road should not be stopped for existing traffic. The contractor will maintain the traffic on both sides of the highway by placing appropriate control measures and flagmen. • Road signage will be fixed at appropriate locations to reduce safety hazards associated with project-related vehicular traffic. • Liaison with traffic police will be maintained • Project drivers will be trained in defensive driving. • Ensure that all construction vehicles observe speed limits on the construction sites and on public roads • Provide adequate signage, barriers, and flag persons for traffic control.	Contractor	PCU CSC
16 . Community exposure to work hazards, STIs and communicable diseases	• Barricade the work areas with hard fencing to prevent the entry of community in the construction areas. • Placing of adequate signboards and flagmen to divert the community away from the construction works. • Implementation of traffic management plan near the construction sites • Community awareness programs on construction-related hazards, including awareness programs in schools Construction activities such as blasting and excavation, particularly at the borrow areas, may pose safety risks to the nearby population. • First aid medical facilities will be made available at the worksite. • Campaigns on STIs and communicable diseases (e.g. HIV/AIDs, COVID-19)	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
17. Dust from vehicular movement on local roads and construction activities	• Dust generation from construction sites will be restricted as much as possible and water sprinkling will be carried out as appropriate, especially at those places where earthmoving, excavation will be carried out. • Frequent sprinkling of water on the local roads and worksites to control dust emissions. The contractor has to mobilize adequate water sprinkling trucks. • A GRM will be put in place to receive and address complaints from the public on various aspects of environmental issues, including dust pollution.	Contractor	PCU CSC
18. Employment opportunities in construction activities	• encourage to engage local workers/laborers with the same terms and condition of outside workers/laborers; • integrating provisions to redress labour related grievances in the Grievance Redress Mechanism (GRM) which should be well known to the laborers/workers and accessible; • prohibition of child labor; • no engagement of forced and bonded labor; • provision of a safe and healthy working environment to workers; and • taking steps to prevent accidents, injury, and disease and appropriate treatment for those suffering from occupational injuries/diseases; and encourage for insurance facility for workers	Contractor	PCU CSC
19. Risk of child labor	• No hiring of workers less than 18 years of age		
20. Impacts from the influx of labor from the outside areas	• This situation will be addressed by an awareness campaign implemented at the beginning of the construction phase. The Contractors will be aware of the possibility and risks of miscommunications between local residents and workers, which easily could lead to conflicts. This will be prevented by raising awareness and implementing a Code of Conduct for the workers. The Contractor shall develop a Worker Code of Conduct to govern the behavior of workers on-site, in camps, and in local communities. • The awareness campaign will also be aimed at the risk of interaction between the resident population and the construction workforce, including the spreading of sexually transmitted diseases such as HIV/AIDS. • The contractor will prepare a labour management plan prior to construction works for approval of PCU. • The contractor's code of conduct shall cover the program to promote awareness to the construction workers on respecting the local community.	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	• Construction camps will be built in the designated areas, located away from the local settlements • The contractor will ensure local water usage will not be affected by the project water usage by the project or compete with water requirements of the local community • The Contractor's monthly training program will cover topics related to respectful attitude while interacting with the local community • COVID-19 protocol measures, specified in the World Bank guidelines, will be complied		
21. Risk of gender-based violence GBV/Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH)	• Inclusion of clause on GBV/SEA/SH behavior obligations in the employment contracts of all employees and construction workers aimed at strengthening measures to address and prevent SEA/SH in the workplace and construction areas. • Awareness training of DRO, CSC, contractor, sub-contractor and service providers staff to sensitize them about SEA, and SH, and their responsibilities to prevent • Posting of CoC standards in public spaces at contractor's work camps and living areas, and village information centers and public places of adjoining/neighboring communities in the Nepali language • Raising awareness that SEA/SH is prohibited • Awareness to explain suspicious situations and the signs of SEA/SH; • Provide information on the use of GRM to report cases of SEA/SH, Code of Conduct breaches and assist victims of SEA, if signs of SEA are identified/a victim approaches them to complain about SEA; • Awareness to communities, particularly women, and male and female children to understand risks of SEA and SH and the roles and responsibilities of parties involved in project implementation on SEA and SH prevention, processes for reporting incidents of project-related SEA/SH, and the corresponding accountability structures. • Strengthen the Contractors' obligations and capacity to public health and safety risks and ensure contractor supervision capacity to monitor the mitigation of these risks. • Proactive GBV/SEA prevention measures will be put in place, such as GBV/SEA related training to sensitize workers and local population along the project implementation area and ensuring that GRM for the project will also take care of GBV related issues if any.	Contractor	PCU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	• There will be adequate mechanisms in place to protect the local vulnerable population, especially women and minors from risks associated with the influx of workers (harassment, underage sex). This mechanism will ensure the sensitization and enforcement of code-of-conduct by the Contractor employees and workers and all other parties that are involved in the project implementation. • Additionally, the Contractor will employ their skilled staff and apply unskilled construction labor from the local population as far as possible to minimize an influx of outsiders into the communities		
22 Chance finds during construction	Chance find procedures that will be used during this Project are as follows: • Stop the construction activities in the area of the chance find; • Delineate the discovered site or area; • Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a nightguard shall be present until the responsible local authorities and relevant Department of Archaeology take over; • Notify the supervisory Engineer who in turn will notify the responsible local authorities and relevant Department of Archaeology immediately (within 24 hours or less); • Responsible local authorities and relevant Department of Archaeology would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archeologists (within 72 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historical, scientific or research, social and economic values; • Decisions on how to handle the finding shall be taken by the local authorities and the relevant Department of Archaeology. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration, and salvage; • Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the relevant Department of Archaeology; and • Construction work could resume only after permission is given from the local authorities and relevant Department of Archaeology concerning the safeguard of the heritage.	Contractor	PCU and CSC

6.3.3 Construction Stage Monitoring Plans

The proposed monitoring plan to be carried out during the construction stage of the Project to ensure contractors are complying with the mitigation measures is given in **Table 6.4,** along with the monitoring indicators and frequency. CSC will be responsible for the supervision of the implementation of the plan. The total cost of monitoring has been estimated at USD 0.1million.

Table 6.4: Effects Monitoring Plan During Construction

(**Note**: PCU will include this Table in the Contract Specifications of the Bidding Documents)

E&S components	Monitoring parameters	Monitoring Agency	Timeline
Physical Environment			
Air quality	Ambient air quality: TSP and PM_{10}	PCU/CSC	Baseline information during preconstruction stage and during construction stage once in every month
Water quality	Turbidity, Conductivity, pH and Color will be conducted at site with the help of portable kits, effluents from construction camps /sites/ waste from batching plants etc.	PCU/CSC	Baseline information during preconstruction stage of nearby water bodies and during construction stage once in every month
Noise	Noise level at regular interval: assessment and interpretation for L_{max}, L_{min}, L_{eq}, L_5, L_{10}, L_{50}, L_{90} and L_{95} parameters.	PCU/CSC	Baseline information during preconstruction stage and during construction stage once every month
Operation of Borrow pits/ Quarry sites/ Stone crushing plants	Quantity of extracted material, restoration of borrow pit areas, Grievance Redressal of the locals	PCU/CSC	Daily during the construction stage
Extraction of river bed materials	Distance of extraction sites from the river banks (5-10 m) Depth of the ditch for excavation (1m)	PCU/CSC	Daily during the construction stage
Obstruction of drainage	Roadside drainage discharge, water impounding area during rain, waterlogging	PCU/CSC	Daily during the construction stage
Hazardous wastes, bitumen/asphalt	List of chemicals, storage, and handling practice. Records of accident/ spillage of chemicals, surface and groundwater contamination	PCU/CSC	Daily during the construction stage
Biological Environment			
Number of felled trees	Statistics of removed and planted trees, nurseries and plantations	PCU/CSC, Divisional Forest Office (DFO)	During the time of tree felling on a daily basis
Compensatory Plantation	Compliance with compensatory plantation plan using locally indigenous trees and shrubs	PCU/CSC, Divisional Forest Office (DFO)	Plantation time during monsoon (before and after carrying out the plantation)
Control of Invasive Alien Species (IAS)	Risk assessments conducted prior to species introductions, regular equipment and vehicle cleaning and control of IAS.	PCU/CSC	Daily during and after the construction stage
Wildlife	Identification of flora and fauna with ecological importance identified in the project area, road kill, occurrence of fauna	PCU/CSC	Daily during the construction stage

E&S components	Monitoring parameters	Monitoring Agency	Timeline
	trapped in pits/trenches and any capture and translocation of tortoises, snakes or other fauna		
Fire-hazard	Project management checklists, site monitoring, fire-extinguishers in labour camps	PCUs/CSCs	Daily during the construction stage
Social Environment			
Community Health and safety	Nuisance to adjoining communities from the construction related works, grievances due to annoyance from the construction related works.	PCU/CSC	Daily during the construction stage
Establishment of camps	Compliance with Camp management plan of Contractor	PCU/CSC	Daily during the construction stage
Property/land acquisition/compensation and rehabilitation	Implementation of compensation and rehabilitation measures provided by the RAP, including compliance with construction-induced impact procedures	PCU/CSC	During the preconstruction and construction stage
Indigenous Peoples	Compliance with IPDP	PCU/CSC	Daily during the construction stage
Safety of workers	Accident Group Insurance of Workers, provision of personal protective equipment/ Use of ear muffs and other personal protective equipment by the workers	PCU/CSC	Daily during the construction stage
Road safety	Traffic Signals, no horn signs, road signals and markings, speed control and GPS-tracking	PCU/CSC	Daily during the construction stage
Grievance Redressal	Management of Grievance Redress Mechanism	PCU/CSC	During the construction stage
Traffic Management	Compliance with Traffic Management Plan	PCU/CSC, Traffic Police, Respective Chief District Officers	Daily during the construction stage
Gender-based violence and human trafficking	Living status of women and vulnerable households after the implementation of project	PCU/CSC	Daily during the construction stage
Stakeholder engagement	Compliance with SEP	PCU/CSC	During the preconstruction and construction stage

6.3.4 Reporting on ESMP Compliance

PCU and its Contractors will prepare periodic monitoring reports on the status of implementation of ESMP and will be submitted to World Bank for their review and feedback. Details of these reports and their content are given in **Tabl6.5**.

Table 6.5: ESMP Monitoring and Compliance Reports

#	Title of the Report	Contents of the Report	Frequency of Report Preparation	Report to be prepared by
1	ESHS Monitoring Report	The compliance status of the Project with environmental and social mitigation and monitoring measures. Besides, the report also covers: • environmental incidents;	Monthly	Contractor

#	Title of the Report	Contents of the Report	Frequency of Report Preparation	Report to be prepared by
		• wildlife-related incidents, • health and safety incidents, • health and safety supervision: • Usage of PPEs by workers • worker accommodations • Training conducted and workers participated • Workers grievances • Community grievances • Chance find (if any)		
2	ESMP Monitoring Report	The compliance status of overall Project with ESMP requirements	Quarterly	PCU
3	Incident Reports	Incident investigation reports for all major incidents covering details of the incident, root cause analysis, and actions taken to address the future recurrence of this event	Initial investigation report within 24 hours Detailed Investigation Report within ten days	Contractor

6.4 Environmental and Social Management During Operation

6.4.1 O&M Stage Mitigation Plans

Detailed mitigation plans for operation and maintenance (O&M) stage impacts have been prepared on the basis of the detailed impact assessment covered under Chapter 5.

Table 6.6: ESHS Impacts and Risks in O&M and Mitigation Measures

Impact	Mitigation Measures	Responsibility for implementation
1. workers health and safety during routine maintenance works	• equipment by: ○ Routing of traffic to alternative roads when possible ○ Closure of lanes and diversion of traffic to the remaining lanes if the road is wide enough (e.g. ○ rerouting of all traffic to one side of a multi-lane highway) ○ Where worker exposure to traffic cannot be completely eliminated, use of protective barriers to shield worker from traffic vehicles, or installation of channeling devices(e.g. traffic cones and barrels) to delineate the work zone ○ Regulation of traffic flow by warning lights, avoiding the use of flaggers if possible ○ Design of the work space to eliminate or decrease blind spots • Reduction of maximum vehicle speeds in work zones; • Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles; and safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space (while controlling glare so as not to blind workers and passing motorists).	DOR O&M Staff
2. Community health and safety from exposure to maintenance works	• Provision of safe corridors along the road alignment and construction areas, including and bridges (e.g. paths separated from the roadway), and safe crossings (preferably over or under the roadway) for pedestrians and bicyclists during operation. Crossing locations should take into account community preferences, including those related to convenience or personal safety (e.g. the prevalence of crime at potential crossing point locations). • Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the roadway except at designated crossing points; ○ Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas; ○ Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways • Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions;	DOR O&M Staff

Impact	Mitigation Measures	Responsibility for implementation
	○ Setting of speed limits appropriate to the road and traffic conditions • Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross; construction of animal crossing structures; installation of fencing along the roadway to direct animals toward crossing structures; and use of reflectors along the roadside to deter animal crossings at night when vehicles are approaching) • Implementation of No Blowing of Horn Zones particularly in settlement areas • Installation of Signages • Monitoring noise level maintained at national standard • The detailed design of BG road improvements integrates the findings and recommendations of the road safety audits undertaken in multiple stages • Road safety will also be undertaken post completion works • Road safety awareness • Speed control and regulations (especially in populated areas, near schools and other public places). • Road crossing infrastructures incorporating principal of universal access. • Speed control mechanisms at place such as zebra cross, speed breakers, speed limits at crowded places etc. • Establishment of traffic signals, GPS tracking and CC cameras for speed control for public buses plying the highway. • Vehicle maintenance and inspection. Control loud horns to avoid sound pollution. • Training of first-aid services in the case of accident. • Manage temporary bypass while constructing the road. • Road safety awareness trainings to general public. • Capacity enhancement for traffic police and locals.	
3. Impact on Flora and Fauna	• Recording the road kill at three forest blocks in coordination with divisional forest offices • Monitoring the use of culvert by wildlife species, especially carnivores, snakes and other reptiles • Assessment of need of additional culvert/wildlife crossing structures long the road based on the monitoring result • Compensatory plantation (including monitoring and maintenance of saplings) • Regular cleaning/ clearing and maintenance of all culverts to reduce the chances of failures and blocking • Regular inspection and maintenance of fencing installed/maintained in the forest areas • Installation of signboard to raise awareness to reduce waste dumping from vehicles in the forest blocks. • Holding workshops for awareness-raising on wildlife protection such as prevention of waste dumping from vehicles, speed limit, potential collision with animals.	

Impact	Mitigation Measures	Responsibility for implementation
	• Continuous monitoring of herpetofauna species movement/crossing and road kill in the forest area • Introduction of no-horn zone in the forest blocks • Installation of traffic signs alerting speed limit • Installation of wildlife crossing information/display board at 1km span and traffic calming measures in the forest blocks	

6.4.2 O&M Stage Monitoring Plans

The proposed monitoring plan to be carried during the O&M stages of the Project is given in **Table 6.7** along with the monitoring indicators and frequency. PCU's ESU staff will be responsible for the implementation of the plan.

Table 6.7: Effects Monitoring Plan During O&M

Parameter	Means of Monitoring	Frequency	Responsibility	
			Implementation	Supervision
Noise Quality	Field Measurements	Yearly	DOR O&M Staff	DCID
Air Quality	Field Sampling and Analysis	Yearly	DOR O&M Staff	DCID
Traffic Safety	CC TV Cameras, site monitoring	Continuous monitoring	DOR O&M Staff	DCID
Wildlife	Trail camera, site monitoring	Continuous monitoring	MoFE, Divisional Forest Office	DCID

6.5 Capacity Building and Training

The environmental and social training will help to ensure that the requirements of the ESMP are clearly understood and followed by all project personnel. The competencies of the Consultant to be selected for capacity building training will include a thorough knowledge and experience of WB Environmental and Social Framework (ESF) and ESHGS guidelines. The trainings will be provided to different professional groups separately, such as managers, skilled personnel, unskilled labors, and camp staff. Capacity building will be aimed at strengthening the PUO staff in the field of environmental management and social development. Safeguard staff of PCU responsible for the supervision of environmental and social mitigation measures would be trained in environmental management, environmental quality control, ecology, environmental awareness, labor and working conditions, and social development. The contractor will also be required to provide environmental and social trainings to its staff to ensure the effective implementation of the ESMP. A budget of USD 0.1 million has been earmarked for capacity building. The training plan shall include a program for the delivery of intermittent training to cover the subjects included in **Table 6.8**. Training should be carried out initially at the induction of staff and repeated throughout the project.

Table 6.8: Environmental and Social Training Programs

Contents	Participants	Trainer	Schedule
Environmental and social impacts of the Project and	All the technical Staff of PCU, DCIE, and relevant technical staff of DRO who are involved in the	ESHS staff of the CSC; and an external	During the initial stages of the Project implementation. The

Contents	Participants	Trainer	Schedule
ESMP requirements of the Contractor; World Bank Group Environmental Health and Safety Guidelines. The contents for the second and subsequent training programs will cover topics related to the issues associated with on-going construction activities.	management of environmental and social issues associated with routine operation and maintenance of the airport. Site Engineers of the Supervision Consultants/Engineer.	training agency who has a thorough knowledge of the WB safeguard policies and guidelines	training will be repeated every six months.
Environmental and Social issues associated with the ongoing construction works; Workers' health and safety	Site Engineers of the Contractor, PCU, and the CSC	E&S staff of the CSC, PCU	On a monthly basis
Code of Conduct Occupational Health and Safety	Construction crew	Contractors ESHS Staff	Prior to the start of the construction activities and during the construction activities (To be repeated as needed.)

6.6 Budget for Implementation of ESIA

The total cost of the ESMP implementation is estimated to be USD 1.24 million (**Table 6.9**).

Table 6.9: Cost Estimates for ESMP Implementation

Sr. No.	Description of Item	Unit	Item Total (USD)
A	**Contractors Budget**		
1.	Contractors preparation of C-ESMP including OHC Plans		Included in construction cost
2	Contractors ESHS Staff		Included in construction cost
3.	Waste Management (procurement of waste management services and facilities)	LS	50,000
4	Dust Management (procurement and operation of sprinklers)	LS	100,000
5	Site/OHS facilities for workers (PPE)	LS	50,000
6	Training of Workers on Code of Conduct (incl. GBV/SH/AIDs)	LS	50,000
8	Wastewater treatment facilities (incl. mobile toilets at worksites)	LS	20,000
10	Environmental Monitoring during construction by a third party (wastewater quality, air, and noise quality) - every 3 months (4 years) at 9 locations	LS	100,000
B.	**DOR's Budget**		
1.	Tree Plantation	LS	300,000
2	Capacity building	LS	Covered in ESMF
3.	COVID-19 Orientation to local communities	LS	20,000
4**.**	Fencing of the Forest Areas	LS	200,000
5	Support to Terai Arc Landscape Conservation Initiaves Wildlife studies, monitoring , recording and community awareness raising,	LS	200,000
C.	**Contingency**		
	Contingency (25% of A+B)		272,500
	Total		**1,362,500**

7 Institutional Arrangements

Details of institutional arrangement for implementation of the ESMP are given in this chapter.

7.1 Existing institutional arrangements for implementation of ESMP during the project construction

The principal responsibility for implementation of ESMP is the Department of Roads (DoR) and Ministry of Physical Infrastructure and Transport (MoPIT).

7.1.1 Department of Roads

DoR is thus directly responsible for managing the E&S risks of individual projects during implementation.

DoR has five (5) deputy directorships /branches that develop and implement projects. These are: (1) the Planning and Design Branch, which develops and implements all GoN-funded roads; (2) the Bridges Branch, which is in charge of the development of bridges; (3) the Maintenance Branch, which is in charge of the repair and rehabilitation of roads and bridges; (4) the Development Cooperation Implementation Division, which handles donor- funded projects; and, (5) the ADB Directorate, which handles all roads and bridges projects funded by ADB. To implement a project, a Project Coordination Unit (PCU) in the case of donor-funded projects is usually created within related branches.

7.1.2 DCID/Project Management Office (PCU)

Development Cooperation Implementation Division (DCID)/PCU handles for donor- funded projects. The DCID/PCU will organized ESMP implementation according to agreed with the donor, usually prepare their own ESIAs, RAPs and other E&S Risk Management Plans by hiring their own consultants. PCU would often seek GESU‘s involvement to fulfil legal requirements, particularly in bringing the IEE/ESIA through the formal review-approval process with MoPIT and MoFE and, depending on the specifications agreed with the donor, the PCU may tap GESU to undertake the EIA/IEE preparation process for their projects and/or provide compliance monitoring in the field. DCID/PCU has Environmental Safeguard expert, Social Safeguard Expert, Occupational Health and Safety Specialist and Gender Specialist.

Geo-Environment and Social Unit (GESU)

The focal point for the E&S risk management of DoR is GESU. GESU is currently under the Planning and Design branch. GESU provides advisory services to units of DoR on environmental and social safeguards matters. Its main role is to prepare IEEs and EIAs for the DoR projects and coordinate with MoPIT in the case of IEEs and by the MoFE in the case of EIAs. GESU interacts with the Environment Unit of MoPIT as well as that of MoFE. For donor-funded projects, the GESU also undertakes compliance monitoring and auditing of projects, and as result also interacts with Project Coordination Units (PCUs). The role of the GESU is very important not only in environmental and social analyses is and ensuring stakeholders’ participation in the planning and implementation process, but also for improved efficiency, effectiveness and sustainability of the projects. Although, the need for right of way acquisition is identified in EIA/ESIA, GESU is not normally involved in the land acquisition, and hence, rarely if at all interacts with the land agencies. Sometimes, RAPs from donor-funded project are submitted to the GESU for review. GESU has dedicated Environmental Inspector and Social Officer, and supporting consultants.

7.1.3 Divisional Offices of DoR

DoR has 4 Federal Road Monitoring Units which are geographically situated and 30 Divisional Offices. These offices will serve as the home base for Federal Government’s road project implementation

where coordination of the local government agencies and field offices of other line agencies will occur, particularly for RoW/land acquisition. There is no any Environmental Officer and Social Officer.

7.1.4 Ministry of Physical Infrastructure and Transport (MoPIT)

MoPIT is the mother agency of the DoR and is mandated by the Environmental Protection Act to review and approve IEEs for projects in public works and transport sector. It also reviews and endorses EIA reports for review and approval of the MoFE. The Ministry will also be the one to authorize the Project Coordination Unit (PCU) to initiate preliminary action for land acquisition. This function is handled by the Environment and Social section under the Planning, Monitoring and Evaluation Division of MoPIT.

7.1.5 EIA Unit under Ministry of Forest and Environment (MoFE)

This unit tasks is to undertake review and approval of EIAs. It is reporting directly to the Ministry and not part of the Department of Environment. This unit convenes and engages multidisciplinary team to constitute the EIA Review Committee for each EIA submitted from approval. The EIA approvals typically include conditions which the project must comply or implement in addition to the EMP/ESMP. Department of Environment is responsible for monitoring of the project.

7.1.6 Department of Forestry and Soil Conservation (DoFSC)

DoFSC under the MoFE reviews and approves applications for RoW of road sections falling within areas classified as public forest. The DoFSC imposes conditions on the acquisition of right of way on forest lands, such as replacement of cut trees. After complying with the requirements, the ownership of right of way is transferred to the concerned agency (for roads: MoPIT).

7.1.7 Department of National Parks and Wildlife Conservation (DNPWC)

DNPWC under MoFE reviews and approves sections of roads within National Parks and protected areas(The project done not required approval from DNPWC).

7.1.8 Department of Labour and Occupational Safety (DoLOS)

DoLOS under the Ministry of Labour and Social Security is currently not involved in the E&S risk management (i.e. it has no role in the IEE/EIA process) of development projects. Its role is mainly on the regulatory side. It can formulate and issue policies, rules and standards for OHS consistent with the law. As such, it can occasionally conduct monitoring and audit of workplaces, construction sites and offices of contractors and project management. It can also provide an expert review of the occupational and community health and safety aspects of the IEE/EIA or the ESMP.

7.1.9 District Coordination Committees (DCC).

DCCs can regulate soil and water conservation activities. DCCs are also responsible for reviewing applications of eminent domain land acquisitions and confirming public use. It will be responsible for the issuance of land acquisition notice; the formation of Compensation Fixing Committee which would determine fair compensation; finalize the list of land owners to receive compensation.

7.1.10 Municipalities and Rural Municipalities

The respective Municipality can regulate quarry, soil and water conservation activities that support to stabilize the road slopes and minimize likely adverse impacts on the road and by the road. Public hearings of the IEE/EIA shall be done in the municipalities/ rural municipalities results and based on it endorse the project. The MoPIT/MoFE will not approve IEE/EIAs without the endorsement/ providing recommendation letter of municipalities.

7.1.11 Department of Archaeology

It regulates all archaeological activities in the country as per the provision of the Ancient Monument Preservation Act (1956). The department is also charged with protection, preservation and management of the World Cultural Heritage Sites and maintains an inventory of the cultural heritage sites.

7.1.12 Supervision Consultant (SC)

Supervision Consultant will be responsible for supervision of environmental and social mitigation measures as per ESMP and compliance monitoring of the construction contractor's activities, and prepare periodic monitoring reports for submission to WB and DCID/PCU. Review monthly monitoring report submitted by Contractors, Identify needed corrective actions and follow-up actions, Conduct regular site inspection to validate monitoring reports and identify unanticipated environmental impacts, Compel contractors to take corrective actions within specified timeframe to address non-compliances, organize stakeholder consultations workshops that will serve as the external monitoring mechanism for the project. The SC's team includes one Environmental Safeguard Expert and one Social Safeguards Expert and one Occupational health and Safety Officer who shall directly assist the PCU with its duties.

7.1.13 Contractor

The Contractor shall be primarily responsible for the implementation and internal monitoring of all environmental and social management measures associated with Project design and construction, develop a Contractor's Environmental and Social Management Plan CESMP based on ESMP of the project, which addresses all applicable construction phase, and revise it as needed in order to obtain approval from SC/PCU. The Contractor shall have the sole responsibility for all activities on sites under its control for the duration of construction. This includes the activities of all subcontractors, whether employed or contracted directly or indirectly by the Contractor. Accordingly, it shall be the Contractor's responsibility to ensure that all activities are compliant with Project plans, permit and approval conditions, and any other statutory requirements. Employ qualified Environmental Social Health and Safety (ESHS) Officers (one Environmental Officer, one Social Officer and one OHS Officer) to oversee the Project's ESHS performance and ensure that staffing and resources are adequate, commensurate with the magnitude and timing of work and potential ESHS risks. Submit monthly report to SC/PCU on the status of ESMP implementation, Implement corrective actions as instructed by SC/PCU.

7.2 Environmental and Social Commitment Plan

The key commitments of the government to be given in the ESCP include

- Quarterly submission of reports on the ESHS performance of the project
- Reporting of any incidents within 24 hours of the incident
- Maintaining the PCU with one environment, one social and one OHS specialist
- Preparation of monthly reports by the contractor
- Incorporating the ESMP in the bidding documents
- Implementing the Contractors-ESMP including LMP
- Stakeholder engagement and consultations according to SEP
- Establishing grievance mechanism
- Capacity building of the project staff on World Bank ESF requirements

7.2.1 Capacity building

DCID/PCU has the responsibility to manage the implementation and monitoring of safeguard compliance in BG Road through the proper safeguard staffing. Three staff, one for environment, one

for social and an occupational health and safety specialist will be engaged to support the existing E&S specialists of DCID.

DCID/PCU will conduct capacity building to the staffs including DoR, DCIP, PCU, GESU, SC and the Contractor's for managing and monitoring of environmental and social risk and impacts associated with the project activities. The capacity building will focus on following:

- Management of Environmental and Social Risks and Impacts
- WB's Environmental and Social Standards (ESS1-10)
- Provision of Environment Protection Act (EPA), Environmental Protection Rules (EPR), 2020 National Environmental Standards on pollution
- Occupational Health and Safety in road construction
- DoR's ESMF
- Project's ESMP
- Land Acquisition, Restriction on Land Uses and Involuntary Resettlement
- Biodiversity Conservation and Sustainable Management of Living Natural Resources

7.3 Grievance Mechanism

7.3.1 Project related grievances

The project Grievance Redress Mechanism (GRM) addresses overall project-related grievances. The construction-related issues, impacts related to land, private structures acquisition and compensation, relocation and rehabilitation of public utilities, impact on private and public structures, impacts on forest and natural resources, issues of landslide, draining management, road safety, traffic management and community-related grievances etc. will be covered by the project-level GRM.

Any household or stakeholder who feels that they are impacted adverse and material harm caused by the project may contact municipality leaders or local leaders of affected municipalities or rural municipalities who would then forward the complaint to the SC or the stakeholder may contact directly DCID/PCU or DOR. The Municipality and SC staffs will also be ready to receive a complaint and resolve and will take to the higher level of authority if necessary.

Every PAP can appeal to the court if they feel that they were not compensated appropriately. They may appeal to appellate court within 35 days of the public notice given to them.

7.3.2 Grievance related Project workers

A GRM will be established specifically for worker-related grievances, in accordance with ESS2. This includes all issues of project workers. The accommodation (health and sanitation), availability of safety gazettes, equal wages to male and female for works of similar nature, delay in payments, hiring of labours without contract document and GBV. The project workers related GRM will be detailed in the Labour Management Procedures (LMP).

7.3.3 Gender Based Violence (GBV) Related Grievances

This includes issues of Gender Based Violence within the project, workers and in the community level (PAP), where a well-equipped separate mechanism for reporting cases of GBV-local based GBV-GRM with GBV skilled community members will respond to such cases and contractors will need to have a Code of Conduct (CoC) as well as proper documentation of each labourer including social sanctions.

7.3.4 Implementation of GRM in the Project Cycle

Under the DCID, Project Coordination Unit (PCU)and Supervision Consultant (SC) will establish the project GRM within 1 month from start of the project and before construction work begin. The types

of grievances expected to be handle concerning all, either land acquisition or more generally, construction-related grievances, and any other social and environmental issues brought up during construction by affected people who lives relatively close to construction sites.

Local households and stakeholders will be informed about the setting up of the Grievance mechanism by the PCU, SC before start of any construction as part of the community mobilization process. Besides, the information board will be in place at construction site with specific information related to the construction works and will provide in local language the description of project and grievance mechanism, where and to whom stakeholders can deliver their complaints, and in what form: verbal or written.

When obtaining the information from the complainant, in verbal or written form, either directly or from the Municipality/District Coordination Committee (DCC) and Community offices PCU/SC office will complete a Grievance Action Form (GAF) to record all grievances and actions taken in a Grievance log. Minimal information recorded in this form will include (i) basic data about the affected person (name, address, contact number); (ii) category of grievance filed (legal, social, environmental, technical/ engineering, financial, etc.); (iii) detailed description of grievance; and (iv) type of action taken. The GAF will be filled out by the person receiving a grievance and signed by the affected party and the receiver of the complaint. The affected party will receive a copy signed by both.

DCID/PCU will handle received grievances related to works on the road construction in collaboration with the SC and the construction contractor. In each case, DCID/PCU will be supported by the SC, DOR. The construction contractor will clarify, if the construction works cause the complaint. The SC will inform and update the complainant about the progress of grievance mitigation within 24 hours for urgent issues and 7 days for non-urgent issues.

Once verified problem/complaint is well founded and due to the construction works, decision will be implemented together with the PCU, SC and Contractor. Contractor will take the necessary corrective actions and try to resolve the grievance informally directly with the complainant. If any sort of filled level grievance is not possible to redress or at the choice of the complainant, a formal redress can be forwarded to the Grievance Redress Committee (GRC).

The GRC will be formed to review complaints that cannot be resolved immediately. The committee will be formed by the Project Director of the proponent as a chair, PCU, (SC) and members of local stakeholders involved: Municipality representative, community members, etc. A complainant has the right to appear in person, to be accompanied by a family member, and/or to request to be represented by senior community member. In the event that the contractor, PCU, SC do not address a grievance, the affected person can seek legal redress of the grievance in the appropriate courts under the formal legal court system.

In the case the established GRM is not in a position to resolve the issue, affected people can also use the World Bank Accountability Mechanism through direct contact (in writing) to the World Bank or Government of Nepal (GoN). The complaint can be submitted in any of the official languages of WB or in local Nepali language.

Depending on the complaints and the mitigation measures decided and implemented, if necessary, the ESMP will be updated in order to avoid similar problems afterwards. The SC Safeguard unit will provide monthly reports of any complaint registered, and how it has been dealt with to the local authorities. The SC Safeguard unit will regularly provide information to dissemination to the local stakeholders and communities of any grievances received and how they have been resolved, through the community mobilization process or through the Communication Strategy Plan implementation.

Grievance recording register will be established at the project office, Contractor’s Office and Consultant's RE office as well. Project affected people as well as local people can lodge their complaints at these Offices related to assets acquisition and other social and environmental concerns due to construction related activities.

Special project grievance mechanisms such as on-site provision of complain hearings allows project affected persons to get fair treatment on time. The GRC will be established in each road sections covering affected Rural Municipality/Municipality to handle initial grievances of the project-affected people. The grievant will have unhindered access to the grievance redress office to forward and file complains. The provision of Social Mobilizer in the project implementation is good practices in this regard. Social Mobilizer can be mobilized in order to help grievants to file the complaints to the concerned agency. Grievants will be exempted from all administrative fees incurred, pursuant to the grievance redressed procedures except for cases filed in court Proposed mechanism for grievance resolution is given below:

Stage 1: Complaints of grievants on any aspect of compensation, relocation, or unaddressed losses will be settled in first instance verbally or in written form in field-based project office. The concerned personnel to settle the issues at local level can discuss the complaint in an informal meeting with the grievant. The community consultation, involvement of social and resettlement specialist and environmental specialist will be helpful in this regard. It will be the responsibility of the GRC and Project In-charge to resolve the issue within 15 days from the date of the complaint received.

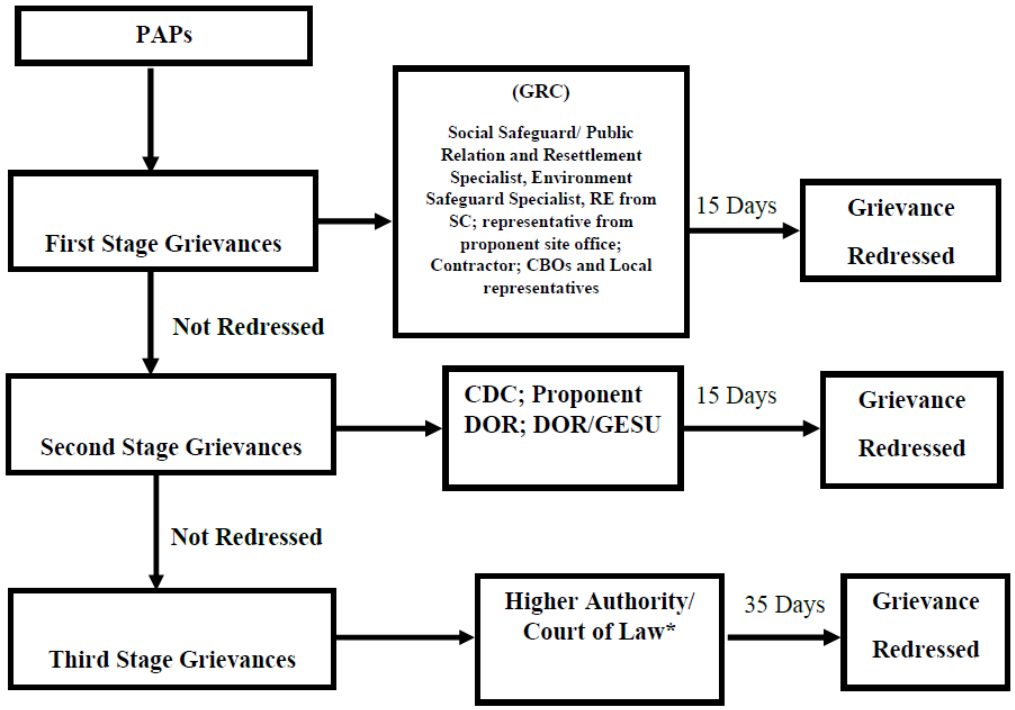


Figure 7.1: Grievance Redress Mechanism structure in the project cycle

Stage 2: If no understanding or amicable solution reaches or no response from the project office, the grievant can appeal to the project proponent/DOR for compensation Determination Committee (CDC). While lodging the complaint, the grievant must produce documents to support his/her claim. The CDC will provide the decision within 15 days of registering the appeal. In the case if established GRM is not in a position to resolve the issue, affected people can also use the World Bank Accountability Mechanism through direct contact (in writing) to the World Bank or Government of Nepal (GoN).

Stage 3: If the grievant is not satisfied with the decision of CDC and project proponent or in absence of any response of its representatives, within 35 days of the complaint, the grievant, in his/her last resort, may submit its case to the court.

CDC= Compensation Determination Committee, PAPs= Project Affected Persons, GRC= Grievance Redress Committee, SC= Project Management and Supervision Consultant, DOR= Department of Roads, GESU= Geo-Environment and Social Unit. *Aggrieved person may also access the country's legal system at any stage (of the three stages) of the grievance redress mechanism.

8 Stakeholder Engagement and Public Consultations

Details of stakeholder consultations and feedback received from the stakeholders and actions taken or to be taken up by DOR to address their concerns are described in this chapter.

8.1 Project Stakeholders

The project stakeholders are categorized as:

Affected parties:

They include individuals, groups, and entities within the project's Corridor of Impact, which is set as the area within the 150 meters each side from the central line of the proposed road, that may be directly impacted by the project activities and/or have been identified as most susceptible to the change associated with the project. So, the project-affected parties need to be closely engaged in identifying impacts, as well as in decision-making on mitigation and management measures. They include:

- Local populations living or public service providers located within the area of 150 meters each side from the central line of the proposed road and may be adversely affected mainly by noise, dust, vibration, and the vehicular movements that will used for the construction activities,
- Persons or households who may lose temporary or permanent access to land and/or will be restricted from accessing natural resources because of the project, e.g., farmers, landowners, informal settlers and businesses, forest user groups, etc.
- Local health centers that provide basic health supports to the project staff and migrant workers.

Interested Parties:

The interested parties in this project, other than those directly affected, include:

- Government officials (elected and non-elected), regulatory, and permit awarding agencies at the federal, provincial, and local levels, including environmental, technical, and labor authorities. E.g. Ministry of Forest and Environment
- Government officials at District level offices of key ministries, including Divisional Forest Offices, Road Offices, Survey Office, Land Revenue Offices, and Electricity Authority, etc.
- Non-elected officials with wide recognition within the community, such as headteachers of local schools, religious leaders, or leaders of local cooperatives
- Leaders of informal or traditional community institutions such as women groups, Dalits Samaj, water consumer groups, village councils, etc.
- NGOs and CBOs at national, provincial, and local levels on the welfare and rights of indigenous people and vulnerable groups such as Dalits and other minorities, gender/GBV issues, etc.
- Residents and communities within the project area that can benefit from increased economic opportunities, employment, and training opportunities stemming from the project; and,
- Media including district and local press clubs.

Disadvantaged/vulnerable individuals or groups:

The project recognizes the need to understand whether impacts may disproportionately fall on disadvantaged or vulnerable individuals or groups that are often unable to express their concerns or not in a position to react to the impacts due to various social barriers or may not even understand the impacts of a project. The vulnerability may stem from an individual's gender, race, age, health condition, ethnicity or caste, education and income levels and other elements of marginalization. The stakeholder engagement activities in this project will consider these elements of vulnerability and deploy strategies such as periodic disclosure of information in a way comprehendible to local communities and meaningful consultations in a culturally appropriate manner to ensure that the disadvantaged and vulnerable individuals fully understand the potential impacts and mitigation measures of the project. The project will also take special measures to ensure that disadvantaged and vulnerable groups have the opportunity to participate in accessing project benefits, provide feedback, and submit grievances. These groups may include and are not limited to the following:

- Physically-challenged and visually-impaired people
- Individuals with chronic diseases and pre-existing medical conditions
- Minority groups including Dalits and Muslims
- Indigenous peoples and groups
- Disaster-affected populations
- Poor households including femlaeheaded, homeless and landless families
- People/children with disabilities; and,
- School children especially in relation to safety in crossing roads

8.2 Consultation Meetings

Consultations have been carried out with all the above stakeholders during the preparation of the ESIA (during December 2021 and January 2022) and after disclosure of the draft ESIA (during February 2022). Details of these consultations are given in Table 8.1. The participants include households that have encroached into the ROW, local population, public service providers, and local health facilities. The other interested parties are local governments (1 Sub-metropolitan City, 3 Municipalities and 1 Rural Municipality), local non-governmental organizations (NGOs), civil society, teachers, political leaders, women groups, local entrepreneurs, local user groups (forest, water, irrigation etc.), security personnel (traffic police and army), drivers and road users (including travellers); and vulnerable and marginalized groups, including those who are differently-abled. In the first round of consultations, during the preparation of the ESIA, the government disclosed early project concepts and objectives and noted their ideas, suggestions, and concerns used to inform the project design. The second round of consultations were carried out through two workshops one with the national-level stakeholders and other with the local-level stakeholders, after disclosure of the draft ESIA, to obtain the feedback on the draft ESIA. A total of 544 stakeholders, 418 men and 126 women, were consulted through all these meetings.

Table 8.1: Details of Public Consultation Meetings

S.No.	Location	Date	Participants		
			Male	Female	Total
I	**First Round of Consultations**				
A	**WARD and Municipal Level Consultations**				
1	Butwal Sub-Metropolitan City -Ward no.4	2022/01/13	5	3	8
2	Butwal Sub-Metropolitan City – Ward no. 1	2022/01/02	7	2	9
3	Butwal Sub-Metropolitan City – Ward no. 2	2022/01/11	5	3	8
4	Butwal Sub-Metropolitan City – Ward no. 12	2021/12/20	9	17	26
5	Butwal Sub-Metropolitan City – Ward no. 13	2021/12/21	14	5	19
6	Sainamaina Municipality – Ward no. 5	2022/01/11	4	1	5
7	Sainamaina Municipality – Ward no. 1	2021/12/21	8	6	14
8	Sainamaina Municipality – Ward no. 2	2022/01/10	14	1	15
9	Sainamaina Municipality – Ward no. 3	2021/12/19	10	6	16
10	Sainamaina Municipality – Ward no. 4	2021/01/18	18	4	22
11	Sainamaina Municipality – Ward no. 5	2021/12/17	8	3	11
12	Sainamaina Municipality – Ward no. 6	2021/12/30	19	2	21
13	Sainamaina Municipality – Ward no. 8	2021/12/29	17	3	20
14	Sainamaina Municipality – Ward no. 9	2021/12/31	21	3	24
15	Sainamaina Municipality – Ward 10	2021/12/28	10	5	15
16	Sainamaina Municipality – Ward 11	2021/12/28	12	1	13
17	Kanchan Rural Municipality – Ward 12	2022/01/11	8	2	10
18	Kanchan Rural Municipality – Ward 5	2022/01/12	6	4	10
19	Banganga Municipality – Ward 4	2022/01/05	6	1	7
20	Banganga Municipality – Ward no. 1	2022/01/11	11	4	15
21	Banganga Municipality – Ward no. 2	2022/01/04	13	2	15
22	Banganga Municipality – Ward no. 4	2022/01/04	43	20	63
23	Banganga Municipality – Ward no. 7	2022/01/04	16	5	21
24	Banganga Municipality – Ward no. 8	2022/01/05	18	0	18
25	Buddhabhumi Municipality	2022/01/05	6	4	10
26	Buddhabhumi Municipality – Ward 2	2022/01/06	9	2	11
27	Buddhabhumi Municipality–Ward 4	2022/01/06	15	1	16
	TOTAL WARD-LEVEL		**332**	**110**	**442**
B	**Environmental Agencies and NGOs**				
28	Community Forest Groups in the Project Area	14 to 29 December 2021	31	6	37

S.No.	Location	Date	Participants		
			Male	Female	Total
29	Wildlife Conservation Nepal – Kathmandu	25 Oct 2021	3		3
30	Bird Conservation Nepal – Kathmandu	25 Oct 2021	1		1
31	Department of Forest /IEE/EIA Section, Kathmandu	27 Oct 2021	2		2
32	Sub Divisional Forest Office, Kanchan, Rupandehi district	14 Dec 2021	2		2
33	Sub Divisional Forest Office, Gorusinghe	14 Dec 2021	2		2
II	**Second Round of Consultations**				
A.	**Disclosure Workshops**				
34	Consultation Workshop with national-level stakeholders	9 Feb 2022	23	6	29
35	Consultation workshop with local-level stakeholders	20 Feb 2022	22	4	26
		GRAND TOTAL	**418**	**126**	**544**

8.3 Feedback from Consultations

Feedback from the consultations was overall supportive of the project from both local communities and the government agencies. All participants unanimously agreed that the draft environmental and social reports were very comprehensive and extensively covered all environmental social aspects including measures for protection of wildlife, conservation of natural resources, and entitlements for resettlement and rehabilitation assistance. The feedback from the first-round consultations (during the preparation of the ESIA is summarized in Table 8.2, and the second of round of consultations (after disclosure of the draft ESIA is summarized in Table 8.3 .

Table 8.2: Feedback from First-Round of Consultations

S.No.	Issues/Concerns/Demand	Response/ Action
1	Construction work to be carried out only after infrastructures like; water pipelines, electricity wires and poles, telecommunications wires, canals, drains etc., which exist along the roadside, to be managed and shifted accordingly after consulting with respective organizations. Also, there shouldn't be any hindrances in the water supply during the construction phase.	Relocation of utilities will be included in the bidding documents and will be implemented by the contractor
2	The facility of cross drainage management and replacement of old worn-out Hume pipes with new culverts to facilitate excess water flow.	The social and environmental report (mitigation measures) will address these issues during implementation, and a sufficient budget will be allocated to resolve these issues in the new design
3	Landslide prone area hence adequate study to be carried out before carrying out construction work.	The social and environmental report (mitigation measures) will address these issues during implementation and a sufficient budget will be allocated to resolve these issues in the new design
4	Should come up with ideal plan in regards of minimizing pollution during the construction phase of project.	The social and environmental report (mitigation measures) will address these issues during implementation, and a sufficient budget will be allocated to resolve these issues in the new design
5	Provision of overhead bridges (sky bridges) and underpass to reduce road accidents and easy access on either side.	The new design has made provisions to address these issues.
6	Construction to be carried out by dividing the entire road section into small parts which would help in reducing the pollution.	The new design has made sufficient provisions to address these issues/ Will discuss with the technical team if possible
7	Telephone and electricity wires to be undergrounded if possible.	The new design has made sufficient provisions to address these issues
8	Different types of environmental pollution may generate as a result of various road construction activities (especially air pollution), which should be mitigated with appropriate measures. The bituminous road must be demolished at the end period to prevent air pollution.	Air pollution measures will apply, such as water sprinkling during the construction period;
9	The project should be sensitive to the occurrence of likely social distortion during road construction and should implement public awareness program.	Social and environmental awareness will be conducted during the implementation
10	The project should be started in coordination with the concerned agencies regarding the existing structures related to electricity, drinking water, telephone, sewerage, and irrigation.	It is necessary to coordinate with concerned agencies

S.No.	Issues/Concerns/Demand	Response/ Action
11	Dust and smoke should be completely controlled during road construction.	The new design has made sufficient provisions to address these issues
12	Skill development programs related to livelihood should be conducted for the locals.	These issues will be addressed through RP.
13	Construction work to be carried out by adopting safety measures.	The new design has made sufficient provisions to address these issues
14	Local people from the project-affected settlement should be prioritized in terms of providing employment in the project on the basis of their skill, qualification, and capability.	The project document has provisions to resolve the issues.
15	The project should be sensitive to the occurrence of likely social distortion during road construction and should implement public awareness program.	Project documents have provisions to resolve the issues GRM will be established in each municipality to address the issues.
16	The project should be completed within a fixed period of time.	The donor and government have fixed the construction period.
17	Proper provisions of CCTV and traffic lights on the roads.	These issues will be discussed with technical team.
18	As there is Lumbini Sajedhari/Tilaurakot Collaborative Forest in this area, arrangements should be made to use the forest produce collected in Lumbini Sajedhari Forest.	Discussion will be done with Divisional Forest Office, local bodies and respective community forests
19	The project will have to reconstruct the Buddha statue, waiting for station and other structures near the Lumbini entrance gate within the road section.	RAP will address the issues. A sufficient budget will be allocated to reconstruct the affected structures.
20	Tree plantation arrangements should be made.	Cost for tree plantation/compensatory plantation will be allocated.
21	The project should help in controlling the floods with the proper provision of drains on either side of the road from Geruwa, Bangai to Koili Bridge.	The new design will address the issues.
22	As there is Mayadevi Stadium in the western part of Banganga Bridge and Shanti Udyan in the north, it should be properly managed and action plan should be made to maintain local identity and pride.	RAP will address the issues. A sufficient budget will be allocated to reconstruct the affected structures.
23	When constructing roads between urban areas and settlements, certain types of pollution-preventing plants should be planted.	Ornamental tree/ shrub will be a plantation in green belt/median.
24	A powerful deity temple, Jhadulamai, lies along the roadside hence, construction work needs to be done with its preservation and protection.	We will discuss this with the technical team. These issues will be given priority
25	Barbed wire fence along roadside should be reconstructed by contractors after demolishing them	Damage by the project will be reinstated/ reconstructed included in the engineer's estimate
26	Ownership of harvested trees should be granted to respective forest user groups	The discussion will be done with Divisional Forest Office, local bodies and respective community forests
27	Construction of Gabion around high Embankment and unstable area and landslide prone areas	For the protection of embankment erosion, bio-engineering measures and civil structures will be constructed as per requirement

S.No.	Issues/Concerns/Demand	Response/ Action
28	Roadside plantation should be restored after its removal for road extension	The issue will be addressed according to Forest Clearance Guidelines. (When 1 tree is felled, it should be replaced with 10 as compensatory plantations) the cost will be allocated
29	Construction of wildlife corridor for easy wildlife passage on both side of road	Certain measures will be applied in the forest area such as warning signs of wildlife crossing, speed limit sign, display board
30	Construction of sewage channel to prevent water flooding in residential areas	Side drain provision is the road design
31	Construction of pavements to connect roadway with major picnic spot	This issue will be discussed with the technical team for incorporation project cost.
32	Construction of wildlife corridor for easy wildlife passage on both side of road	Certain measures will be applied in the forest area such as warning signs of wildlife crossing, speed limit sign, display board
33	Construction of sewage channel to prevent water flooding in residential areas	Side drain provision is the road design
34	Construction of pavements to connect roadway with major picnic spot	This issue will be discussed with the technical team for incorporation project cost.
35	Filing material required for road construction should not be extracted from the community forests	Filling material will not be taken from the community forest area
36	Land stabilization activities should be done in Chure region considering its senility during excavation	This issue will be discussed with the technical team for incorporation project cost.
37	Need to prepare cross drainage structure (Box culvert, bridge) wildlife friendly in Jungle area height and width, and need certain interval	If any location is identified, the issue will be addressed
38	Gaida lake is near the project area there is Vulture restaurant	It will be studies during environmental assessment
39	For removal of roadside tree need to follow Government trees clearance criteria 2071 (2014 AD) (Number 4 and 10) It is national Priority project or not For compensatory plantation need to follow 1:10, compensatory cost need to include in project cost Recommendation letters is necessary Divisional Forest Office	We review the Government tree clearance criteria 2071 (Numbers 4 and 10). It is a national priority project; Project will include the compensatory cost in project cost. A letter will be collected from DFO during IEE
40	Take all trees from ROW, using GPS coordinate, diameter and height We will support for census survey if required. Compensatory cost to be included in project cost	The survey team will take GPS coordinate, diameter and height of all trees The compensatory cost will be included in the ESIA/project cost
41	Take all trees from ROW, using GPS coordinate, diameter and height Compensatory cost to be included in project cost	The survey team will take GPS coordinate, diameter and height of all trees The compensatory cost will be included in the ESIA/project cost

Table 8.3: Feedback from Second-Round of Consultations

SN	Issue Raised	Response
1	Are the climate change adaptation measures for the design of hydraulic structures adequate?	The project design has considered an additional 10% flow as the climate change adaptation measures consistent with the DoR related to climate change adaptation Also, the existing pipe culverts will be replaced by box culverts to improve the flow conditions
2	What is the basis of the Butwal-Gorusinge-Chanauta road section into two separate subprojects?	The feasibility and design of the Butwal -Gorusinghe are in progress with the support of ADB funding. While the studies for the Gorusinge-Chanauta section are yet to be undertaken. World Bank will finance the study.
3	Controlling mechanism for encroachment in the forest area	The project will not develop any temporary facilities (like construction camps and material storage areas) in the forest areas. The forest user groups will also regularly monitor these areas during the implementation.
4	Construction of wildlife crossings for mammals and wild animals in forest areas.	The project will design all the culverts in the forest areas suitable for mammal crossings. In addition, the ESIA recommended culverts to facilitate the movement of herpetofauna in Budhi forest areas. The ESIA has included measures for monitoring wildlife movement in the B-G road section.
5	Please ensure that the project will comply with the government's policies on health and safety and labor and employment.	The ESIA and labour-management Procedure (LMP) have been prepared consistent with the national occupational health safety and labour rights regulations. The compliance with the ESMP and LMP will be monitored during the implementation.
6	Application of bioengineering techniques in the road design	Bioengineering measures will be included in the road design for control of potential landslides and riverbank and embankment erosion.
7	The modality for implementation of compensatory plantations.	The compensatory plantation will be carried out with the support of the forest department. The budget for implementing these activities is already included in the ESIA.
8	Responsible agencies for regular monitoring of the implementation of ESMP.	As detailed in the ESIA, there will be adequate Environmental Social Health and Safety staff with the contractors, construction supervision consultants and PCU (DCID) to ensure implementation of ESMP and regular monitoring. Further, the safeguard officers of the Geo-Environmental and Social Unit (GESU) of DOR will also carry out regular monitoring.
9	Install traffic lights along the alignment	Traffic lights will be proposed at all junctions along the project alignment
10	Issues related to dust nuisance and disturbances in traffic in construction phase should be adequately managed	Measures related to control of dust through regular sprinkling of water and traffic control are included in the ESMP.
11	Compensation related to land structure, crops, fodder and fruits	Compesnation will be provided all losses as per Land acquisition Act, 2034 and Resettlement Action Plan prepared for the project

SN	Issue Raised	Response
12	Delay in construction and problem to public regarding access and disturb their regular activities	Construction activities will be completed timely as per the construction schdule
13	Relocation of religious structures, bus shelters, restig places and public utilities	Relocation activities will be carried out in consultation with local people during project implementation phase
14	Construction of overpass bridge near Namuna School and Durga Higher Secondary School	Overpasses are recommended in the ESIA in the sensitive areas such as schools and will be incorporated in the project designs

8.4 Access to Information

The draft ESIA and Executive Summary of ESIA (including executive summary in Nepali language) have been disclosed on the DOR website and the World Bank's external website on December 23, 2021. This updated ESIA (including executive summary in Nepali language) will also be disclosed in the DOR's website.

9 Annexes

Annex 1: Methodology of Biological Survey and List of Species in the Project Area

Study Methods

The study methodology opted, field based direct observation and secondary information collection method i.e. literatures review and public consultation throughout the wildlife-biodiversity study. Varied approaches were applied within direct observation method specific to Mammals, Aves, Herpetofauna and Fish biodiversity. The study was undertaken from December 20, 2021 to January 11, 2022. The study methods applied are as follow:

Mammal

The mammal species presence and impact study in the project zone of influence was carried applying approaches of i) Surveying animal tracks on the roadside and direct observation; ii) road kill survey and iii) analysis of animal movements, such as road avoidance, barrier effect and increased overlapping of home ranges (Smith and Ree, 2015). Considering the 2 kilometer distance alongside the road as the Ecologically Appropriate Area of Analysis (EAAA) with higher possibilities of wildlife movement the highway to and from, the grid size of 2 Km x 2 Km is created through the application of Geographic Information System (QGIS v. 3.10.9) (Figure 1). Due to insignificant number of prior studies of the area therewith less information was available on mammal species, Direct Impact Area was thus increased to 300m (150m on either side) as has already been tested in the Environment Impact Assessment of Kamala Dhalkebar Pathlaiya Section of MRM (ERMC 2020) for critical habitat screening.

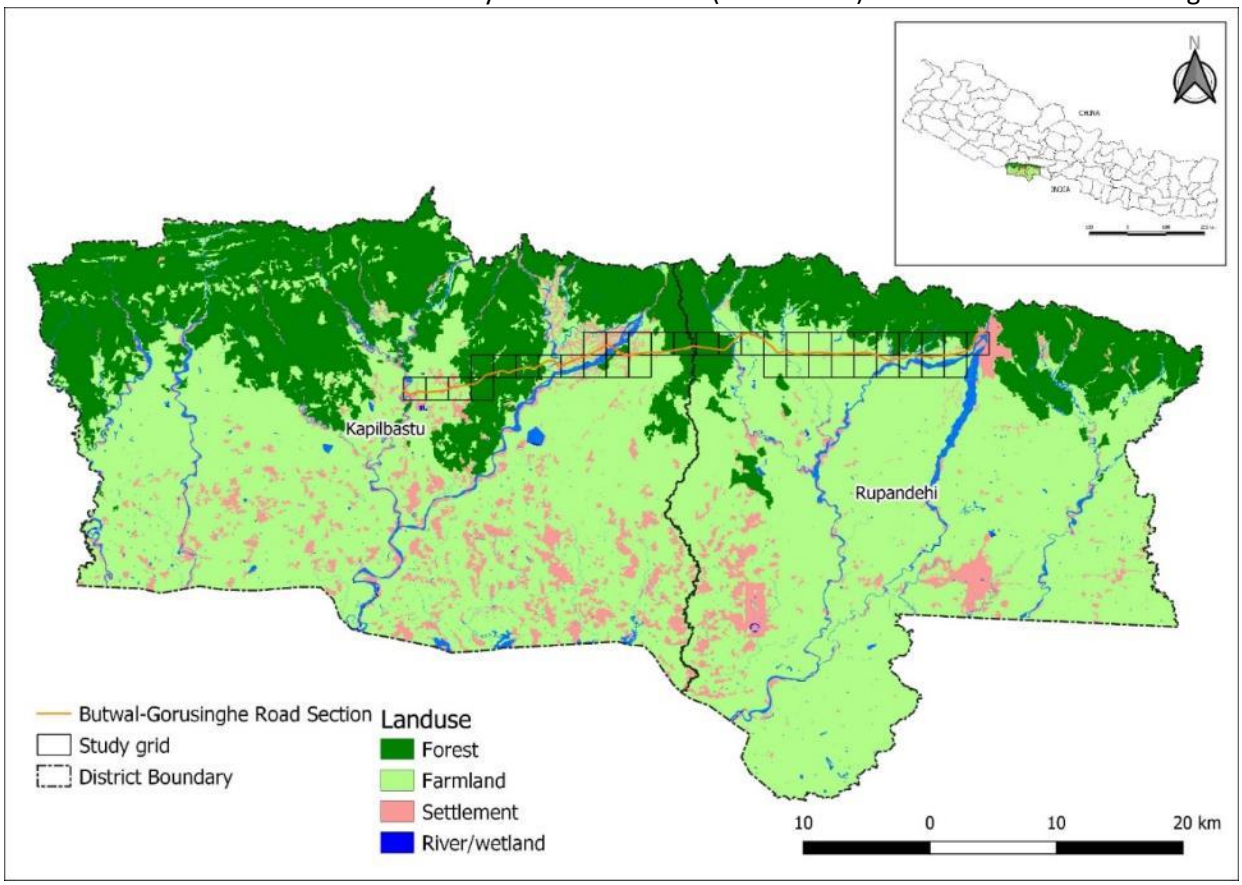


Figure 1: Mammal Survey Grids (2 Km x 2 Km)

Sign survey such as; pugmark/footprint/hoof mark, scats/pellets/dung, scratch on the tree trunks were thoroughly conducted in designated Direct Impact Area. Direct observation was conducted within 2km x 2km grid. Road kill survey was carried sequentially after sign survey. The mammal's presence record in the project area are listed referring "The Status of Nepal's Mammals: The Red List Series" (Jnawali et al, 2011). Addition to the field study, Forest officials (Division Forest and Sub-division Forest Offices), Local Forest Management Groups (Community Forest User Group, Collaborative Forest Management Groups, Religious Forest Management Groups) and other stakeholders were consulted for the better understanding wildlife relating points. Such as:

- Wildlife species in community forest (mammals, avifauna, herpetofauna and fish species)
- Human-Wildlife Conflict (intensity, causes and reduction measures)
- Wildlife road crossing spots, intensity wildlife strike/collision and kill (Black spots) and road kill avoidance measures
- Community Forest initiative for wildlife management and habitat restoration, challenges, lacking and way forth
    - Fodder species plantation
    - Hunting and poaching
    - Water hole/ Pond construction
- Opportunity and support hunting
- Knowledge on wildlife corridor

Avifauna

For Avifauna study, line transects method was used with unlimited radius to record all heard or seen birds (Bibby et al, 2000). Bird monitoring was done along the highways as well as visiting nearby forests. The walking speed was ~1km per hour. Transect walk was carried in the grid designed for the mammal study (figure 3). Bird observations were conducted from 7:00am to 6: 30 pm in evening with some breaks in the afternoon. Opticorn Binoculars of 10x42 and Canon 90D with 55-250mm lens were used to locate and photograph birds respectively. Identification of birds were carried following and Birds of Nepal (Grimmett et al, 2016). Migratory pattern and global status each species was noted following the IUCN Redlist (IUCN, 2021). Similarly, National status was noted following National Redlist of Birds (Inskipp et al, 2016).

Herpatofauna

Capture and Release method applied for sample collection herpetofauna. Frogs and toads were captured using Insect Mesh Net for short span and released back after taking photographs for further identification process. While in the case of reptiles, photographs of directly observed creatures during survey taken for its identification. "Herpetofauna of Nepal-A Conservation Companion". For Turtles followed "Turtles of Nepal: A Field Guide for Species Accounts and Distribution" (Aryal, P.C. *et al.,* 2010) were followed for herpetofauna identification.

Wild boar bath

Indian crested porcupine quills

Pellets of Sambar

Pellet of Barking deer

Mongoose Footprint (left) and Scat (right)

Pellets of Indian hare

Common Leopard Pugmark (Left) and Scat (Right)

Dry scat of Striped Hyaena

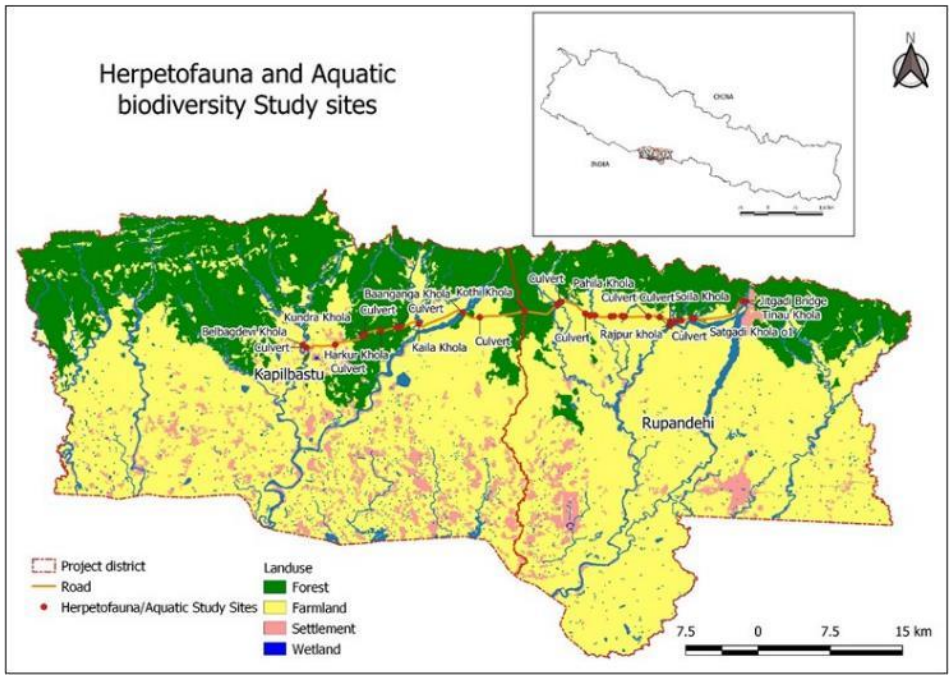


Figure 2. Herpetofauna and Aquatic Biodiversity Study sites

Fish

Butwal-Gorusinghe road segment pass primarily through settlements and farmland while pass across limited rivers (2) with annual flow while other are ephemeral streams such as Kothi Khola, Kaila Khola, Balbagadevi Khola, Kanchan Khola that are considered for fish study.

Net fishing and indigenous ways of fishing (trapping and angling) used for fish sample collection with the help of local anglers. Fish species identified following “Ichthyology of Nepal-A Study of Fishes of the Himalayan Water” and “Fish, Fisheries and Farmers in Nepal”. Consultation with experts made for

precision in Identification of species. Institutional Animal Care and Use Committee and Animal Welfare Act referred for humane collection of samples.

Table 1: Observed avifauna in the project area during the field Survey

S.N	Common Name	Scientific Name	Threatened Status		CITES	Movement Pattern
			Global	National		
1	Alexandrine Parakeet	*Palaeornis eupataria*	NT	NT	II	Nomadic
2	Ashy Prinia	*Prinia socialis*	LC			Not a Migrant
3	Asian Pied Starling	*Gracupica contra*	LC			
4	Besra	*Accipiter virgatus*	LC		II	Altitudinal Migrant
5	Black Bulbul	*Hypsipetes leucocephalus*	LC			Full Migrant
6	Black Drongo	*Dicrurus macrocercus*	LC			Full Migrant
7	Black Kite	*Milvus migrans*	LC		II	Full Migrant
8	Black Redstart	*Phoenicurus ochruros*	LC			Full Migrant
9	Black-hooded Oriole	*Oriolus xanthornus*	LC			Not a Migrant
10	Black-winged Cuckooshrike	*Lalage melascistos*	LC			Full Migrant
11	Black-winged Kite	*Elanus caeruleus*	LC		II	Not a Migrant
12	Blue Whistling Thrush	*Myophonus caeruleus*	LC			Altitudinal Migrant
13	Blue-throated Barbet	*Psilopogon asiaticus*	LC			Not a Migrant
14	Cattle Egret	*Bubulcus ibis*	LC			Full Migrant
15	Chestnut-shouldered Bush-sparrow	*Gymnoris xanthocollis*	LC			Not a Migrant
16	Chestnut-tailed Starling	*Sturnia malabarica*	LC			Not a Migrant
17	Great Tit	*Parus major*	LC			Not a Migrant
18	Common Hawk Cuckoo	*Hierococcys varius*	LC			Full Migrant
19	Common Iora	*Aegithina tiphia*	LC			Not a Migrant
20	Common Myna	*Acridotheres tristis*	LC			Not a Migrant
21	Rock Dove	*Columba livia*	LC			Not a Migrant
22	Common Stonechat	*Saxicola Torquatos*	LC			Full Migrant
23	Common Tailorbird	*Orthotomus sutorius*	LC			Not a Migrant
24	Coppersmith Barbet	*Psilopogon haemacephalus*	LC			Not a Migrant
25	Crested Bunting	*Emberiza lathami*	LC			Altitudinal Migrant
26	Crested Serpent Eagle	*Spilornis cheela*	LC		II	Not a Migrant
27	Crimson Sunbird	*Aethppyga siparaja*	LC			Not a Migrant
28	Eurasian Collared Dove	*Streptopelia decaocto*	LC			Not a Migrant
29	Eurasian Tree Sparrow	*Passer montanus*	LC			Not a Migrant
30	Golden-fronted Leafbird	*Chloropsis aurifrons*	LC			Not a Migrant

S.N	Common Name	Scientific Name	Threatened Status		CITES	Movement Pattern
			Global	National		
31	Greater Coucal	*Centropus sinensis*	LC			Not a Migrant
32	Greater Racquet-tailed Drongo	*Dicrurus paradiseus*	LC			Not a Migrant
33	Asian Green Bee-eater	*Merops orientalis*	LC			Full Migrant
34	Green Sandpiper	*Tringa ochropus*	LC			Full Migrant
35	Greenish Warbler	*Phylloscopus trochiloides*	LC			Full Migrant
36	Grey-breasted Prinia	*Prinia hodgsonii*	LC			Altitudinal Migrant
37	Grey-hooded Warbler	*Phylloscopus xanthoschistos*	LC			Not a Migrant
38	Hair-crested Drongo	*Dicrurus hottentottus*	LC			Full Migrant
39	Himalayan Bulbul	*Pycnonotus leucogenys*	LC			Full Migrant
40	Himalayan Griffon	*Gyps himalayensis*	NT	VU	II	Full Migrant
41	House Sparrow	*Passer domesticus*	LC			Not a Migrant
42	Indian Grey Hornbill	*Ocyceros birostris*	LC			Not a Migrant
43	Indian Peafowl	*Pavo Cristatus*	LC	NT	III	Not a Migrant
44	Indian Pond Heron	*Ardeola grayii*	LC			Not a Migrant
45	Indian Roller	*Coracias benghalensis*	LC			Not a Migrant
46	Jungle Babbler	*Turdoides striata*	LC			Not a Migrant
47	Jungle Owlet	*Glaucidium radiatum*	LC		II	Not a Migrant
48	Indian Cuckooshrike	*Coracina macei*	LC			Not a Migrant
49	Large Woodshrike	*Tephrondornis varigatus*	LC			Altitudinal Migrant
50	Large-billed Crow	*Corvus macrorhynchos*	LC			Not a Migrant
51	Lesser Adjutant	*Leptoptilos javanicus*	VU	VU		Full Migrant
52	Black-rumped Flameback	*Dinopium benghalense*	LC			Not a Migrant
53	Little Cormorant	*Microcarbo niger*	LC			Not a Migrant
54	Little Egret	*Egretta garzetta*	LC			Full Migrant
55	Little Ringed Plover	*Charadrius dubius*	LC			Full Migrant
56	Long-tailed Shrike	*Lanius schach*	LC			Full Migrant
57	Oriental Honey Buzzard	*Pernis ptilorhynchus*	LC		II	Full Migrant
58	Oriental Magpie-robin	*copsychus saularis*	LC			Not a Migrant
59	Oriental Pied Hornbill	*Anthracoceros albirostris*	LC	NT	II	Not a Migrant
60	Indian White-eye	*Zosterops palpebrosus*	LC			
61	Paddyfield Pipit	*Anthus rufulus*	LC			Not a Migrant
62	Pale-billed Flowerpecker	*Dicaeum erythrorhynchos*	LC			Not a Migrant
63	Pied Bushchat	*Saxicola caprata*	LC			Full Migrant
64	Plain Prinia	*Prinia inornata*	LC			Altitudinal Migrant
65	Plum-headed Parakeet	*Himalayapsitta cyanocephala*	LC		II	Not a Migrant
66	Purple Sunbird	*Cinnyris asiaticus*	LC			Not a Migrant

S.N	Common Name	Scientific Name	Threatened Status		CITES	Movement Pattern
			Global	National		
67	Red Avadavat	*Amandava amandava*	LC			Not a Migrant
68	Red Junglefowl	*Gallus gallus*	LC			Not a Migrant
69	Red-billed Blue Magpie	*Urocissa erythroryancha*	LC			Altitudinal Migrant
70	Red-headed Vulture	*Sarcogyps calvus*	CR	EN	II	Not a Migrant
71	Red-naped Ibis	*Pseudibis papillosa*	LC			Not a Migrant
72	Red-rumped Swallow	*Cecropis daurica*	LC			Full Migrant
73	Red-vented Bulbul	*Pycnonotus cafer*	LC			Not a Migrant
74	Red-whiskered Bulbul	*Pycnonotus jocosus*	LC			Not a Migrant
75	Rose-ringed Parakeet	*Alexandrinus krameri*	LC			Not a Migrant
76	Ruddy Shelduck	*Tadorna ferruginea*	LC	NT		Full Migrant
77	Rufous Treepie	*Dendrocitta vagabunda*	LC			Not a Migrant
78	Rufous Woodpecker	*Micropternus brachyurus*	LC			Not a Migrant
79	Rusty-cheeked Scimitar-babbler	*Erythrogenys erythrogenys*	LC			Not a Migrant
80	Scarlet Minivet	*Pericrocotus flammeus*	LC			Not a Migrant
81	Shikra	*Accipiter badius*	LC		II	Full Migrant
82	Slaty-headed Parakeet	*Himalayapsitta himalayana*	LC		II	Nomadic
83	Slender-billed Vulture	*Gyps tenuirostris*	CR	CR	II	Not a Migrant
84	Western Spotted Dove	*Spilopelia suratensis*	LC			Full Migrant
85	Steppe Eagle	*Aquila nipalensis*	EN	VU	II	Full Migrant
86	Velvet-fronted Nuthatch	*Sitta frontalis*	LC			Not a Migrant
87	Verditer Flycatcher	*Eumyias thalassinus*	LC			Full Migrant
88	White-bellied Drongo	*Dicrucus caerulescens*	LC			Not a Migrant
89	White-bellied Redstart	*Hodgsonius phaenicuroides*	LC			Altitudinal Migrant
90	White-browed Wagtail	*Motacilla maderaspatensis*	LC			Not a Migrant
91	White-rumped Vulture	*Gyps bengalensis*	CR	CR	II	Not a Migrant
92	White-throated Kingfisher	*Halcyon gularis*	LC			Not a Migrant
93	Zitting Cisticola	*Cisticola juncidis*	LC			Not a Migrant

Table 2. Herpetofauna species observed and present in the project site

S.N	Common Name	Species Name	Conservation Status		CITES	National Protection Status	Reference
			Global	National			
Frog and Toads							
1	Black-spined Toad	*Duttaphrynus melanostictus*	LC				Shah and Tiwari, 2004
2	Marbled Toad	*Duttaphrynus stomaticus*	LC				Shah and Tiwari, 2004
3	Skittering frog	*Euphlyctis cynoplyctis*	LC				Observed
4	Indian bull frog	*Hoplobactrachus tigerinus*	LC		II		Observed
5	Bhamo frog	*Humerana humeralis*	LC				Shah and Tiwari, 2004
6	Teipeh frog	*Hylarana tytleri*	LC				Shah and Tiwari, 2004
7	Indian burrowing frog	*Sphaerotheca breviceps*	LC				Shah and Tiwari, 2004
8	Maskey's burrowing frog	*Sphaerotheca maskeyi*	LC				Shah and Tiwari, 2004
9	Common Indian tree frog	*Polypedates maculatus*	LC				Observed
Skinks, Geckos and Lizards							
10	Common garden lizard	*Calotes versicolor versicolor*					Observed
11	Himalayan rock lizard	*Laudakia tuberculata*					Observed
12	Nepalese Fan-throated lizard	*Sitana sivalensis*					Shah and Tiwari, 2004
13	Sikkim skink	*Scincella sikimmensis*					Shah and Tiwari, 2004
14	Brahminy skink	*Mabuya carinata*					Shah and Tiwari, 2004
15	Striped grass skink	*Mabuya dissimilis*					Shah and Tiwari, 2004
16	Bronze grass skink	*Mabuya macularia macularia*					Shah and Tiwari, 2004
17	Spotted litter skink	*Sphenomorphus maculatus*					Shah and Tiwari, 2004
18	Bengal monitor	*Varanus bengalensis*	LC		I		Shah and Tiwari, 2004
19	Golden monitor	*Varanus flavescens*	LC		I	Protected	Shah and Tiwari, 2004
Snakes and Python							
20	Common blind snake	*Rhamphotyphlops braminus*					Shah and Tiwari, 2004
21	Burmese python	Python molurus bivittatus	VU		II		Shah and Tiwari, 2004
22	Common vine snake	*Ahaetulla nasuta*					Shah and Tiwari, 2004
23	Buff-striped keelback	*Amphiesma stolatum*					Shah and Tiwari, 2004
24	Olive keelback water snake	*Atretium schistosum*	LC				Shah and Tiwari, 2004
25	Forsten's cat snake	*Boiga forsteni*	LC				Shah and Tiwari, 2004

S.N	Common Name	Species Name	Conservation Status		CITES	National Protection Status	Reference
			Global	National			
26	Common cat snake	*Boiga trigonata trigonata*					Shah and Tiwari, 2004
27	Common bronze backed tree snake	*Dendrelaphis tristis*					Shah and Tiwari, 2004
28	Mock Viper	*Psammodynastes pulverulentus*					Shah and Tiwari, 2004
29	Common rat snake	*Ptyas mucosus*			II		Shah and Tiwari, 2004
30	Cantor's black-headed snake	*Sibynophis sagittaria*					Shah and Tiwari, 2004
31	Dark-bellied marsh snake	*Xenochrophis cerasogaster*					Shah and Tiwari, 2004
32	Yellow spotted keelback	*Xenochrophis fravipunctatus*					Shah and Tiwari, 2004
33	Chequered keelback	*Xenochrophis piscator*					Shah and Tiwari, 2004
34	Common Krait	*Bungarus caeruleus*					Shah and Tiwari, 2004
35	Banded krait	*Bungarus fasciatus*	LC				Shah and Tiwari, 2004
36	Monocellate cobra	*Naja kaouthia*	LC		II		Shah and Tiwari, 2004
37	Spectacled cobra	*Naja naja*	LC				Shah and Tiwari, 2004
38	King cobra	*Ophiophagus hannah*	VU		II		Shah and Tiwari, 2004
39	Russell's viper	*Daboia russelii russelii*	LC		III		Shah and Tiwari, 2004
Turtle and Tortoise							
40	Tricarinate hill turtle	*Melanochelys tricarinata*	EN	VU	I		Aryal et al., 2010
41	Black pond turtle	*Melanochelys trijuga indopeninsularis*	NT	Susceptible	II		Aryal et al., 2010
42	Indian eyed turtle	*Morenia petersi*	EN	Susceptible	II		Aryal et al., 2010
43	Indian tent turtle	*Pangshura tecta*	LC	Susceptible	I		Aryal et al., 2010
44	Elongated tortoise	*Indotestudo elongata*	CR	Susceptible	II		Aryal et al., 2010
45	Indian softshell turtle	*Aspideretes gangeticus*	EN	VU	I		Aryal et al., 2010
46	Indian peacock softshell turtle	*Aspideretes hurum*	VU	Susceptible	I		Aryal et al., 2010
47	Indian flapshell turtle	*Lissemys punctata andersoni*	LC	Susceptible	II		Aryal et al., 2010

Table 3: Fish species of the project area

S.N	Common Name	Species Name	Conservation Status		CITES	Reference
			Global	National		
1	Reba carp	*Cirrhinus reba*	LC	Uncommon		Cited
2	Kalbasu	*Labeo calbasu*	LC	Common		Cited
3	Cooper mahseer	*Neolissocheilus hexagonalepis*	LC	Vulnerable		Observed
4	Tor mahseer	*Tor tor*	DD	Endangered		Cited
5	Silver razor belly minnow	*Salmostoma acinaces*	LC	Common		Cited

S.N	Common Name	Species Name	Conservation Status		CITES	Reference
			Global	National		
6	Barred baril	*Barilius barila*	LC	Common		Cited
7	Hamilton's baril	*Barilius bendelisis*	LC	Common		Cited
8	Annandale garra	*Garra annandalei*	LC	Uncommon		Cited
9	Gotyla	*Garra gotyla gotyla*	LC	Common		Observed
10	Asiatic snakehead	*Channa gachua*	LC	Common		Observed
11	Walking catfish	*Clarias batrachus*	LC	Common		Observed
12	Spotfin swamp barb	*Punctius sophore*	LC	Rare		Observed
13	Spotted snakehead	*Channa punctatus*	LC	Common		Observed
14	Stinging catfish	*Heteropneustes fossilis*	LC	Common		Observed

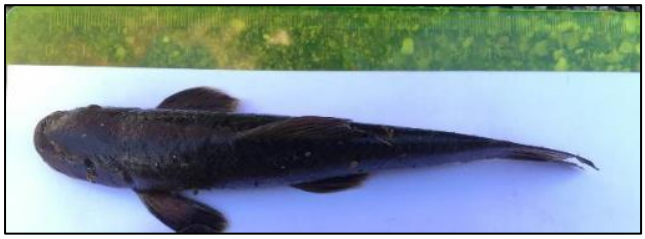
Asiatic snakehead

Spotted snakehead

Spotfin swamp barb

Stinging Catfish

Walking catfish



Gotyla

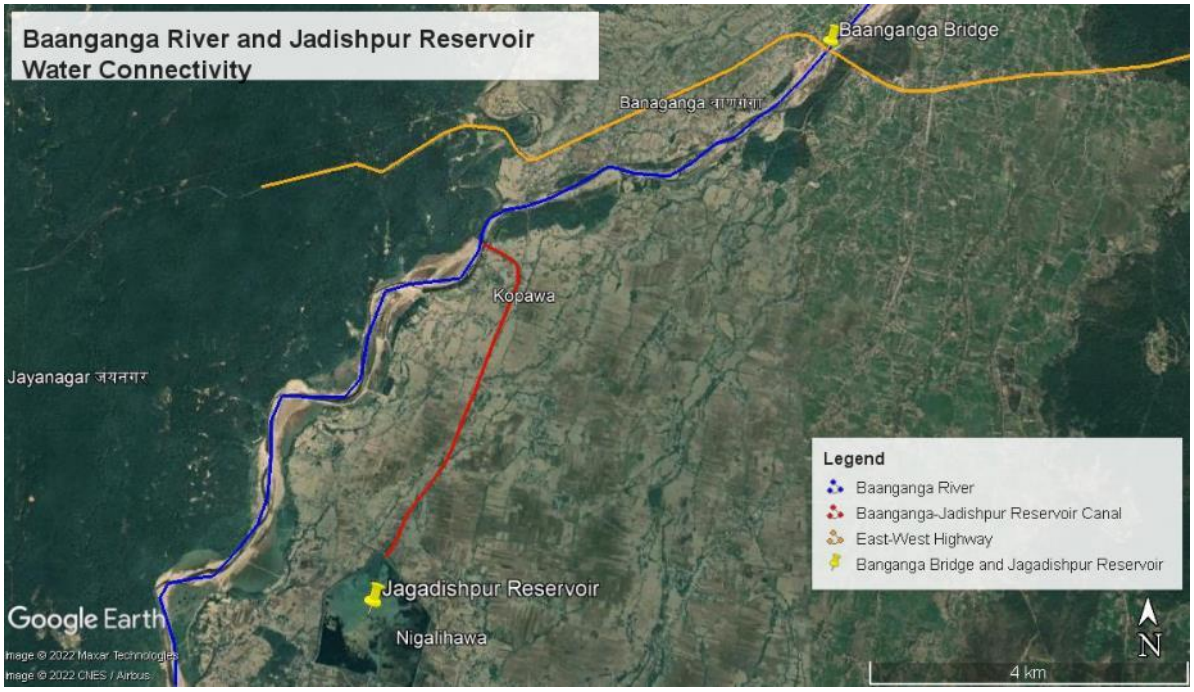


Figure 6: Baanganga- Jadishpur Reservoir Water Connectivity

Table 7: Important IBAs of Nepal identified through IBAT

1	Annapurna Conservation Area	A1, A2, A3	NP001
2	Barandabhar forests and wetlands	A1, A3, A4i	NP002
3	Bardia National Park	A1, A3, A4i	NP003
4	Chitwan National Park	A1, A3, A4i	NP004
5	Dang Deukhuri foothill forests and west Rapti wetlands	A1, A3	NP005
6	Dharan forests	A1, A2, A3, A4i	NP006

7	Dhorpatan Hunting Reserve	A1, A2, A3	NP007
8	Ghodaghodi Lake	A1, A3, A4i	NP008
9	Kanchenjungha Conservation Area	A1, A2, A3	NP010
10	Khaptad National Park	A1, A2, A3	NP011
11	Langtang National Park	A1, A2, A3	NP013
12	Mai Valley forests	A1, A2, A3	NP015
13	Makalu Barun National Park	A1, A2, A3	NP016
14	Nawalparasi forests	A1	NP017
15	Parsa Wildlife Reserve	A1, A3	NP018
16	Phulchoki Mountain forests	A2, A3	NP019
17	Rampur valley	A1	NP020
18	Rara National Park	A1, A2, A3	NP021
19	Sagarmatha National Park	A1, A3	NP022
20	Shey-Phoksundo National Park	A1, A2, A3	NP023
21	Shivapuri-Nagarjun National Park	A2, A3	NP024
22	Sukla Phanta Wildlife Reserve	A1, A3, A4i	NP025
23	Tamur valley and watershed	A2, A3	NP026
24	Urlabari forest groves	A1, A4i	NP027
25	Farmlands in Lumbini area	A1, A3, A4i	NP014
26	Jagdishpur Reservoir	A1, A4i, A4ii	NP009
27	Koshi Tappu Wildlife Reserve and Koshi Barrage	A1, A3, A4i, A4iii	NP012

Annex 2: Critical Habitat Assessment of Critically Endangered, Endangered and Restricted-range Species

This annex provides a summary of the method for assessment of critical habitat, and presents the species lists, their stages of assessment and justifications for inclusion or exclusion as critical habitat features for the project.

1. METHODOLOGY

A list of 40 CR and EN species potentially occurring within a default 50 km radius of the project area was generated by IBAT (Figure 1). This data was supplemented with an additional 67 species with a CR and EN threatened status from the Nepal National Red List Series of Mammals (single volume, 2012) and Birds (six volumes, 2016). These additional species were selected where national red list distribution maps indicate their potential occurrence within an approximately 50 km radius of the project site. The full list (107 species) is provided in Table A2.1.

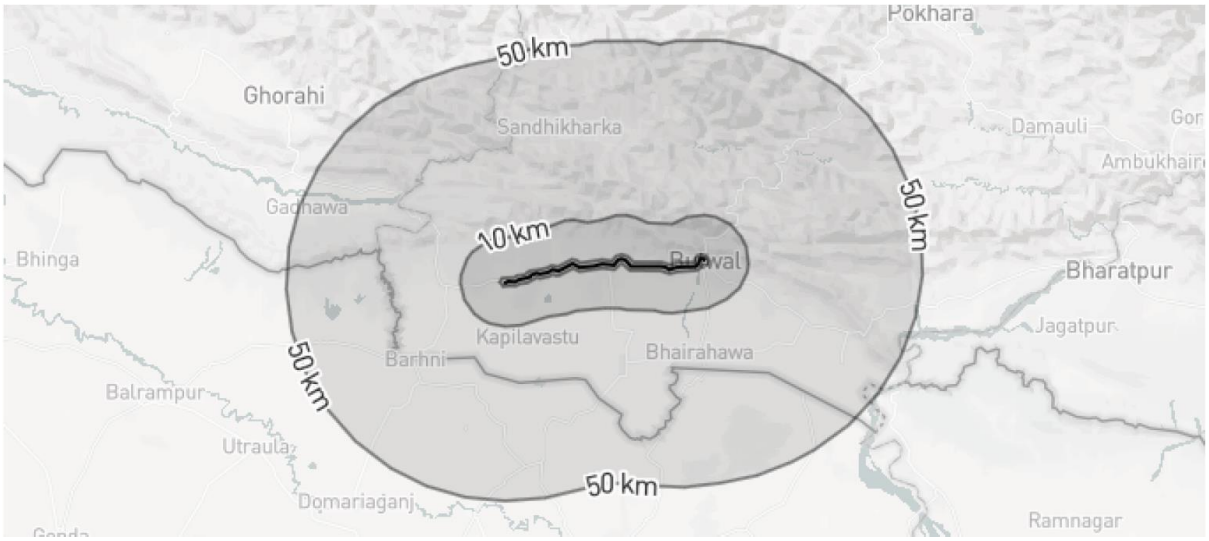


Figure 1: Map of the project route provided by IBAT showing 1 km, 10 km and 50 km buffers

IBAT presents a list of 12 species that are potentially range-restricted, which was supplemented with an additional 13 bird species listed as range-restricted within the Nepal Red Lists of Birds (Volume No. 6, 2016). These species are presented in Table A2.2.

The Likelihood of Occurrence (LOO) of each species (within an approximately 50 km radius of the project) was assessed in Table A2.1 and Table A2.2 based on their distribution within Nepal and habitat requirements compared to baseline descriptions of habitats described within a 2km wide corridor of the project route. Species not present or with an unlikely presence were screened out to yield a reduced list of 31 CR and EN species recorded present or with possible occurrence. All potential range-restricted species were screened out within Table A2.2 as none have a possible occurrence within an approximately 50 km radius of the project.

Table 3 presents an assessment of the potential of the reduced list of species to qualify as critical habitat features. Assessments are based on their known occurrence, threatened status and

population size. This assessment has yielded eight faunal species considered to qualify as critical habitat features.

Arguments for acceptance or rejection of a critical habitat status are provided for each species in Table A2.3, although the following points were used as guidance while assessing each species for this assessment:

- Key Biodiversity Areas (KBA) including Important Bird Areas (IBA) and Alliance for Zero Extinction (AZE) sites provide important indicators of potential critical habitat. Careful consideration is also to be given to legally protected areas, Ramsar wetlands of international importance, UNESCO world heritage sites and Government recognized conservation initiatives.
- ESS6 Criterion (a) requires an assessment against both global (IUCN) and national red list ratings. ESS6 critical habitat criterion (a) places an emphasis on national red lists, while footnote 13 proposes that national red list ratings should be given priority over IUCN (global) red list ratings.
- Where a significant proportion (>= ±0.5%) of the national or global population of a species has a likely presence within the project area, consideration is to be given for the habitat to have significant importance for the species under ESS6 Criterion (a), (b) or (c). For examples, refer to Fishing Cat (*Prionailurus viverrinus*) and Steppe Eagle (*Aquila nipalensis*) in Table A2.3.
- By IUCN definition, a CR species faces an extremely high risk of extinction and its continued survival in the wild is in a critical state. Therefore, evidence of use of habitats within the project-affected area by a surviving population of a CR species suggests that these habitats have a significant importance for the species under ESS6 Criterion (a). For an example, refer to Slender-billed Vulture (*Gyps tenuirostris*) in Table A2.3.
- ESS6 Criterion (b) can be achieved for range-restricted species with evidence or believed to occur within the project-affected area where the full extent of that area overlaps a significant proportion (± 1%) of a species' distribution range.
- There is no specific guidance for assessment of Criteria (d) and (e) and each situation needs to be assessed on a case-by-case basis.

Threats, potential risks and impacts to critical habitat features were assessed in Table A2.4 to identify two mammals and one reptile that are potentially impacted by the project and will require mitigation measures to be developed for their protection. Residual impacts are not expected to be significant, but support to the Terai Arc Landscape (TAL) may present opportunities to achieve Net Gain if required.

2. DATA TABLES

Table A2.1: Full list of CR and EN species for screening out species based on distribution and habitat requirements (species identified for critical habitat assessment are shaded green)

Species English and Scientific Name	Threatened Status		Habitat Requirements	Distribution Data in Nepal	LOO and Reasons for Exclusion
	National	IUCN			
Mammals (25 species)					
Asian Elephant (*Elephas maximus*)	EN	EN	Mixed forest	Potentially throughout the lowlands of Nepal	Possible
Greater One-horned Rhino (*Rhinoceros unicornis*)	EN	VU	Selected protected areas	In and around Bardia, Chitwan and Shukla Phanta protected areas	Not present OOR
Asiatic Black Bear (*Ursus thibetanus*)	EN	VU	Steep forested areas	Mid-altitude throughout Nepal	Unlikely, HNS
Sloth Bear (*Melursus ursinus*)	EN	VU	Generalist, mostly in protected areas	Terai Arc Landscape but mostly in protected areas	Unlikely, OOR
Red Panda (*Ailurus fulgens*)	EN	EN	Mountainous habitat	At elevations from 2,800 m to 3,600 m.	Not present, HNS
Grey Wolf (*Canis lupus*)	CR	LC	High elevation scrubland	Higher elevations in eastern and western Nepal.	Not present, OOR
Dhole (*Cuon alpinus*)	EN	EN	Widespread	Patchy distribution at various altitudes within Nepal	Not present, OOR
Bengal Tiger (*Panthera tigris tigris*)	EN	EN	Forest	Potentially throughout the Terai Arc Landscape	Possible
Clouded Leopard (*Neofelis nebulosa*)	EN	VU	Primary evergreen forest	Patchy distribution at various altitudes within Nepal	Not present, HNS
Fishing Cat (*Prionailurus viverrinus*)	EN	VU	Wetlands and riverine	Restricted to the Terai Arc Landscape	Present
Striped Hyaena (*Hyaena hyaena*)	EN	NT	Generalist habitat req.	Throughout the lowlands of Nepal, except far east of Nepal	Present
Honey Badger (*Mellivora capensis*)	EN	LC	Generalist habitat req.	Throughout the lowlands of Nepal	Possible
Spotted Linsang (*Prionodon pardicolor*)	EN	LC	Riverine forests and undulating areas	Throughout eastern Nepal	Unlikely, HNS
Smooth-coated Otter (*Lutrogale perspicillata*)	EN	VU	Rivers with riparian vegetation	Widespread within the Terai Arc Landscape & eastern Nepal	Possible
Chinese Pangolin (*Manis pentadactyla*)	EN	CR	Widespread	Annapurna Conservation Area, Makalu Barun National Park and districts of Baglung	Not present, OOR
Indian Pangolin (*Manis crassicaudata*)	EN	EN	Generalist habitat req.	Chitwan and Shukla Phanta protected areas and surrounding districts	Not present, OOR
Barasingha/Swamp Deer (*Rucervus duvaucelii*)	EN	VU	Swampy habitats, floodplains	Only in Bardia and Shukla Phanta protected areas	Not present, HNS
Indian Chevrotain (*Moschiola indica*)	CR	LC	Sal forests & grasslands	No reports of this deer from Nepal since the 1970s	Not present, OOR
Hog Deer (*Axis porcinus*)	EN	EN	Wetlands	Found only within the protected areas	Not present, HNS
Himalayan Field Mouse (*Apodemus pallipes*)	EN	LC	High elevation scrub	Elevations from 2,200 m to 3,600 m	Not present, HNS
Himalayan Muskdeer (*Moschus leucogaster*)	DD	EN	Mountainous habitat	Elevations from 2,200 m to 4,300 m.	Not present, HNS

Species English and Scientific Name	Threatened Status		Habitat Requirements	Distribution Data in Nepal	LOO and Reasons for Exclusion
	National	IUCN			
Hispid Hare (*Caprolagus hispidus*)	EN	EN	Tall grass wetlands	Only in Bardia and Chitwan National Parks and Shukla Phanta Wildlife Reserve	Not present, OOR
Mouse-eared Myotis (*Myotis csorbai*)	CR	DD	Caves in mountainous forest	Known only from Kailash caves Syngja district	Unlikely, OOR
Great Evening Bat (*Ia io*)	CR	NT	Tropical moist forest.	Known only from Chitwan National Park	Not present, OOR
South Asian River Dolphin (*Platanista gangetica*)	CR	EN	Large rivers	Karnali, Geruwa, Mohana, Bhada, Koshi and Narayani Rivers	Not present, HNS, OOR
Birds (67 species)					
White-rumped Vulture (*Gyps bengalensis*)	CR	CR	Widespread	Patchy distribution in the centre, rare in the east and locally frequent in west Nepal	Present
Cinereous Vulture (*Aegypius monachus*)	EN	NT	Open country	Rare in the east and uncommon in the centre and west Nepal	Possible
Indian Vulture (*Gyps indicus*)	-	CR	Generalist habitat req.	Marginal and possibly extinct in Nepal, not described in Red List	Possible
Red-headed Vulture (*Sarcogyps calvus*)	EN	CR	Widespread	Widespread in mid to west Nepal, rare east of Kathmandu	Present
Slender-billed Vulture (*Gyps tenuirostris*)	CR	CR	Generalist	Rare in the east and uncommon in the centre and west Nepal	Present
Egyptian Vulture (*Neophron percnopterus*)	VU	EN	Widespread	Fairly common in west & west-central, but rare in east Nepal	Possible
Eastern Imperial Eagle (*Aquila regario*)	CR	VU	Winter visitor, open water	Rare passage migrant / winter visitor with patchy occurrence	Possible
Steppe Eagle (*Aquila nipalensis*)	VU	EN	Passage migrant	Fairly common winter visitor and migrant throughout Nepal	Present
Pallas's Fish-eagle (*Haliaeetus leucoryphus*)	CR	EN	Passage migrant	Central Nepal	Possible
Grey-headed Fish-eagle (*Icthyophaga ichthyaetus*)	CR	NT	Resident, slow moving rivers	Since 1990 mainly in Chitwan National Park and buffer zone	Unlikely, HNS
Lesser Fish-eagle (*Icthyophaga humilis*)	CR	NT	Fast flowing forest rivers	Mostly in Chitwan Nat Park and eastern Nepal	Unlikely, HNS
White-tailed Eagle (*Haliaeetus albicilla*)	CR	LC	Large rivers	Rare winter visitor and passage migrant. Chitwan Nat Park and eastern Nepal	Unlikely, HNS
Rufous-bellied Eagle (*Lophotriorchis kienerii*)	CR	NT	Forest	Extremely rare, possibly a visitor	Unlikely, HNS
Saker Falcon (*Falco cherrug*)	EN	EN	Passage migrant	Annapurna Conservation Area, mostly at moderate altitudes.	Unlikely, OOR
Red-headed [necked] Falcon (*Falco chicquera*)	EN	NT	Cultivation & semi-open areas	Uncommon at Koshi but rare and local elsewhere in Nepal	Unlikely, OOR
Brahminy Kite (*Haliastur indus*)	CR	LC	Wetlands and paddy fields	Eastern lowlands, especially the Koshi marshes prior to draining	Unlikely, HNS
Oriental Hobby (*Falco severus*)	CR	LC	Forested foothills	Easily confused with Peregrine Falcon.	Not present, OOR
Montagu's Harrier (*Circus pygargus*)	CR	LC	Grassland, swamp & cultivation	Kathmandu Valley with individual irregularly elsewhere	Not present, HNS
Laggar Falcon (*Falco jugger*)	CR	NT	Open areas and cultivation	Kathmandu Valley with individual irregularly elsewhere	Unlikely, HNS
Painted Stork (*Mycteria leucocephala*)	EN	NT	Large wetlands	Uncommon visitor to Chitwan National Park	Unlikely, HNS

Species English and Scientific Name	Threatened Status		Habitat Requirements	Distribution Data in Nepal	LOO and Reasons for Exclusion
	National	IUCN			
Black-necked Stork (*Ephippiorhynchus asiaticus*)	CR	NT	Swamps and large rivers	Occasionally in the south-east lowlands	Not present, OOR
Greater Adjutant (*Leptoptilos dubius*)	CR	EN	Passage migrant	No known records since 1995, was seen in Koshi	Not present, OOR
Spot-billed Pelican (*Pelecanus philippensis*)	CR	NT	Koshi River in Nepal	Rare and irregular, Koshi marshes and Chitwan NP	Not present, OOR
Black Bittern (*Ixobrychus flavicollis*)	EN	LC	Forested reed-edges	Rare, only in Sukla Phanta, Chitwan and Koshi Tappu protected areas	Not present, OOR
Eurasian [Great] Bittern (*Botaurus stellaris*)	EN	LC	Reedbeds and marshes	Very rare passage migrant, mainly found in the Terai	Not present, HNS
Eurasian Curlew (*Numenius arquata*)	CR	NT	Muddy riverbanks and fields	Rare passage migrant	Unlikely, HNS
Eurasian Spoonbill (*Platalea leucorodia*)	CR	LC	Marshes, lakes and large rivers	rare winter visitor and passage migrant Koshi Barrage and Koshi Tappu Wildlife Reserve	Unlikely, HNS
[African] Comb Duck (*Sarkidiornis melanotos*)	EN	LC	Resident, aquatic vegetation	Rare in Chitwan National Park	Unlikely, HNS
Falcated Duck (*Mareca [Anas] falcata*)	CR	NT	Winter visitor, Lakes and rivers	Rare winter visitor and passage migrant	Unlikely, HNS
Baer's Pochard (*Aythya baeri*)	CR	CR	Passage migrant	Rare and local passage migrant	Unlikely, HNS
Northern Pintail (*Anas acuta*)	EN	LC	Winter visitor, open water	Uncommon passage migrant and winter visitor	Unlikely, HNS
Bengal Florican (*Houbaropsis bengalensis*)	CR	CR	Grasslands with scrub	Restricted to prominent protected areas	Unlikely, HNS
Lesser Florican (*Sypheotides indicus*)	CR	CR	Dry grassland	Rare summer visitor, mostly in prominent protected areas	Not present, OOR
Great Thick-knee (*Esacus recurvirostris*)	CR	NT	Stony or sandy large riverbanks	Rare, Koshi Barrage and Koshi Tappu Wildlife Reserve.	Not present, HNS
Slaty-legged Crake (*Rallina eurizonoides*)	EN	LC	Marshes in forest	Rare and very local summer visitor	Unlikely, HNS
Caspian Tern (*Hydroprogne caspia*)	CR	LC	Lakes and large rivers	Very rare and local visitor, Koshi Barrage and Koshi Tappu Wildlife Reserve	Not present, OOR
River Tern (*Sterna aurantia*)	CR	VU	Rivers, streams and lakes	Very rare and local visitor, big rivers in Terai	Not present, HNS
Black-bellied Tern (*Sterna acuticauda*)	CR	EN	Large rivers, rare visitor	Rare and local visitor, Koshi Barrage and Koshi Tappu Wildlife Reserve	Not present, HNS
Ibisbill (*Ibidorhyncha struthersii*)	EN	LC	Braided river channels	Uncommon altitudinal migrant above 3000 masl	Unlikely, HNS
Cheer Pheasant (*Catreus wallichii*)	EN	VU	Precipitous terrain with scrub	Vicinity of Dhorpatan Hunting Reserve, scarce elsewhere	Not present, HNS, OOR
Sociable Lapwing (*Vanellus regarious*)	-	CR	Habitat generalist.	Possibly extinct in Nepal and not described in Nepal Red List	Not present
Indian Courser (*Cursorius coromandelicus*)	EN	LC	Open country and scrub	Lowlands with most birds recorded from the Koshi area	Unlikely, HNS
Swamp Francolin (*Francolinus gularis*)	EN	VU	Tall wet grassland and swamps	Sukla Phanta and Koshi Barrage/Koshi Tappu reserves	Not present, HNS
Spot-bellied Eagle-owl (*Bubo nipalensis*)	EN	LC	Dense forest	Very rare and mostly in prominent protected areas	Not present, OOR

Species English and Scientific Name	Threatened Status		Habitat Requirements	Distribution Data in Nepal	LOO and Reasons for Exclusion
	National	IUCN			
Tawny Fish-owl (*Ketupa flavipes*)	CR	LC	Ravines and forest streams	Chitwan National Park and buffer zone	Unlikely, HNS
Dusky Eagle-owl (*Bubo coromandus*)	CR	LC	Thick foliage near water	Sukla Phanta and Chitwan protected areas	Not present, OOR
Eastern Grass-owl (*Tyto longimembris*)	CR	LC	Tall lowland grassland	Very rare, Bardia and Chitwan National Park	Not present, OOR
Great Hornbill (*Buceros bicornis*)	EN	VU	Forest with fruiting trees	Rare and local resident, mainly in Chitwan NP and community forests	Possible
Vernal Hanging-parrot (*Loriculus vernalis*)	CR	LC	Forest	Only 4 known records, Kapilvastu District	Unlikely, HNS, OOR
Red-headed Trogon (*Harpactes erythrocephalus*)	EN	LC	Dense forest	Pokhara valley to Makalu Barun National Park	Unlikely, HNS, OOR
Ruddy Kingfisher (*Halcyon coromanda*)	CR	LC	Forest streams and pools	Only in Chitwan National Park	Not present, OOR
Blue-eared Kingfisher (*Alcedo meninting*)	EN	LC	Streams in dense forest	Mainly recorded from Chitwan National Park	Not present, OOR
Abbott's Babbler (*Malacocincla abbotti*)	EN	LC	Dense tropical thickets	Rare and local resident, mainly in East Nepal	Not present, OOR
Chestnut Munia (*Lonchura atricapilla*)	EN	LC	Wetlands and tall grassland	Lumbini IBA, Rupandehi District south and north of Telar area	Unlikely, HNS
Great Grey Shrike (*Lanius excubitor*)	CR	LC	Dry open scrub	Rare and locally distributed resident in the Terai	Possible
Grey-crowned Prinia (*Prinia cinereocapilla*)	CR	VU	Grassland close to forest	Only in Chitwan, Parsa & Bardia protected areas and buffers	Unlikely, HNS
Indian Nightjar (*Caprimulgus asiaticus*)	EN	LC	Scrub and fallow lands	Rare resident or visitor to the terai	Possible
Long-tailed Sibia (*Heterophasia picaoides*)	CR	LC	Broadleaved forest	Only known in Chitwan National Park	Not present, OOR
Rufous-necked Laughingthrush (*Pterorhinus ruficollis*)	CR	LC	Forest edge	Only known in Chitwan National Park	Unlikely, HNS
Rusty-fronted Barwing (*Actinodura egertoni*)	EN	LC	Dense thickets	Annapurna Conservation Area and Makalu Barun NP.	Not present, OOR
Silver-eared Mesia (*Leiothrix argentauris*)	EN	LC	Thicket	Local resident with scattered distribution across Nepal	Possible
Striated Grassbird (*Megalurus palustris*)	CR	LC	Damp grassland and reedbeds	Chitwan NP, formerly in Koshi Tappu Wildlife Reserve	Unlikely, OOR
Tawny-bellied Babbler (*Dumetia hyperythra*)	EN	LC	Scrub and tall grass	Recorded from three localities since 1980s, in west nepal	Unlikely, OOR
White-throated Bushchat (*Saxicola insignis*)	EN	VU	Winters in fields, and wet grasslands.	Mostly in Terai, Chitwan National Park and surroundings	Possible
Ruby-cheeked Sunbird (*Chalcoparia singalensis*)	EN	LC	Tropical broadleaved forest	Rare and local resident, mostly in Chitwan and eastern Nepal	Not present, OOR
Streaked Weaver (*Ploceus manyar*)	CR	LC	Reedbeds	Far east and far west Nepal	Not present, OOR
Yellow-breasted Bunting (*Emberiza aureola*)	CR	CR	Wetlands, winter migrant	Central Nepal	Possible
Reptiles (11 species)					
Gharial (*Gavialis gangeticus*)	-	CR	Big rivers	Bred and released in Chitwan and Bardiya National Parks	Not present, HNS
Elongated Tortoise (*Indotestudo longate*)	-	CR	Forest, widespread	Potentially throughout the lowlands of Nepal	Present

Species English and Scientific Name	Threatened Status		Habitat Requirements	Distribution Data in Nepal	LOO and Reasons for Exclusion
	National	IUCN			
Crowned River Turtle (*Hardella thurjii*)	-	EN	River generalist	Potentially across the Terai landscape	Possible
Tricarinate Hill Turtle (*Melanochelys tricarinata*)	-	EN	Generalist	Potentially throughout the lowlands of Nepal	Present
Indian Eyed Turtle (*Morenia petersi*)	-	EN	River generalist	Potentially throughout the lowlands of Nepal	Present
Indian Peacock Softshell Turtle (*Nilssonia hurum*)	-	EN	Widespread	Potentially throughout the lowlands of Nepal	Present
Indian Softshell Turtle (*Nilssonia gangetica*)	-	EN	Widespread	Potentially throughout the lowlands of Nepal	Present
Red-crowned Roofed Turtle (*Batagur kachuga*)	-	CR	Big rivers	Lowlands west of Chitwan National Park	Unlikely, HNS
Spotted Pond Turtle (*Geoclemys hamiltonii*)	-	EN	River generalist	Potentially throughout the lowlands of Nepal	Possible
Three-striped Roofed Turtle (*Batagur dhongoka*)	-	CR	River generalist	Potentially throughout the lowlands of Nepal	Possible
Yellow Monitor (*Varanus flavescens*)	-	EN	Widespread	Widespread within Nepal	Present
Fish (1 species)					
Golden Mahseer (*Tor putitora*)	-	EN	Large rivers	Patchy distribution across Nepal	Unlikely, HNS
Plants (3 species)					
Himalayan Trillium (*Trillium govanianum*)	-	EN	Temperate forests	Widespread within Himalayas of Nepal	Not present, HNS
Indian Nard (*Nardostachys jatamansi*)	-	CR	Mountainous habitat	Widespread within Nepal	Unlikely, HNS
Picrorrhiza (*Picrorhiza kurroa*)	-	EN	Alpine herb of high altitude forest edge	Western Nepal	Not present, OOR
Acronyms used as reasons for exclusion: OOR – Out of Range based on Nepal Red List distribution data; HNS – Habitat not suitable based on assessment of habitats in the project area.					

Table A2.2: Potential Range-restricted species for critical habitat screening

Species English and Scientific Name	National	IUCN	Habitat Requirements	Distribution Data in Nepal	LOO and Reasons for Exclusion
Mammal (1 species)					
Surat Serotine (*Eptesicus dimissus)*	DD	DD	No known	Restricted to Chitwan National Park	OOR
Birds (16 species)					
Cheer Pheasant (*Catreus wallichi*)	EN	VU	Precipitous terrain with scrub	Northwestern Nepal	HNS
Nepal Wren Babbler (*Pnoepyga immaculata*)	LC	LC	Mixed deciduous forest	Moderately widespread in Nepal	NRR
Rufous-throated Wren Babbler (*Spelaeornis caudatus*)	CR	NT	Dense thickets	Makalu Barun National Park	OOR
Blackish-breasted Babbler (*Sphenocichla humei*)	CR	NT	Riparian vegetation	Known from single record in Sunsari District	OOR
Spiny Babbler (Acanthoptila [Turdoides] nipalensis)	LC	LC	Mountainous habitat above 1000 masl	Four large discrete distributions in Nepal	HNS

Species English and Scientific Name	National	IUCN	Habitat Requirements	Distribution Data in Nepal	LOO and Reasons for Exclusion
Pied Thrush (*Geokichla wardii*)	LC	LC	Forest habitats above 1000 masl	Migratory, movement from Nepal to Sri Lanka.	HNS
Kashmir Flycatcher (*Ficedula subrubra*)	VU	VU	Open broadleaved forest	Central and east Nepal	OOR
Kashmir Nuthatch (*Sitta cashmirensis*)	LC	LC	Oak-spruce-pine forests above 2400 masl	Northwestern Nepal	OOR
White-throated Tit (*Aegithalos niveogularis*)	LC	LC	Birch and pine forests above 2800 masl	Central Himalayas of Nepal	OOR
Tytler's Leaf Warbler (*Phylloscopus tytleri*)	DD	NT	Forest edges above 2135 masl	Khaptad National Park, Northwestern Nepal	OOR
Yellow-vented Warbler (*Phylloscopus cantator*)	EN	LC	Dense, moist broadleaved evergreen forest	Jhapa District, western Nepal	OOR
Broad-billed Warbler (*Tickellia hodgsoni*)	EN	LC	Bamboo and other undergrowth	Jhapa District, western Nepal	OOR
Hoary-throated Barwing (*Actinodura nipalensis*)	LC	LC	Oak-rhododendron forests	Widespread in Nepal	OOR
White-naped Yuhina (*Yuhina bakeri*)	CR	LC	Broadleaved evergreen forests	Makalu Barun National Park	OOR
Grey-crowned Prinia (*Prinia cinereocapilla*)	CR	VU	Grassland edges	Five discrete ranges in Nepal, India and Bhutan	OOR
Black-breasted Parrotbill (*Paradoxornis flavirostris*)	RE	VU	not applicable	Extinct in Nepal	not applicable
Reptile (1 species)					
Himalayan Stripe-necked Snake (*Liopeltis rappi*)	-	LC	Hilly regions in forests, cultivated fields and plantations	Himalayas north of the project	HNS
Fish (5 species)					
Oreichthys cosuatis	-	LC	Habitat generalist	Large but unconfirmed distribution, not range-restricted	NRR
Psilorhynchus nepalensis	-	LC	Mountain streams and tributary rivers	Known from tributaries of the Kali Gandaki and Kosi Rivers.	HNS
Schistura multifasciata	-	LC	Hill streams with gravel	Discrete ranges in western Nepal	OOR, HNS
Dinnawah snowtrout (*Schizothorax progastus*)	-	LC	Mountainous streams	Restricted to central Nepal but potentially widespread.	OOR, HNS
Xenentodon cancila	-	LC	Generalist within freshwater rivers	Widespread and not range-restricted	NRR
Invertebrate (1 species)					
Giant River Prawn (*Macrobrachium rosenbergii*)	-	LC	Rivers and streams connected to the sea.	Widespread and not range-restricted	NRR
Plant (1 species)					
Floating Fern (*Salvinia natans*)	-	LC	Palaeotemperate species	Widespread and not range-restricted	NRR

Acronyms used as reasons for exclusion:

OOR – Out of Range based on Nepal Red List distribution data;

HNS – Habitat not suitable based on assessment of habitats in the project area.

Table A2.3: Assessment of Critical Habitat Occurrence (species qualifying critical habitats are shaded orange)

Species English and Scientific Name	Threatened Status		Population Size		Assessment of Critical Habitat
	National	IUCN	National Population	Global Population	
Mammals (6 species)					
Asian Elephant (*Elephas maximus*)	EN	EN	255 to 265 individuals (227 individuals)	48,323–51,680 individuals in the wild	The Nepal NRL illustrates a possible presence of Asian elephant, however a DNPW Bulletin (2020) presents an up-to-date distribution and reveals there are no wild Asian Elephants in the greater vicinity of the Project. Online Link
Bengal Tiger (*Panthera tigris tigris*)	EN	EN	155 individuals 209 individuals are described in the DNPWC Status of Tigers and Prey in Nepal (2019).	2,154 to 3,159 mature individuals (all subsp.)	The Nepal NRL illustrates a possible presence of Bengal Tiger, however the DNPWC Status of Tigers and Prey in Nepal (2019) provides a detailed maps of habitats supporting tigers and reveals the greater project area does not support this species. Online Link The Dang Deukhuri Foothill Forests and West Rapti Wetlands located west of the project road 60 km along the East-West Highway is recognized for the presence of Bengal Tiger, which needs to be considered a priority feature for future phases of the project.
Fishing Cat (*Prionailurus viverrinus*)	EN	VU	150 to 200 individuals	Not specified	Photographic evidence reveals this cat is present in the Jagadishpur Lake, which is linked to the project area. Assuming a breeding population (>2 individuals) exists, suggests the project area supports >1% of the national population and **habitats have significant importance for this species as per Criterion (a)**.
Striped Hyaena (*Hyaena hyaena*)	EN	NT	10 to 100 individuals	5,000 to 9,999 mature individuals	Striped Hyaena have a widespread global distribution, however the Nepal population is restricted in size. The Forest Officer of Gorusinghe stated this Striped Hyaena is not seen by them, however Evidence of presence of the species was recorded in the project area, which reveals that greater than 1% of the national population of hyaena is present in the project area, and the **project area supports habitat of significant importance for this species as per Criterion (a)**.
Smooth-coated Otter (*Lutrogale perspicillata*)	EN	VU	200 to 1000 individuals	Not specified	This species has not been recorded during baseline surveys. River habitat that this otter is associated with, are crossed with large bridges, allowing movement, and the road is unlikely to have a significant impact. This otter is not considered to qualify a critical habitat for the project.
Honey Badger (*Mellivora capensis*)	EN	LC	Less than 100 individuals	Not specified	Four studies (1971 to 2008) discuss the presence of honey badgers in the project area, however no evidence of presence of honey badgers was recorded during the baseline surveys. Mitigation developed to protect carnivores with known presence will similarly protect honey badgers, and this species is not considered to qualify a critical habitat for the project.
Birds (16 species)					
Red-headed Vulture (*Sarcogyps calvus*)	EN	CR	200 to 400 individuals	2,500 to 9,999 mature individuals	This Red-headed Vulture was recorded and positively identified from a photograph of an individual at a vulture feeding site within the project area. Experts of Bird

Species English and Scientific Name	Threatened Status		Population Size		Assessment of Critical Habitat
	National	IUCN	National Population	Global Population	
			Population size estimated at 60 individuals, Bird Conservation Nepal (2021), Online link		Conservation of Nepal, a local NGO, have suggested a number of Data suggests more than one individuals is present, that confirms the presence of greater than 0.5% of the national population. This species is classified on the IUCN Red List as CR as it exists in a critical state of survival, and local habitat for Red-headed Vulture and **local habitat therefore has significant importance for this species as per Criterion (a)**.
Cinereous Vulture (*Aegypius monachus*)	EN	NT	60 to 100 individuals. Population of 7 individuals estimated by Bird Conservation Nepal (2021).	16,800 to 22,800 mature individuals	The Cinereous Vulture was not recorded during baseline surveys, and is unlikely to occur based on the very low 2021 population estimate. The species is therefore not considered to qualify a critical habitat for the project.
White-rumped Vulture (*Gyps bengalensis*)	CR	CR	1,000 to 2,000 individuals Population size (60 individuals) confirmed by Bird Conservation Nepal (2021), Online link	4,000 to 6,000 mature individuals	The White-rumped vulture is the most abundant vulture species in Nepal. This species was recorded at a vulture feeding site within the project area although the species forages over vast areas and local population is not easily estimated. This species is classified as CR on both the national and IUCN Red Lists as there is serious concern regarding the survival of the species and the population is in a critical state. The diversity of vultures in the project area and CR status, **local habitat therefore has significant importance for this species as per Criterion (a)**.
Indian Vulture (*Gyps indicus*)	none	CR	Not assessed	5,000 to 15,000 mature individuals	The Indian Vulture occurs in a widespread across India but has a small range overlap with Nepal. Data is not available at the national level as the conservation status of species has not been assessed within the Nepal Red List. The species has not been recorded during baseline surveys and is therefore unlikely to occur at sufficient abundance to qualify a critical habitat status against global data.
Slender-billed Vulture (*Gyps tenuirostris*)	CR	CR	50 to 75 individuals Population of 33 individuals estimated by Bird Conservation Nepal (2021).	730 to 870 mature individuals	Both national and IUCN Red Lists classify the Slender-billed Vulture as CR and data suggests the Nepal population of Slender-billed Vulture is rapidly declining and in a very critical state. Yet the species was recorded at a vulture feeding site within the project area along with a diversity of other vulture species. **The local habitat therefore has significant importance for this species as per Criterion (a)**.
Egyptian Vulture (*Neophron percnopterus*)	VU	EN	300 to 1000 individuals Population size (392 individuals) confirmed by Bird Conservation Nepal (2021), Online link	12,400 to 36,000 mature individuals	Egyptian Vultures have not been recorded during baseline surveys. This species has a widespread global population, and a relatively large Nepal population in comparison to other vulture species. Habitats within the project area are unlikely to have significant importance for this species.
Eastern Imperial Eagle (*Aquila heliaca*)	CR	VU	10 to 35 individuals	2,500 to 9,999 mature individuals	The Eastern Imperial Eagle was not recorded during baseline surveys and is not considered to qualify a critical habitat for the project.
Steppe Eagle (*Aquila nipalensis*)	VU	EN	10,000 to 20,000 individuals	50,000 to 75,000 mature individuals	Data reveals that 20% to 26% of the global population migrates through Nepal. Data from the Movebank website reveals the project is in proximity of a multispecies avian

Species English and Scientific Name	Threatened Status		Population Size		Assessment of Critical Habitat
	National	IUCN	National Population	Global Population	
					migratory route. Empirical data on this species in the project area is limited however available data suggests that the habitat is a conduit for significant seasonal concentrations of this species. **A Criterion (c) critical habitat status is therefore recognised.**
Pallas's Fish-eagle (*Haliaeetus leucoryphus*)	CR	EN	5 to 10 individuals	1,000 to 2,499 mature individuals	The Pallas's Fish-eagle was not recorded during baseline surveys, neither were other fish-eating birds recorded. This species is therefore unlikely to occur is not considered to qualify a critical habitat for the project.
Painted Stork (*Mycteria leucocephala*)	EN	NT	5 to 50 individuals	16,000 to 24,000 mature individuals	Storks are prominent birds and if present are unlikely to be overlooked. This species exists as a small population in Nepal, but with larger population widespread across South and Southeast Asia. This Painted Stork is therefore not considered to qualify a critical habitat for the project.
Great Hornbill (*Buceros bicornis*)	EN	VU	80 to 150 individuals	13,000 to 27,000 mature individuals	No hornbills were recorded during baseline. The forests are disturbed through community ownership, and therefore is unlikely that this species will qualify a critical habitat for the project.
Indian Nightjar (*Caprimulgus asiaticus*)	EN	LC	20 to 100 individuals	Unknown	Nightjars exhibit nocturnal behaviour patterns and are frequently overlooked during baseline surveys, however this species is rare and unlikely to occur, and therefore not considered to qualify a critical habitat for the project.
Great Grey Shrike (*Lanius excubitor*)	CR	LC	10 to 50 individuals	Unknown	This shrike has a limited distribution and population in Nepal, but is abundant across Europe and occurs across North Africa, Middle East, Central and South Asia. There is no basis to consider this species as a critical habitat feature for the project.
Silver-eared Mesia (*Leiothrix argentauris*)	EN	LC	Unknown	Unknown	This Mesia occurs widely across Southeast Asia where is not considered to be threatened, and there is no basis to consider this species as a critical habitat feature for the project.
White-throated Bushchat (*Saxicola insignis*)	EN	VU	150 individuals	2,500 to 9,999 mature individuals	This chat is a migrant that breeds in Mongolia and overwinters in the southern Himalayas. The seasonal presence could be the reason for not being recorded, however is unlikely to be affected by the project and there is no basis to qualify as a critical habitat feature.
Yellow-breasted Bunting (*Emberiza aureola*)	CR	CR	250 to 2000 individuals	Unknown	A winter visitor that potentially occurs in cultivated fields, but populations have been reduced through trapping for the cage bird trade. Potentially occurs in the project area and needs protection against illegal wildlife trade and is therefore **considered a precautionary critical habitat feature as per criterion (a).**
Reptiles (9 species)					
Elongated Tortoise (*Indotestudo elongata*)	-	CR	Not assessed	Not specified	The Elongated Tortoise occurs in Nepal and across Southeast Asia, but populations are in a critical state of survival having been intensively exploited for export trade. This tortoise has been recorded onsite and needs to be protected and is therefore **considered a precautionary critical habitat feature as per criterion (a).**

Species English and Scientific Name	Threatened Status		Population Size		Assessment of Critical Habitat
	National	IUCN	National Population	Global Population	
Tricarinate Hill Turtle (*Melanochelys tricarinata*)	-	EN	Not assessed	Not specified	This Turtle was recorded at the Gaidhawa Lake during baseline surveys, but there is no quantified population data online for critical habitat determination. This species is widespread across the Nepal lowlands but is not expected to be impacted by road construction or operation and is therefore not considered as a critical habitat feature.
Indian Eyed Turtle (*Morenia petersi*)	-	EN	Not assessed	Not specified	The Indian Eyed Turtle was recorded at the Gaidhawa Lake during baseline surveys. The IUCN Red List states this species has suffered widespread declines, with several robust yet localised subpopulations remain in the Terai region of India and Nepal, but is not expected to occur in the project affected habitats or be impacted by road construction or operation and is therefore not considered as a critical habitat feature .
Indian Peacock Softshell Turtle (*Nilssonia hurum*)	-	EN	Not assessed	Not specified	The Indian Peacock Softshell Turtle is widespread across Pakistan, northern India and Bangladesh but classified as EN due to a rapid decline due to an illegal trade to Southeast Asia. This species was recorded at the Gaidhawa Lake during baseline surveys but is not expected to occur in the project affected habitats or be impacted by road construction or operation and is therefore not considered as a critical habitat feature.
Three-striped Roofed Turtle (*Batagur dhongoka*)	-	CR	Not assessed	Not specified	The Three-striped Roofed Turtle has not been recorded during baseline surveys, and there is an absence of data to justify a critical habitat status.
Spotted Pond Turtle (*Geoclemys hamiltonii*)	-	EN	Not assessed	Not specified	The Spotted Pond Turtle has not been recorded during baseline surveys, and there is no basis to justify a critical habitat status.
Crowned River Turtle (*Hardella thurjii*)	-	EN	Not assessed	Not specified	The Crowned River Turtle has not been recorded during baseline surveys, and there is no basis to justify a critical habitat status.
Indian Softshell Turtle (*Nilssonia gangetica*)	-	EN	Not assessed	Not specified	The Indian Softshell Turtle has not been recorded during baseline surveys, and there is no basis to justify a critical habitat status.
Yellow Monitor (*Varanus flavescens*)	-	EN	Not assessed	Not specified	The Yellow Monitor is distributed across Pakistan, Northern India, Nepal, Bhutan, and Bangladesh. The area where it occurs coincides with the highest human population densities habitat loss and degradation are major threats to the species. The species was recorded on site, but although population data are not available, it is unlikely that the project would not qualify as being of significant importance for the species. The species will benefit from protection measures proposed for other reptiles.

Table A2.4: Final screening of critical habitat features against potential project impacts (species highlighted with blue shading where Net Gains may be applicable)

Species English and Scientific Name	Threat. Status		Documented Threats	Potential Project Risks and Impacts	Net Gain Requirements
	Nat.	IUCN			
Mammals (2 species)					
Fishing Cat (*Prionailurus viverrinus*)	EN	VU	Poaching & persecution, Declining food availability, Habitat loss.	Road kill	Yes Support to TAL is proposed
Striped Hyaena (*Hyaena hyaena*)	EN	NT		Road kill, Fragmentation.	
Birds (5 species)					
Red-headed Vulture (*Sarcogyps calvus*)	EN	CR	Poisoning, Food scarcity, Loss of nesting trees.	Significant project impacts are not expected.	Net Gain requirements not applicable
White-rumped Vulture (*Gyps bengalensis*)	CR	CR			
Slender-billed Vulture (*Gyps tenuirostris*)	CR	CR			
Steppe Eagle (*Aquila nipalensis*)	VU	EN	Specific threats in Nepal are unknown.	No project impacts expected.	Net Gain requirements not applicable
Yellow-breasted Bunting (*Emberiza aureola*)	CR	CR	Illegal trade, Use of pesticides.	Significant project impacts are not expected	Net Gain requirements not applicable
Reptile (1 species)					
Elongated Tortoise (*Indotestudo elongata*)	-	EN	Illegal trade, Religious ceremonies, Habitat loss.	Fragmentation Disturbance within cleared habitats Collection by workforce.	Yes Support to TAL is proposed

Annex 3: Consultation Photographs and Attendance Sheets

First Round of Consultations

Consultation Photographs

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<tr><td colspan="2">Butwal Sub-metropolitan City and its Ward Offices</td></tr>
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<tr><td>Butwal Sub-Metropolitan City, Ward no. 12</td><td>Butwal Sub-Metropolitan City, Ward no. 13</td></tr>
</table>

Sainamaina Municipality and its Ward Offices	
	
Sainamaina Municipality, Municipality Office	Sainamaina Municipality, Ward no. 1

	
Sainamaina Municipality, Ward no. 3	Sainamaina Municipality, Ward no. 4
	
Sainamaina Municipality, Ward no. 5	Sainamaina Municipality, Ward no. 6

	
Sainamaina Municipality, Ward no. 8	Sainamaina Municipality, Ward no. 9
	
Sainamaina Municipality, Ward no. 10	Sainamaina Municipality, Ward no. 11
Kanchan Rural Municipality and its Ward Offices	
	
Kanchan Rural Municipality, Rural Municipality Office	Kanchan Rural Municipality, Ward no. 5
Banganga Municipality and its Ward Offices	

	
Banganga Municipality, Municipality Office	Banganga Municipality, Ward no.1
	
Banganga Municipality, Ward no.2	Banganga Municipality, Ward no.4

	
Banganga Municipality, Ward no.7	Banganga Municipality, Ward no.8
Buddhabhumi Municipality and its Ward Offices	

	
Buddhabhumi Municipality, Ward no. 4	Buddhabhumi Municipality Officer, Ward no. 2

10. Attendance Sheet

Date: 2022/01/13

Butwal Sub-Metropolitan city

Ward No: 4 **Location:**

S.N.	Name	Age	Position	Address	Remarks
1	Guma Devi Acharya	48	Deputy Mayor	Butwal	
2	Mitramani Khanal	50	Former Mayor	Butwal	
3	Durga Prasad Subedi	60	Ward Chairperson	Butwal	
4	Suman Shrestha	45	Ward No.3	Butwal	
5	Mahendra Prasad Ligal	51	Ward No.1	Butwal	
6	Narayan Pd Pandey	48	Chair man-13	Butwal	
7	Laxmi Aryal	46	Officer 6th	Butwal	
8	Chinmaya Rai	49	Officer Helper	Butwal	

Date: 2022/01/02

Butwal Sub-Metropolitan city

Ward No: 1

S.N.	Name	Age	Position	Address	Remarks
1	Mahendra Prasad Ligal	51	Ward President	Butwal 1	
2	Madan Kumar Shrestha	55	Ward Member	Butwal 1	
3	Ashok Rai	41	DCC Rupandhehi	Butwal 1	
4	Ghanashyam Gautam	55	Head Teacher	Butwal 1	
5	Devendra Lal Shrestha	61	Local resident	Butwal 1	
6	Devraj Shrestha	46	Ward Secretary	Butwal 1	
7	Sita Ksedhan	38	Ward Member	Butwal 1	
8	Uka Bahadur Bagale	45	Local resident	Butwal 2	
9	Parwoti Poudel	39	Buyer	Butwal 1	
10	Sunita Chettri Kuwar	36	Officer Helper	Butwal 1	

Date: 2022/01/11

Butwal Sub-Metropolitan city

Ward No: 2

S.N.	Name	Age	Position	Address	Remarks
1	Ramesh Prasad Nepal	57	Ward President	Butwal 2	
2	Sunil Sakya	36	Ward Member	Butwal 2	
3	Khagisara Gurung	43	Ward Member	Butwal 2	
4	Kamala Nagarkoti	50	Ward Member	Butwal 2	
5	Ganga Ghimire	52	Tole President	Butwal 2	
6	Bal Ram Katel	59	Ward Secretary	Butwal 2	
7	Bishnu Baral Nepal	47	Tole President	Butwal 2	
8	Prem Bahadur Magar	63	Ward Member	Butwal 2	

Date: 2021/12/20

Butwal Sub-Metropolitan city

Ward No: 12

S.N.	Name	Age	Position	Address	Remarks
1	Durga Prasad	60	Ward President	Butwal 12	
2	Ganga Gyawali	39	Pasang Tole	Butwal 12	
3	Tilak K.C	50	Ward Secretary	Butwal 12	
4	Harihar Upadhyaya	61	Social worker	Butwal 12	
5	Rajaram Upadhyaya	48		Butwal 12	
6	Dhani Kumari Bhusal	41	Tole President	Butwal 12	
7	Kamal Nepal	36	Tole Secretary	Butwal 12	
8	Devi Neupane	43	President	Butwal 12	
9	Dhundi Raj Khanal	46	Secretary	Butwal 12	
10	Bhagwati Acharya	46	President	Butwal 12	
11	Laxmi Regmi	52	Vice President	Butwal 12	
12	Chopkala Poudel	52	Advisor	Butwal 12	
13	Lalita Bhandari	48	President	Butwal 12	
14	Yashodha Kharel	40	Secretary	Butwal 12	
15	Saradha Khanal	41	Sub-Secretary	Butwal 12	
16	Gota Belbase Poudel	42	President	Butwal 12	
17	Madan Thapa	33	President	Butwal 12	
18	Simrata Khanal	17	Student	Butwal 12	
19	Roshani Bhandari	18	Student	Butwal 12	
20	Kaushila Belbase	18	Student	Butwal 12	
21	Puspa Panthi	18	Student	Butwal 12	
22	Asmita Pandey	18	Student	Butwal 12	
23	Tara Prasad Marasini	51	Local resident	Butwal 12	

24	Krishna Prasad Poudel	50	Tole Member	Butwal 12	
25	Sita Kandel	40	Local resident	Butwal 12	
26	Durga Devi Saru	42	Secretary	Butwal 12	
26	Nawaraj Adhikari	40	Officer	Butwal 12	

Date: 2021/12/21

Butwal Sub-Metropolitan city

Ward No: 13

S.N.	Name	Age	Position	Address	Remarks
1	Narayan Prasad Pun	47	Ward President	Butwal 13	
2	Bishnu Kumari Sharma	56	Office Helper	Butwal 13	
3	Namakala Belbase	41	Tole President	Butwal 13	
4	Gun Nidhi Gyawali	65	Tole member	Butwal 13	
5	Ramji Prasad Bhattrai	58	Tole President	Butwal 13	
6	Chiran Baral	61	Tole Secretary	Butwal 13	
7	Yohan Prasad Gautam	55	Tole President	Butwal 13	
8	Jeevan Bhattrai	50	Ward Secretary	Butwal 13	
9	Pitambar Bhandari	62	Tole President	Butwal 13	
10	Ekraj Pandey	48	Tole President	Butwal 13	
11	Deepak Panthi	46	CPN-UML Incharge	Butwal 13	
12	Bed Prasad Gaire	52	ward Member	Butwal 13	
13	Chetan Bahadur Raja	55	Tole President	Butwal 13	
14	Lok Bahadur Darlami	60		Butwal 13	
15	Shanti Shrestha	51	Tole President	Butwal 13	
16	Puspa Gaha	45	Tole President	Butwal 13	
17	Purshotam Dhayal	74	Belbas	Butwal 13	
18	Bishnu Bahadur KC	65	Jitgadi	Butwal 13	
19	Sarswati Pariyar	30	Ward Secretary	Butwal 13	

Date: 2022/01/11

Sainamaina Municipality

Ward No: 5

S.N.	Name	Age	Position	Address	Remarks
1	Chitra Bahadur Karki	56	Former Mayor	Sainamaina 3	
2	Bina Rani	50	Deputy Mayor	Sainamaina 10	
3	Tekraj Panthi	50	Mayor	Sainamaina	
4	Suraj Neupane	29	Senoir	Sainamaina	
5	Indra Bahadur Khadka	52	Animal Development officer	Sainamaina	

Date: 2021/12/21

Sainamaina Municipality

Ward No: 1

S.N.	Name	Age	Position	Address	Remarks
1	Kehar Singh Galami (Thapa)	59	Ward President	Sainamaina 1	
2	Dhan Bahadur Thapa	59	Agriculture	Sainamaina 1	
3	Umananda Ghimire	62	Tole Chairperson	Sainamaina 1	
4	Narayan Prasad Pandit	39	Business	Sainamaina 1	
5	Nar Bahadur Khan	72	Tole President	Sainamaina 1	
6	Deepak Kumar Chalesha	45	Tole President	Sainamaina 1	
7	Ganga Khad	50	Aama Samuha President	Sainamaina 1	
8	Urmila Pokhrel	39	Vice President	Sainamaina 1	
9	Maya Roka	38	Local resident	Sainamaina 1	
10	Bal Kumari Pun	36	Local resident	Sainamaina 1	
11	Puspa Raj Sharma	49	Local resident	Sainamaina 1	
12	Bishnu Khad	50	Aama Samuha Member	Sainamaina 1	
13	Ganga Khad	26	Local resident	Sainamaina 1	
14	Anita Khad	30	Local resident	Sainamaina 1	

Date: 2022/01/10

Sainamaina Municipality

Ward No: 2

S.N.	Name	Age	Position	Address	Remarks
1	Kamdev Bhusal		President	Sainamaina 2	
2	Raj Bahadur		Local resident	Sainamaina 2	
3	Sujan Tharu		Ward Member	Sainamaina 2	
4	Bimal Gyawali		Local resident	Sainamaina 2	
5	Hari Bahadur Adhikari		Local resident	Sainamaina 2	
6	Bhesh Raj Poudel		President	Sainamaina 2	
7	Gyan Prasad Bhattrai		Secretary	Sainamaina 2	
8	Nawanidhi Ghimire		President	Sainamaina 2	
9	Madan Panthi		ToleSecretary	Sainamaina 2	
10	Bishnu Regmi		Tole President	Sainamaina 2	
11	Krishna Prasad Gyawali		Secretary	Sainamaina 2	
12	Nilam Thapa		President	Sainamaina 2	
13	Ganesh Gautam		Social worker	Sainamaina 2	
14	Thaneshwor Giri		Ward Member	Sainamaina 2	
15	Kul Bahadur BK		Ward Member	Sainamaina 2	

Date: 2021/12/19

Sainamaina Municipality

Ward No: 3

S.N.	Name	Age	Position	Address	Remarks

1	Ratna Bahadur poudel		Ward President	Sainamaina 3	
2	Kapi Bahadur karki	60	……. President	Sainamaina 3	
3	Mohan Kumar Sijali Magar	52	Namuna Tole President	Sainamaina 3	
4	Man Bahadur Kuwar	46	Ganganagar Tole President	Sainamaina 3	
5	Laxman Sharma	36	Tole President	Sainamaina 3	
6	Chabi Lal Regmi	62	Secretary	Sainamaina 3	
7	Rama Poudel	60	President	Sainamaina 3	
8	Kamala Poudel	40	President	Sainamaina 3	
9	Sakumari	56	President	Sainamaina 3	
10	Nawal	54	Agriculture President	Sainamaina 3	
11	Harihar Gyawali	46	Ganganagar Tole Chairperson	Sainamaina 3	
12	Sabita Bhusal		CPN Member	Sainamaina 3	
13	Phunsara Sugar		Ward Member	Sainamaina 3	
14	Bhim Bahadur Khadka		Ward Member	Sainamaina 3	
15	Ramesh Prasad Acharya		Ward Member	Sainamaina 3	
16	Geeta Sharma		CPN	Sainamaina 3	

Date: 2021/01/18

Sainamaina Municipality

Ward No: 4

S.N.	Name	Age	Position	Address	Remarks
1	Dhan Bahadur Karki	62	Ward President	Sainamaina 4	
2	Dhan Kumari Rana	42	Ward Member	Sainamaina 4	
3	Nisha Pariyar	40	Ward Member	Sainamaina 4	
4	Dan Bahadur Tharu	40	Ward Member	Sainamaina 4	
5	Shanti Chettri	38	Jhakara Tole President	Sainamaina 4	
6	Tika Ram Aryal	64	Sangam Tole President	Sainamaina 4	
7	Ram Prasad Adhikari	45	Local resident	Sainamaina 4	
8	Dewaraj Poudel		Local resident	Sainamaina 4	
9	Harihar Bhattrai	64	Local resident	Sainamaina 4	
10	Prem Bahadur Khadka	50	…….President……..	Sainamaina 4	
11	Tejendra Subedi		Local resident	Sainamaina 4	
12	Jageshwor Sharma	50	CPN-UML Incharge	Sainamaina 4	
13	Tej Bahadur Neupane	56	Shiva Mandir Tole President	Sainamaina 4	
14	Tej Narayan Sukki	49	…… President	Sainamaina 4	
15	Amrita Devi Neupane	49	Ward Member	Sainamaina 4	
16	Pitamber Neupane	50	CPN-UML Incharge President	Sainamaina 4	
17	Dev Raj Poudel	60	Local resident	Sainamaina 4	
18	Dal Bahadur Malla	65	Local resident	Sainamaina 4	
19	Ser Bdr Rana Magar	67	Local resident	Sainamaina 4	
20	Chandrakala Bhandari	53	President	Sainamaina 4	

21	Hemraj Chaudhary	30	Ward Secretary	Sainamaina 4	
22	Ram Prasad Sapkota	40	CPN-UML Incharge	Sainamaina 4	

Date: 2021/12/17

Sainamaina Municipality

Ward No: 5

S.N.	Name	Age	Position	Address	Remarks
1	Pashuram Sapkota	54	Ward President	Sainamaina 5	
2	Sarswati Bhandari	41	Tole President	Sainamaina 5	
3	Ramesh Prasad Acharya	49	Ward Secretary	Sainamaina 5	
4	Ram Prasad Chaudhary	54	President	Sainamaina 5	
5	Prakash Poudel	35	Business	Sainamaina 5	
6	Sita Gyawali	40	Member	Sainamaina 5	
7	Chandraman Chaudhary	43	Teacher	Sainamaina 5	
8	Man Kumari Rai	63	Local resident	Sainamaina 5	
9	Dhan Raj Chaudhary	71	Agriculture	Sainamaina 5	
10	Hari Mangal Tharu	42	Agriculture	Sainamaina 5	
11	Madav Poudel	45	Tole President	Sainamaina 5	

Date: 2021/12/30

Sainamaina Municipality

Ward No: 6

S.N.	Name	Age	Position	Address	Remarks
1	Basanta Pandey	46	President	Sainamaina 6	
2	Prakash Acharya	39	Local resident	Sainamaina 6	
3	Shovakhar Bhandari	42	President	Sainamaina 6	
4	Minaram Panthi	29	Ward Secretary	Sainamaina 6	
5	Khagandra Pokhrel	42	President	Sainamaina 6	
6	Hari Prasad Ghimire	62	Social Worker	Sainamaina 6	
7	Pitambar Gyawali	43	Social Worker	Sainamaina 6	
8	Bishnu Prasad Adhikari	49	President	Sainamaina 6	
9	Tilak Ram Ghimire	55	Local resident	Sainamaina 6	
10	Ram Prasad Ghimire	54	Agriculture	Sainamaina 6	
11	Renuka Gautam		Ward Member	Sainamaina 6	
12	Gopal Bhandari		Local resident	Sainamaina 6	
13	Bharat Sunar	36	Local resident	Sainamaina 6	
14	Devi Prasad Pokhrel	58	Agriculture	Sainamaina 6	
15	Premraj Pandey	48	Social Worker	Sainamaina 6	
16	Thaneshwor Poudel	52	Business	Sainamaina 6	
17	Ghanshyam Bashayal	57	Business	Sainamaina 6	
18	Gyan Dhari Acharya	84	Business	Sainamaina 6	
19	Tula Ram Poudel	97	Local resident	Sainamaina 6	

20	Suman Panthi	22	Business	Sainamaina 6	
21	Chabilal Luitel	45	Business	Sainamaina 6	

Date: 2021/12/29

Sainamaina Municipality

Ward No: 8

S.N.	Name	Age	Position	Address	Remarks
1	Ramsharan Neupane	62	Ward President	Sainamaina 8	
2	Mahendra Dhakal	50		Sainamaina 8	
3	Cholakanta Bhattrai	60	Agriculture Tole President	Sainamaina 8	
4	Ishowari Bhandari	44	Ward Member	Sainamaina 8	
5	Mukti Nath Gyawali	66	Local resident	Sainamaina 8	
6	Rabi Lal Neupane	65	Local resident	Sainamaina 8	
7	Chandramani Bhandari	32	Local resident	Sainamaina 8	
8	Khimananda Khanal	46	Local resident	Sainamaina 8	
9	Umanath Kadel	57	Tole President	Sainamaina 8	
10	Govinda Shrestha	40	Local resident	Sainamaina 8	
11	Bhakta Bahadur Thapa	55	Local resident	Sainamaina 8	
12	Suprama Banjari	47	Tole President	Sainamaina 8	
13	Bhojraj Bhandari	54	Local resident	Sainamaina 8	
14	Khemraj Dhakal	66	CPN UML Incharge	Sainamaina 8	
15	Narayan Pd Neupane	50	Agriculture	Sainamaina 8	
16	Yam lala Neupane	68	Agriculture	Sainamaina 8	
17	Tulshi Ram Neupane	75	Agriculture	Sainamaina 8	
18	Tara Neupane	44	Agriculture	Sainamaina 8	
19	Babu Ram Pandey	47	Agriculture	Sainamaina 8	
20	Chunni Bhandari	53	Agriculture	Sainamaina 8	

Date: 2021/12/31

Sainamaina Municipality

Ward No: 9

S.N.	Name	Age	Position	Address	Remarks
1	Dol Nath Bhandari	38	Ward President	Sainamaina 9	
2	Bhanu Bhakta Pandey	36	Local resident	Sainamaina 9	
3	Ishowari Prasad Tiwari	36	Local resident	Sainamaina 9	
4	Hari Prasad Pandey	45	Local resident	Sainamaina 9	
5	Shiva Lal Bhat Chettri	33	Agriculture	Sainamaina 9	
6	Om Bahadur Bhat	35	Local resident	Sainamaina 9	
7	Netra Prasad lamichhane	51	Agriculture	Sainamaina 9	
8	Nar Bahadur Pulami	45	Local resident	Sainamaina 9	
9	Lila Ram Tiwari	39	Agriculture	Sainamaina 9	

10	Maniram Bhandari	36	Ward Secretary	Sainamaina 9	
11	Reena Giri	29	Office Helper	Sainamaina 9	
12	Kabita Rana	27	Student	Sainamaina 9	
13	Bishnu Chapagai	20	Unemployment	Sainamaina 9	
14	Ram Bahadur Pariyar	38	Local resident	Sainamaina 9	
15	Megraj Bhattrai	42	Local resident	Sainamaina 9	
16	Deepak Bhandari	42	Local resident	Sainamaina 9	
17	Sita Poudel	54	Ward Women Member	Sainamaina 9	
18	Baburam Bhandari	56	Local resident	Sainamaina 9	
19	Prem Raj Chawali	71	Agriculture	Sainamaina 9	
20	Krishna Pariyar	40	Local resident	Sainamaina 9	
21	Tek Bahadur Bishwokrma	42	Agriculture	Sainamaina 9	
22	Yadu Sapkota	31	Business	Sainamaina 9	
23	Netra Prasad Neupane	48	Agriculture	Sainamaina 9	
24	Deepak Prasad Shrestha	42	Business	Sainamaina 9	

Date: 2021/12/28

Sainamaina Municipality

Ward No: 10

S.N.	Name	Age	Position	Address	Remarks
1	Lok Narayan Thapa	52	Ward President	Sainamaina 10	
2	Laxman Prasad Gyawali	64	Tole President	Sainamaina 10	
3	Giri Prasad Pun	61	Tole President	Sainamaina 10	
4	Ran Bahadur Rana	68	Tole President	Sainamaina 10	
5	Khemchandra Karki	41	President	Sainamaina 10	
6	Hari Bahadur	55	Ward Member	Sainamaina 10	
7	Kul Bahadur Hamal	50	Local resident	Sainamaina 10	
8	Sunita Hamal	45	Local resident	Sainamaina 10	
9	Anuradha KC	35	Local resident	Sainamaina 10	
10	Kamala Parajuli	39	Local resident	Sainamaina 10	
11	Padam Thapa	50	Office Helper	Sainamaina 10	
12	Narendra Somer	56	Local resident	Sainamaina 10	
13	Kuwar	42	Local resident	Sainamaina 10	
14	Kamal Prasad Poudel	44	Ward Secretary	Sainamaina 10	
15	Shankar Regmi	33	Office Helper	Sainamaina 10	

Date: 2021/12/28

Sainamaina Municipality

Ward No: 11

S.N.	Name	Age	Position	Address	Remarks
1	Sunil Prasad Marasini	49	President	Sainamaina 11	

2	Nabin Kumar Sawad	42	Ward Secretary	Sainamaina 11	
3	Ram Prasad Bhusal	47	Ward Member	Sainamaina 11	
4	Bhoj Raj Gawali	43	Local	Sainamaina 11	
5	Thanashwor Ghimire	39	Journalist	Sainamaina 11	
6	Bhuwan JC	35	Journalist	Sainamaina 11	
7	Hari Khanal	40	Local	Sainamaina 11	
8	Ram Prasad Aryal	42	Ward Member	Sainamaina 11	
9	Govinda Pokhrel	35	Local resident	Sainamaina 11	
10	Bhumi Lal Sapkota	48	Local resident	Sainamaina 11	
11	Santosh Pandey	38	Local resident	Sainamaina 11	
12	Sudan Gautam	33	Office Helper	Sainamaina 11	
13	Sunita Koirala	30	Local resident	Sainamaina 11	

Date: 2022/01/11

Kanchan Rural Municipality

Ward No: 2

S.N.	Name	Age	Position	Address	Remarks
1	Gokarna Bahadur Chhetri	58	President	Kanchan 3	
2	Goma Tarami	37	Vice President	Kanchan 1	
3	Lekh Bahadur Basnet	41	Local resident	Kanchan	
4	Krishna Prasad Adhikari	65	ward President	Kanchan 5	
5	Ram Prasad Gautam	55	Local resident	Kanchan	
6	Asim Bhandari	24	Local resident	Kanchan 2	
7	Nagendra Malla	34	Local resident	Kanchan 5	
8	Dhanpati Gyawali	26	Local resident	Kanchan 3	
9	Radha Bhattrai Acharya	42	Local resident	Kanchan 2	
10	Prakash Gurung	32	Local resident	Kanchan 6	

Date: 2022/01/12

Kanchan Rural Municipality

Ward No: 5

S.N.	Name	Age	Position	Address	Remarks
1	Krishna Prasad Acharya	65	Ward President	Kanchan 5	
2	Purna Bahadur Pariyar	60	Local resident	Kanchan 5	
3	Mukti Ram Belbase	64	Ward Member	Kanchan 5	
4	Mohan Lal Gurung	24	Local resident	Kanchan 5	
5	Juna Thapa	30	Vice President	Kanchan 5	
6	Num Bahadur Thapa	47	Ward Member	Kanchan 5	
7	Khem Bahadur Chettri	33	Employment	Kanchan 4	
8	Puspa Pandey	25	Employment	Kanchan 5	
9	Anita Tharu	24	Employment	Kanchan 5	

10	Sonamati Tharu	40	Ward Member	Kanchan 5	

Date: 2022/01/05

Banaganga Municipality

Ward No: 4

S.N.	Name	Age	Position	Address	Remarks
1	Mangal Prasad Tharu	62	Mayor	Banaganga 11	
2	Chakrapani Aryal	52	Deputy Mayor	Banaganga 4	
3	Baburam Bhatrai	57	Vice Secretary	Banaganga 8	
4	Khem Bahadur JC	55	Local resident	Banaganga 2	
5	Govinda Prasad Acharya	31	Local resident	Banaganga 4	
6	Parvati Acharya	38	Journalist	Banaganga 4	
7	Kulraj Poudel	48	Teacher	Banaganga 8	

Date: 2022/01/11

Banaganga Municipality

Ward No: 1

S.N.	Name	Age	Position	Address	Remarks
1	Bal Kumari Pandey	51	President (Political Agriculture)	Banaganga 1	
2	Sita Kumari Thapa	60	Social Worker	Banaganga 1	
3	Jhalak Malla Thakuri	61	Political	Banaganga 1	
4	Sanju Kumar Saru	51	Political	Banaganga 1	
5	Harikala Sarki	49	Representative	Banaganga 1	
6	krishna Bahadur Bishwokarma	48	Agriculture	Banaganga 1	
7	Govinda Acharya	38	Secretary	Banaganga 1	
8	Durga Bahadur Sen	66	Agriculture	Banaganga 1	
9	Yubraj KC	52	Agriculture	Banaganga 1	
10	Savraj Durgam	31	Social Worker	Banaganga 1	
11	Ram Bahadur Tandan	50	Social Worker	Banaganga 1	
12	Gita Bhusan	35	Social Worker	Banaganga 1	
13	Chen Narayan Khad	72	Social Worker	Banaganga 1	
14	Debeshwor Neupane	54	Local resident	Banaganga 1	
15	Nawadha Ghimire	46	Business	Banaganga 1	

Date: 2022/01/04

Banaganga Municipality

Ward No: 2

S.N.	Name	Age	Position	Address	Remarks
1	Bishnu Prasad Poudel	50	Ward President	Banaganga 2	
2	Tika Kumari Acharya	67	Ward Member	Banaganga 2	
3	Bimala Pariyar	40	Member	Banaganga 2	

4	Ram Chaudhary	40	Member	Banaganga 2	
5	Krishna Prasad Giri	52	CPN UML Incharge	Banaganga 2	
6	Hem Bahadur Karki	53	Local resident	Banaganga 2	
7	Ratna Bahadur Karki	66	Local resident	Banaganga 2	
8	Gopal Bhattrai	50	Social worker	Banaganga 2	
9	Amar Bahadur Thapa	89	Tole Development President	Banaganga 2	
10	Hari Neupane	40	Tole Development President	Banaganga 2	
11	Narendra Prasad Poudel	33	Ward Secretary	Banaganga 2	
12	Asok Kumar Khatri	57	Social worker	Banaganga 2	
13	Satya narayan Tharu	53	Social worker	Banaganga 2	
14	Babu Ram Joshi	50	Social worker	Banaganga 2	
15	Krishna Karki	36	Social worker	Banaganga 2	

Date: 2022/01/04

Banaganga Municipality

Ward No: 4

S.N.	Name	Age	Position	Address	Remarks
1	Ganesh Bahadur Chettri	43	President	Banaganga 4	
2	Bishnu Prasad Poudel	62	Officer	Banaganga 4	
3	Mohan Khosa	68	Agriculture	Banaganga 4	
4	Shankar Prasad Poudel	58	Agriculture	Banaganga 4	
5	Chitra Bahadur Khan	61	Ward Member	Banaganga 4	
6	Mukta Ram Katel	53	Tole Secretary	Banaganga 4	
7	Chabilal Gautam	72	Agriculture	Banaganga 4	
8	Khemlal Adhikari	47	Business	Banaganga 4	
9	Jang Bahadur Malla	57	Agriculture	Banaganga 4	
10	Ram Bahadur Chhatri	65	Agriculture	Banaganga 4	
11	Bishnu Ghimire	82	Agriculture	Banaganga 4	
12	Kabiraj Musal	67	Agriculture	Banaganga 4	
13	Geeta Gyawali	49	Agriculture	Banaganga 4	
14	Shanti Malla	22	Agriculture	Banaganga 4	
15	Kamala Aryal	40	Business	Banaganga 4	
16	Geeta Pandey	27	Business	Banaganga 4	
17	Sabita Ghimire	37	Agriculture	Banaganga 4	
18	Nirmala BC	48	Agriculture	Banaganga 4	
19	Laxmi KC	49	Agriculture	Banaganga 4	
20	Bishnu Thapa	47	Agriculture	Banaganga 4	
21	Chandrakala Acharya	41	Agriculture	Banaganga 4	
22	Laxmi Danali	45	Agriculture	Banaganga 4	
23	Bhagirathi Gawa	40	Agriculture	Banaganga 4	
24	Shanti Tharu	44	Agriculture	Banaganga 4	

25	Sarita BC	48	Business	Banaganga 4	
26	Mitra Khadka	36	Agriculture	Banaganga 4	
27	Apshara Adhikari	46	Agriculture	Banaganga 4	
28	Sani Lama	30	Business	Banaganga 4	
29	Anju KC	69	Agriculture	Banaganga 4	
30	Til Kumari Thapa	50	Agriculture	Banaganga 4	
31	Suman Chettri	40	Agriculture	Banaganga 4	
32	Uma Raskoti	60	Agriculture	Banaganga 4	
33	Sita Thapa	74	Local resident	Banaganga 4	
34	Capt TB Ram	50	Agriculture	Banaganga 4	
35	Shiva Bahadur Thapa	70	Agriculture	Banaganga 4	
36	Mukta Ram Neupane	22	Business	Banaganga 4	
37	Dilip Sharma	30	Business	Banaganga 4	
38	Deepak Chettri	26	Business	Banaganga 4	
39	Janak Adhikari	30	Agriculture	Banaganga 4	
40	Bikram Bahadur Sen	42	Business	Banaganga 4	
41	Kamala Malla	48	Business	Banaganga 4	
42	Prakash Banjari	78	Agriculture	Banaganga 4	
43	Bhupal Singh Sen	78	Agriculture	Banaganga 4	
44	Kul Bahadur Rana	58	Agriculture	Banaganga 4	
45	Krishna JC	52	Teacher	Banaganga 4	
46	Harka Chettri	53	Agriculture	Banaganga 4	
47	Dinesh Ghimire	41	Business	Banaganga 4	
48	Hira Bahadur Pandey	40	Agriculture	Banaganga 4	
49	Hari Khanal	55	Agriculture	Banaganga 4	
50	Karna Pratap Rana	44	Agriculture	Banaganga 4	
51	Sujan Saha	26	Agriculture	Banaganga 4	
52	Sunil Rana	36	Agriculture	Banaganga 4	
53	Bindu Katel	35	Agriculture	Banaganga 4	
54	Sunita Poudel	30	Agriculture	Banaganga 4	
55	Kamal Bhat Chettri	41	Agriculture	Banaganga 4	
56	Kamal Sen	43	Agriculture	Banaganga 4	
57	Uma Thapa	53	Local resident	Banaganga 4	
58	Sagar Chettri	24	Unemployment	Banaganga 4	
59	Sobit Bahadur Chettri	33	Unemployment	Banaganga 4	
60	Soni Tharu	62	Agriculture	Banaganga 4	
61	Pawan Baral	34	Unemployment	Banaganga 4	
62	Ekraj Adhikari	51	Business	Banaganga 4	
63	Chabilal Giri	68	Agriculture	Banaganga 4	

Date: 2022/01/04

Banaganga Municipality

Ward No: 7

S.N.	Name	Age	Position	Address	Remarks
1	Bishnu Giri	50	Ward President	Banaganga 7	
2	Bhum Bahadur Pandey	44	Ward Member	Banaganga 7	
3	Sambhu Ram Khanal	45	Local resident	Banaganga 7	
4	Pratap Giri	58	Social Worker	Banaganga 7	
5	Krishna Khanal	51	Social Worker	Banaganga 7	
6	Geetaram Ghimire	66	Tole Secretary	Banaganga 7	
7	Jaya Lal Giri	50	Social Worker	Banaganga 7	
8	Udayaman Kunwar	67	Local resident	Banaganga 7	
9	Hari Kunwar	58	Social Worker	Banaganga 7	
10	Bishnu Bhat	57	Social Worker	Banaganga 7	
11	Rupsingh Thapa	52	Social Worker	Banaganga 7	
12	Pradip Chettri	60	Tole President	Banaganga 7	
13	Top Bahadur Thapa	66	Tole President	Banaganga 7	
14	Ram Bahadur Basnet	58	Tole President	Banaganga 7	
15	Bishnu Acharya	59	Social Worker	Banaganga 7	
16	Kashiram Damase	71	Local resident	Banaganga 7	
17	Ram Bahadur KC	42	Tole Vice President	Banaganga 7	
18	Yem Bahadur BC	62	Vice President	Banaganga 7	

Date: 2022/01/05

Banaganga Municipality

Ward No: 8

S.N.	Name	Age	Position	Address	Remarks
1	Gunnidhi Bhusal	50	Ward President	Banaganga 8	
2	Laxmi Shrestha	46	Agriculture	Banaganga 8	
3	Ram Prasad Ghimire	67	Agriculture	Banaganga 8	
4	Giri Raj Poudel	54	Business	Banaganga 8	
5	Hem Bahadur Khadka	57	Business	Banaganga 8	
6	Nathuram Chaudhary Tharu	51	Ward Member	Banaganga 8	
7	Karna Bahadur Lama	65	Tole President	Banaganga 8	
8	Tulshi Prasad Aryal	54	Tole Vice President	Banaganga 8	
9	Madhu Aryal	50	Tole Vice President	Banaganga 8	
10	Santa Bikram Poudel	48	Tole Secretary	Banaganga 8	
11	Mitra Lal Sapkota	40	Tole Secretary	Banaganga 8	
12	Homnath poudel	49	Business	Banaganga 8	
13	Manju Poudel	38	Business	Banaganga 8	
14	Dibash Ghimire	39	Employment	Banaganga 8	
15	Bharati Sapkota	64	Local resident	Banaganga 8	

16	Premraj Ghimire	60	Local resident	Banaganga 8	
17	Bishnu	52	Local resident	Banaganga 8	
18	Ram Prasad Poudel	50	Business	Banaganga 8	
19	Dhan Bir Bk	39	Business	Banaganga 8	
20	Ramesh Ghimire	39	Business	Banaganga 8	
21	Shalik Ram Poudel	64	Business	Banaganga 8	

Date: 2022/01/05

Buddhabhumi Municipality

Ward No: 8

S.N.	Name	Age	Position	Address	Remarks
1	Kasab Bahadur Shrestha		Local resident	Buddhabhumi	
2	Mira Tharu	30	Local resident	Buddhabhumi	
3	Kasab Raj Subedi	37	Local resident	Buddhabhumi	
4	Pawan Bahadur Tharu	35	Ward President	Buddhabhumi	
5	Nikita Tripathi	28	Engineer	Buddhabhumi	
6	Hem Lal Neupane	68	Social worker	Buddhabhumi	
7	Bhesh Raj Sharma	68	Ward President	Buddhabhumi	
8	Shradha Belbare	48	Local resident	Buddhabhumi	
9	Muna Khanal	26	Local resident	Buddhabhumi	
10	Artha Bahadur Bista	55	Local resident	Buddhabhumi	

Date: 2022/01/06

Buddhabhumi Municipality

Ward No: 2

S.N.	Name	Age	Position	Address	Remarks
1	Bhesh Raj Sharma	68	Ward President	Buddhabhumi 2	
2	Hemlal Neupane	68	Social Worker	Buddhabhumi 2	
3	Damber Kumar Kafle	69	Tole President	Buddhabhumi 2	
4	Ishwori Khanal	60	Local resident	Buddhabhumi 2	
5	Narayan Gautam	55	Social Worker	Buddhabhumi 2	
6	Lilapati Ghimire	58	Local resident	Buddhabhumi 2	
7	Bishnu Prasad Lamshal	56	Local resident	Buddhabhumi 2	
8	Bishnu Prasad Poudel	87	Social Worker	Buddhabhumi 2	
9	Damber Dev Pandey	66	Local resident	Buddhabhumi 2	
10	Sakar Bahadur Birat	67	Ward Member	Buddhabhumi 2	
11	Sher Bahadur BK	38	Teacher	Buddhabhumi 2	

Date: 2022/01/06

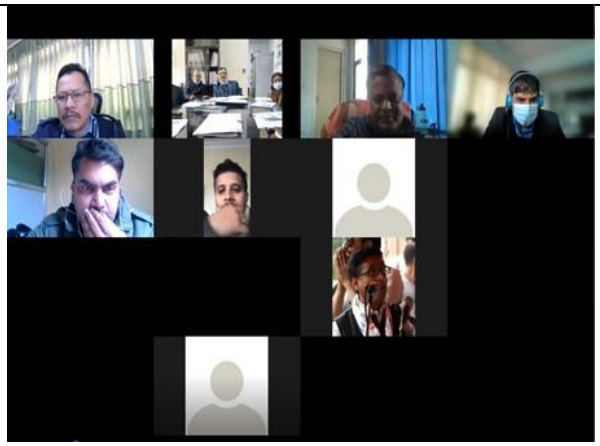
Buddhabhumi Municipality

Ward No: 4

S.N.	Name	Age	Position	Address	Remarks
1	Pawan Kumar Tharu	35	Ward President	Buddhabhumi 4	
2	Lok Prasad Sanal	55	Ward Member	Buddhabhumi 4	
3	Jagaman Bahadur Tharu	53	Ward Member	Buddhabhumi 4	
4	Keshar Bahadur Sen	56	Ward President	Buddhabhumi 4	
5	Ram Achal Tharu	47	Tole President	Buddhabhumi 4	
6	Ram Kishwor Tharu	53	Vice President	Buddhabhumi 4	
7	Bhiku Tharu	67	Village Social Worker	Buddhabhumi 4	
8	Harilal Tharu	49	Social Worker	Buddhabhumi 4	
9	Basanta Parajuli	36	CPN UML Incharge	Buddhabhumi 4	
10	Nar Bahadur Sunar	61	Tole President	Buddhabhumi 4	
11	Ramkala Nepali	60	Ward Member	Buddhabhumi 4	
12	Ram Prasad Chaudhary	51	Local resident	Buddhabhumi 4	
13	Motilal Belbase	74	Tole President	Buddhabhumi 4	
14	Chandra Bahadur Gharti Magar	49	Ward	Buddhabhumi 4	
15	Narayan Malla	49	Social worker	Buddhabhumi 4	
16	Anuj Chandra Saha	48	CPN UML Incharge	Buddhabhumi 4	
17	Artha Bahadur Bista	55	Local resident	Buddhabhumi 4	

Second Round of Consultations (National and Local Workshops)

Photographs of National-Level Consultations



Photographs of Local-Level Consultations

List of Participants in National Workshop (February 9, 2022)

SN	Name	Position
Ministry of Physical Infrastructure and Transport (MoPIT)		
1	Mr. Keshab Kumar Sharma	Joint Secretary
2	Mr. Suresh Poudel	Senior Divisional Engineer
3	Shobha Bhandari	Sociologist
Department of Roads (DoR)		
4	Mr. Shiva Hari Sapkota	Director General
5	Mr. Ram Hari Pokharel	Deputy Director General, DoR DCID
6	Mr. Laxmi Dutta Bhatta	Senior Divisional Engineer, DoR DCID
7	Ms. Prakriti Pandey	Engineer, DoR DCID
8	Ms. Rama Shrestha	Social Development Expert, DoR-DCID
9	Mr. Yubaraj Satyal	Environment Safeguard Expert, DoR-DCID
Ministry of Forest and Environment (MoFE)		
10	Mr. Khila Nath Dahal	Assistant Forest Officer, EIA section
Department of Forest and Soil Conservation (DoFSC)		
11	Mr. Govinda Kumar Shrestha	Assistant Forest Officer
Department of National Park and Wildlife Conservation (DNPWC)		
12	Mr. Dil Bahadur Purja Pun	Under Secretary (Technical)
Department of Environment		
13	Ms. Swasti Shrestha	
Department of Labour and Occupational Safety		
14	Mr. Baburam Kushwaha	Factory Inspector
Zoom Participant		
15	Mr. Prem Prakash Khatri	Director, Road Board Nepal
16	Mr. Manoj Aryal	Environment Inspector, DoR-GESU
17	Mr. Surendra Karmacharya	Nepal Telecom
18	Ms. Binita Shrestha	Nepal Telecom
19	Mr. Bimlesh Jha	Nepal Telecom
20	Mr. Manoj Gyawali	Nepal Telecom
21	Mr. Gana Shekhar Shrestha	Deputy Superintendent of Nepal Police (DSP)
22	Mr. Asish Thapa Magar	Senior Divisional Engineer, DoR DCID

SN	Name	Position
23	Ms. Bandana Acharya	Engineer, DoR DCID
24	Mr. Trilok Nath Ghimire	Engineer, DoR DCID
25	Mr. Youb Raj Bhatta	Occupational Health and Safety Expert, DoR-DCID
26	Mr. Nawaraj Dahal	Joint Trade Union Coordination Center (JTUCC)
27	Mr. Rajan Shreshta	Environment Expert, ESIA Consultant
28	Mr. Rabin Dhakal	Social Safeguard Expert, ESIA Consultant
29	Mr. Prayag Raj Tamrakar	Forest and Biodiversity Expert, ESIA Consultant

List of Participants in Local Workshop (February 20, 2022)

SN	Name	Position
Provincial Ministries- Lumbini Province		
1	Mr. Rajendra Thapa	Secretary, Ministry of Law, Women Children and Senior Citizen
2	Mr. Bhimarjun Pandey	Director, Physical Infrastructure Directorate- Ministry of Physical Planning and Development
3	Mr. Govinda Prasad Khanal	Senior Divisional Engineer, Ministry of Physical Planning and Development
4	Mr. Sabin Koirala	Engineer, Ministry of Physical Planning and Development
5	Mr. Bishnu Dangi	Survey Officer, Ministry of Agriculture, Food Technology and Land Management
Sub-Metropolitan City/Municipality/Rural Municipality		
6	Mr. Keshav Kumar Shrestha	Mayor, Buddhabhumi Municipality, Kapilvastu
7	Mr. Chitra Bahadur Karki	Mayor, Sainamaina Municipality, Rupandehi
8	Mr. Ratna Bahadur Paudel	Ward President, Sainamaina Municipality Ward-3, Rupandehi
9	Mr. Hem Raj Chaudhari	Sainamaina Municipality Ward 4, Rupandehi
10	Ms. Kamala Paudel	Acting Ward President, Sainamaina Municipality Ward 6, Rupandehi
11	Mr. Dev Raj Shrestha	Ward Secretary, Ward 1- Butwal Sub-Metropolitan City, Rupandehi
12	Mr. Gunanidhi Bhusal	Ward President, Banaganga Municipality Ward 8, Kapilvastu
13	Mr Tekraj Panthi	Chief Administrative Officer, Banganga Municipality, Kapilvastu
World Bank		
14	Mr. Prakash Awasthi	Environment Expert
Department of Roads		
15	Mr. Ram Hari Pokharel	Deputy Director General, DoR DCID

SN	Name	Position
16	Mr. Laxmi Dutta Bhatta	Senior Divisional Engineer, DoR DCID
17	Mr. Ashish Thapa Magar	Senior Divisional Engineer, DoR DCID
18	Ms. Bandana Acharya	Engineer, DoR DCID
19	Ms. Prakriti Pandey	Engineer, DoR DCID
20	Ms. Rama Shrestha	Social Development Expert, DoR-DCID
21	Mr. Yubaraj Satyal	Environment Safeguard Expert, DoR-DCID
22	Mr. Shankar Acharya	Gender Expert , DoR-DCID
23	Mr. Youb Raj Bhatta	OHS Expert, DoR-DCID
Consultant Team		
24	Mr. Rajan Shreshta	Environment Expert, ESIA Consultant
25	Mr. Rabin Dhakal	Social Safeguard Expert, ESIA Consultant
26	Mr. Prayag Raj Tamrakar	Forest and Biodiversity Expert, ESIA Consultant