



**INITIAL ENVIRONMENTAL EXAMINATION (IEE) FOR
UPGRADING OF GORUSINGHE-CHANDRAUTA (19.2 km) ROAD AND
ASSOCIATES BRIDGES**

A section of East-West Highway (EWH) Kapilvastu District, Lumbini Province,
Nepal



Submitted Through:
Department of Road
Geo-Environment and Social Unit (GESU)
Babarmahal, Kathmandu, Nepal

<u>Submitted by:</u> Development Cooperation Implementation Division, (DCID) Department of Road Babarmahal, Kathmandu, Nepal Email: dorfeb@dor.gov.np	<u>Submitted to:</u> Ministry of Physical Infrastructure and Transport Singhadurbar, Kathmandu, Nepal Contact: 01-4211732 Email: info@mopit.gov.np
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ABBREVIATIONS

AADT	Annual Average Daily Traffic
ACCESS	Accelerating Transport and Trade Connectivity in Eastern South Asia
ADB	Asian Development Bank
AH	Asian Highway
amsl	Above Mean Sea Level
APHA	American Public Health Association
CBS	Central Bureau of Statistics
CDC	Compensation Determination Committee
CF	Community Forest
Ch	Chainage
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
CO	Carbon monoxide
CSC	Construction Supervision Consultant
Cum	Cubic Meter
CV	Curriculum Vitae
dB	Decibel
DBH	Diameter at Breast Height
DCC	District Coordination Committees
DCID	Development Cooperation Implementation Division
DFO	Division Forest Office
DHM	Department of Hydrology and Meteorology
DIZ	Direct Impact Zone
DoFSC	Department of Forest and Soil Conservation
DNPWC	Department of National Park and Wildlife Conservation
DoR	Department of Roads
EA	Environmental Assessment
EAAA	Ecologically Appropriate Area of Analysis
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan



Initial Environmental Examination (IEE) for
Upgrading the Gorusinghe-Chandrauta (19.2 Km) Road and Associated

EMoP	Environmental Monitoring Plan
EPA	Environment Protection Act
EPR	Environment Protection Rule
EWB	East West Highway
FGD	Focus Group Discussion
FoB	Footover Bridge
GC	Gorusinghe- Chandrauta
GESI	Gender Equality and Social Inclusion
GESU	Geo-Environment and Social Unit
GHG	Green House Gas
GIS	Geographic Information System
GoN	Government of Nepal
GPS	Geographic Positioning System
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
Ha	Hectare
HHs	Households
IBA	Important Bird and Biodiversity Area
IEE	Initial Environmental Examination
IIZ	Indirect Impact Zone
ILO	International Labour Organization
LG	Local Government
IUCN	International Union for Conservation of Nature
KII	Key Informant Interview
Km	Kilometer
Leq	Equivalent Noise Level
LG	Local Government
LPG	Liquified Petroleum Gas
m	Meter
MC	Motor Cycles
MoFE	Ministry of Forests and Environment



Initial Environmental Examination (IEE) for
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MoPIT	Ministry of Physical Infrastructure and Transport
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standards
NDWQS	National Drinking Water Quality Standards
NO _x	Nitrogen Oxide
NRs	Nepalese Rupees
OHS	Occupational Health and Safety
PCU	Project Coordination Unit
PM	Particulate Matter
PMU	Project Management Unit
PPE	Personal Protection Equipment
RAP	Resettlement Action Plan
RCC	Reinforced Cement Concrete
RHS	Right Hand Side
RoW	Right of Way
SAARC	South Asian Association for Regional Cooperation
SC	Supervision Consultant
SEA	Sexual Exploitation and Abuse
SO ₂	Sulphur dioxide
Sq.m	Square meter
STD	Sexually Transmitted Diseases
ToR	Terms of Reference
TCS	Tree Census Survey
TMO	Transport Management Office
ToR	Term of References
TSP	Total Suspended Particle
UNESCO	United Nations Educational, Scientific and Cultural Organization
WB	World Bank
WHO	World Health Organization
ZoI	Zone of Influence



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EXECUTIVE SUMMARY

1. Proponent

Development Cooperation Implementation Division, (DCID), Department of Road (DoR) under the Ministry of Physical Infrastructure and Transport (MoPIT) is implementing agency or Project Proponent for this project.

2. Proposal Details

The Gorusinghe -Chandrauta upgradation road project is part of Accelerating Transport and Trade Connectivity in Eastern South Asia (ACCESS) - Nepal Phase 1 Project located in the Western Part of Nepal in Kapilvastu District. It starts from Belwagurdawa Nadi (CH 640+000) i.e., continuation of Butwal-Gorusinghe Section and ends at Umari/Shivpur Chowk (CH 659+200).

A. Scope of the Proposal

The main objective of the project is to improve Gorusinghe- Chandrauta (19.2 km) road section of East-West Highway (EWH) from 2 lanes into 4 lanes national highway standard including construction of 2 major, 6 minor, 1 VUP, 2 PUPs & 1 FOB and 64 box culverts as well as 7 pipe culverts in proposed section. Widening and improvement components will include pavement upgrading, geometry improvement, construction of new bridges, junction improvements, service roads on both sides of the road in urban areas including cycle lanes and footpaths, pedestrian crossing (overhead bridges/underpass), wildlife crossings designs, drainage improvement, retaining structures; slope protection and stabilization, other off-road works, and bus bays and installation of adequate road safety measures etc.

B. Relevancy of the Proposal

The proposal is a transportation service sector project for upgrading the existing road of the national highway from existing two-lane road to four lanes from Gorusinghe- Chandrauta for a total 19.2 km. The proposed project will support capacity, quality, and safety improvements of the East- West Highway (EWH) in the proposed section. In the similar manner as per the DoR's EWH upgradation activity it will be further linked with Butwal- Gorusinghe Highway section of Asian Highway Standard. Hence this project will not only support capacity, quality, and safety improvements but also avoid bottlenecks of traffic between these two sections of the East-West Highway (EWH). It also intends to improve international connectivity for promoting trade and business.

C. Rationality and Objective of IEE

During the implementation of the project, an environmental assessment is essential to enhance beneficial impacts and minimize adverse effects on the environment. In accordance with the Environment Protection Act (EPA) 2076 and the Environment Protection Rules (EPR) 2077 (with addendum 2078), Schedule 2, Rule 3, Transport Sector D (8), an Initial Environmental Examination (IEE) is required for the upgrading of national highways or feeder roads with a length ranging from 10 to 50 kilometers. The proposed road upgrading project covers a total length of 19.2 kilometers;



hence, preparation and approval of an IEE report is mandatory.

As per Rule 7, Sub-rule 8 of the EPR 2077, this IEE report has been prepared in English, considering the project is funded by the World Bank. Additionally, a brief summary report, including the executive summary, has been prepared in Nepali in compliance with the same sub-rule.

D: Detailed Description of the Project

The road project traverses through Buddhabhumi and Shivaraj Municipalities, linking two major settlements i.e. Gorusinge and Chandrauta while also passing through smaller built-up areas such as Imiliya, Champapur, Kharendrapur, and Shivpur. The entire alignment lies within flat terrain, with elevations generally ranging between 100 and 150 meters above sea level. Certain sections of the road pass through community and cooperative forest areas.

In Chandrauta and other urban areas, the road width is maintained at a minimum of 15 meters. All bridges along the corridor are designed to double-lane standards. The upgraded road will generally be elevated by approximately 0.5 to 1 meter above the existing road level or natural ground surface. In areas where the alignment crosses rivers or streams, embankments may reach heights of up to 6 meters.

The road's Right-of-Way (RoW) extends 25 meters on either side of the centerline, resulting in a total width of 50 meters. Consequently, no additional land acquisition is required for the project.

3. Study Methodology

The study employed a combination of methodologies, including a desk study involving a review of Google and topographic maps, field surveys conducted in August 2024, and extensive stakeholder interactions-particularly with local government representatives (Mayor, Ward Chair, Forest User Groups). It also included a series of consultations (11 meetings in total) and key informant interviews with individuals such as the District Forest Officer (DFO), temple priests, vendors (including Kiwoks), health institution staff, and school principals. Potential impacts were identified and explored, and an impact assessment was conducted using an evaluation matrix. The desk study component involved an extensive review of relevant literature, including national legal frameworks such as the Constitution, sectoral policies, Acts, Regulations, standards, and applicable international treaties. Additionally, key reference documents such as the Environmental and Social Management Framework (ESMF) of the Department of Roads (2023), Occupational Health and Safety (OHS) Guidelines of DoR, as well as safeguard policies of the Asian Development Bank (ADB) and the World Bank (WB) were reviewed. The study also consulted project feasibility reports and environmental assessment reports from similar infrastructure projects to guide the assessment process.

Demographic data for the affected municipalities and wards were obtained from official reports published by the National Statistics Office. Furthermore, a household survey was conducted



covering 312 households, which included 50 project-affected families (PAFs) to gather socio-economic and perception data.

As part of public consultation and information dissemination, two public hearing events were organized in Gorusinghe and Chandrauta. Public hearing notices were issued by DCID and published in the Arthik Abhiyan National Daily on 11th Poush 2081. Additionally, a public notice related to public deeds was published in the same newspaper on 28th Magh 2081.

Physical Environment:

The study team conducted data collection and assessment in the proposed project area using approved checklists and questionnaires. Surveys were carried out within a 300-meter aerial distance from the affected wards of the municipality to gather information on existing land use, including land use practices, planting niches, cropping patterns, and agricultural yields. The survey also identified potential quarry sites, disposal areas, camp sites, and soil conservation measures practiced locally.

Physical data related to land use changes-such as the conversion of forest, barren land, and agricultural land for additional pavement-were documented. Environmental quality parameters, including ambient air quality, water quality, soil quality, and noise levels, were analyzed and found to be within national standards.

Furthermore, land stability, hydrology, and seismicity data were evaluated based on secondary sources, field visits, and data interpretation. Detailed geological and geomorphological analyses were performed through comprehensive surveys.

Biological Environment:

The vegetation and forest types within the project site and adjoining areas were systematically surveyed, focusing on their distribution, the occurrence of protected species, and their ethnobotanical and cultural significance. Seventeen quadrats, each measuring 20 x 20 m², were established beyond the road's Right-of-Way (RoW) to assess the status of the forest along the alignment. Additionally, census surveys were conducted with technical staff from three subdivision offices in Kapilvastu to determine the total number of trees requiring clearance for the upgrading works and to propose appropriate mitigation measures.

In compliance with the Forest Regulation (2022) and Environment Protection Regulation (2020), quantitative vegetation data were analyzed to estimate the total tree population within the study area. Biodiversity and wildlife were assessed through a combination of field surveys, literature reviews, and stakeholder consultations. Evidence of wildlife presence was documented using indirect signs such as droppings, pellets, remains (including skin, feathers, bones, and carcasses), and nests.

Transect walk surveys were conducted to monitor mammal populations, while vantage point counts were used for bird surveys, complemented by Road Kill Surveys. Furthermore, an **Integrated**



Biodiversity Assessment Tool (IBAT) analysis was performed to identify key wildlife areas, assess their activities, and evaluate potential impacts of the project on wildlife as well as vice versa.

Socio-Economic and Cultural Environment:

Information related to the socio-economic and cultural aspects of the project influence area was collected through field surveys. This included data on population distribution, ethnicity, employment opportunities, education status, health and hygiene conditions, settlement patterns, market centers, migration trends, land values, household incomes, accessibility, vulnerability, availability of services, labor supply, religion and religious events, as well as other infrastructure such as schools, government offices, and banks.

Project-affected families who lost land and property were identified through a detailed census survey. Compensation valuation was conducted by the **Compensation Determination Committee (CDC)**. Additionally, the status of gender equity and social inclusion in the area was assessed to inform project planning and mitigation measures

4.0 Existing Environmental Condition

4.1 Physical Environment

The project area is located in the Terai region, with elevations ranging from 100 to 150 meters above mean sea level (msl). Soils along the road section primarily consist of recent alluvial deposits, including silt, clay, gravel, boulders, and cobbles. While the soils are generally stable, erosion is possible, especially along riverbanks. The terrain is predominantly flat, and no landslides or unstable areas were identified within the project site.

Land use in the corridor is mainly agricultural, rural, and forested, with a few scattered settlements. The entire road alignment lies within the Department of Roads' (DoR) Right-of-Way (RoW), and there is a mixed land use pattern on both sides of the road. Several fuel stations exist throughout the project corridor. Significant portions of community-managed forests are also present along the route.

Multiple public utilities, including electric poles, solar poles, cables (telephone and internet), and water pipelines, either run parallel to or cross the road at various points. Air quality measurements taken near Imiliya, Chandrauta, and Bel River were found to be within national standards at the time of sampling. Similarly, water quality tests in Belgardawa, Bel, and Jawai Khola rivers met potable water standards. Soil quality and ambient noise levels in these areas were also within acceptable limits.

The road section lies on flat terrain from Imiliya to Chandrauta, where slope stability is not a concern. However, embankment erosion due to flooding is anticipated along rivers and streams. The Belgardawa basin, the largest basin along the project alignment, frequently experiences flash floods caused by high-intensity, short-duration precipitation events, leading to downstream flooding and waterlogging.

Field surveys and laboratory analyses of air, water, and noise were conducted to establish the baseline environmental status in the project area.



4.2 Biological Environment

The project road is situated in a tropical climate zone and does not pass through any protected areas. The forests flanking both sides of the alignment are primarily tropical, dominated by *Shorea robusta* (Sal) and *Terminalia alata* (Sajh) species. Additionally, patches of *Dalbergia* and *Syzygium cumini* forests are found along the road corridor. Major associated species in the Sal Forest include *Ficus glaberrima*, *Mallotus philippensis*, *Syzygium cumini*, *Madhuca longifolia*, *Acacia catechu*, and *Anogeissus latifolia*.

Vegetation sampling adjacent to the Right-of-Way (RoW) was conducted during field surveys to document the total floral and faunal diversity and their protection status. A total of 24 tree species were recorded at the sampling sites. Wildlife surveys identified 14 mammal species, 62 bird species, 11 herpetofauna species, and 9 fish species within the project area.

Notably, several globally threatened species were recorded, including the Common Leopard (*Panthera pardus*), White-rumped Vulture (*Gyps benghalensis*), Slender-billed Vulture (*Gyps tenuirostris*), Egyptian Vulture (*Neophron percnopterus*), Burmese Python (*Python bivittatus*), and Indian Flapshell Turtle (*Lissemys punctata*).

4.3 Socio-economic and Cultural Environment

According to the National Census 2078, the total population of Buddhabhumi Municipality is 76,507, comprising 48.3% males (36,951) and 51.7% females (39,556). Only Ward No. 9 of Buddhabhumi Municipality falls within the project construction area. The population of this ward-9 is 11,043, with 5,222 males and 5,821 females, resulting in a sex ratio of 89.80 males per 100 females. There are 2,441 households in the ward, with an average household size of 4.52. Same as the total population of Shivaraj Municipality is 84,810, with 48.7% (41,328) are male and 51.3% (43,482) are female, yielding a sex ratio of 95.05 males per 100 females. The municipality comprises 16,241 households and has a population density of 299 people per square kilometer. The literacy rate in Shivaraj Municipality is 72.7%.

The total surveyed population is (1643) of (312) households within indirect impact zone (300m, either side of road) comprising male population is (847) with (51.6%) and female population is (796) with (48.4 %). Similarly, the project affected population is 316 of 50 households comprising male population is (161) with (51%) and female population is (155) with (49%) which is directly affected by road upgrading works within RoW. The majority of project-affected people in the area primarily rely on business activities. There are four major settlements along the proposed road corridor. Basic facilities such as health posts, hospitals, primary and secondary schools, market centers, veterinary centers, maternal health facilities, electricity offices, water supply systems, and banking services are available within the project area.

Several religious and cultural sites are located along the road, including Shiva temples, Supadeurali Mandir, and the Diwar of the Tharu community, reflecting Hindu religious heritage. Additionally, a Masjid and Madarasa are situated on the north side of Chandrauta Chowk.



The local population includes many migrants from hill districts such as Arghakhanchi and Pyuthan. The community is ethnically diverse, with Brahmin/Chhetri as the dominant caste, followed by Muslim and Madhesi groups.

5. Alternative Analysis

The alternative analysis evaluated multiple options including design approaches, technologies, implementation procedures, time schedules, a reduced forest impact option, and the no-project scenario. Since the project is already operational and focuses on upgrading the existing road, alternative alignments or locations were not considered. Instead, detailed assessments were carried out on design parameters such as at-grade versus elevated intersections, pavement materials, lane width and number, shoulder types, and the maintenance or upgrading of drainage and bridge structures.

Various combinations of these elements were developed to identify a design that optimally balances financial viability, economic benefits, and technical feasibility. Construction will be executed in phased stages to systematically improve the existing road infrastructure.

Recognizing that complete avoidance of forest areas is unfeasible, the project reduces the road width to 24 meters in forested sections to minimize tree clearance and environmental impact. Overall, the selected design alternatives are deemed the most environmentally responsible while fulfilling project objectives.

6. Environmental Impacts

6.1 Beneficial Impact and Augmentation Measures

Upgrading the road section to four-lane standards will significantly contribute to regional development by enhancing transport facilities and reducing travel time. In addition to the core infrastructure improvements, supplementary activities such as the construction of universal toilets, strengthening local markets (haat bazars) at Imiliya and Chandrauta, and providing additional livelihood training to local communities will further integrate the project benefits with local development. The key beneficial impacts of the project are summarized as follows:

a. Generation of huge Employment opportunities

The proposed road upgrading project will require approximately 400,000 unskilled & 56,000 skilled person, offering significant employment opportunities for the local community. Priority will be given to hiring local residents, thereby boosting local employment and stimulating economic growth. Increased job availability is expected to raise household incomes, support community development, and promote the growth of local businesses. Thus, the project not only improves infrastructure but also fosters local economic and social progress.



b. Improved transport facilities and international connectivity

The road project will substantially enhance transport facilities and international connectivity by upgrading infrastructure, reducing travel time, and lowering transportation costs. These improvements will facilitate trade and commerce by providing local businesses with improved access to national and international markets. Additionally, the project is expected to attract more tourists, thereby boosting the local economy. Improved connectivity will also encourage cross-border collaboration and cultural exchange, while providing better access to international ports

c. Enhancement in technical skills

The road construction project will engage a significant number of semi-skilled and unskilled workers from the project-affected communities. Through hands-on experience in activities such as masonry, gabion wire weaving, foundation wall construction, bar binding for structures and bridges, and bio-engineering work, these workers will have opportunities to develop into fully skilled laborers. This skill development will create sustainable employment prospects for locals and contribute to strengthening the local human resource base.

d. Opportunities of new income sources

In addition to creating labor opportunities, the road project is expected to stimulate local businesses such as tea stalls, small eateries, and shops, enabling residents to expand their enterprises. Increased demand for local products-including vegetables, dairy, and meat-will generate new income streams, significantly boosting the local economy. Consequently, a substantial portion of the project's expenditures will circulate within the community, enhancing overall economic activity and growth.

e. Reduced travel time and cost

Upgrading a 2-lane road to a 4-lane road can significantly reduce travel time and costs. The increased capacity allows traffic to flow more smoothly and at higher speeds, alleviating congestion, especially during peak hours. This improved traffic flow is expected to reduce travel time by approximately 30%, enabling drivers to reach their destinations more quickly. As a result, fuel consumption decreases, leading to lower fuel costs and reduced vehicle maintenance expenses. Therefore, expanding the road to four lanes not only enhances travel efficiency but also generates substantial savings for both individuals and businesses.

f. Enhancement in economic activities, trade and business

The increased road capacity facilitates better access to commercial and industrial areas, making it easier for businesses to operate and for customers to reach them. Improved road infrastructure can stimulate regional economic growth by attracting new businesses and investments, leading to job creation. Additionally, faster and more reliable transportation lowers overall costs for businesses, potentially leading to reduced consumer prices and increased profit margins. Moreover, enhanced



connectivity makes a region more competitive, fostering business expansion and driving economic development.

g. Increase potential of industrial development

The proposed road project can significantly increase the potential for industrial development by improving access and connectivity. With a larger and more efficient roadway, industries can transport raw materials and finished products more easily and cost-effectively, attracting new businesses to the area. Such easy access to the transport sector also paves the way for local small-scale enterprises.

h. Improve traffic facilities and road furniture structures

With the increase in road capacity, there are more opportunities to incorporate additional physical infrastructure such as rest areas and service facilities. Features like appropriately sized medians, street lighting, dedicated pedestrian paths, and additional service lanes in urban areas help organize activities like parking and loading/unloading, thereby minimizing obstructions on the main lanes of the highway.

Similarly, road expansion allows for more effective traffic management through designated turning points, improved traffic signals, proper road signage, and information boards about fuel stations and parking areas at various locations. At Chandrauta Chowk, a Vehicular Underpass (VUP) will be constructed, allowing highway vehicles to pass directly over the bridge, thus reducing traffic impacts. Additionally, two pedestrian underpasses will ensure safer road crossings for walkers. These improvements will make travel safer and more comfortable.

Furthermore, the installation of upgraded road safety signs, crash barriers, and designated pedestrian crossings will enhance traffic flow, reduce congestion, and minimize the risks of accidents and delays- making travel more efficient and convenient for all road users.

6.2 Adverse Impacts and Mitigation Measures

The likely adverse impacts during construction and subsequent operation and maintenance in terms of physical, chemical, biological, socioeconomic, and cultural aspects have been identified and appropriate mitigation measures are recommended. The potential adverse impacts of the project implementation have been summarized in following sub headings.

A. Socio-Economic and Cultural Environment

i. Construction Phase

a. Land acquisition and property/assets and their management issues

There will be no need of land acquisition in the project as road upgrading works is confining within the RoW of the road. The GC Road project will affect a total of 53 private structures of 50 Project



Affected Households (PAH), 82 Public Structures (Chautaro, waiting place, toilet, police bit, check post, temples and handpumps.) and 1202 Public Utilities (Electric pole). Compensation for the private structures will be determined for all damage structures as per land acquisition Act 2034. Out of the total project affected households, only 5 PAH are going to lose their structures fully and 45 PAH are going to lose their structures partially affected and need complete demolition rest will be partially affected.

Similarly, members of affected households will be offered various skill development training such as toy and cushion making, hotel management, operation of small and light vehicles, beauty parlor management, and mobile phone repair etc.

b. Potential increase in road safety concerns as well as road accident

The upgradation works initially increase road safety concerns and the potential for accidents. During construction, altered traffic patterns, and lane closures can create confusion and discomfort conditions for drivers. The transportation of heavy construction equipment and presence of workers on or near the road can also pose safety risks.

To minimize the risk, Pedestrian Crossing (zebra crossing, traffic lights) will be constructed at community preferred locations. An overhead pedestrian bridge with space for lift will be provided at Imiliya chowk (near to the school-Sri Higher Secondary School, Imiliya-Budhhabhumi MC-9) for safe access to local people and school children. Additionally, the project will include the installation and regular maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities. Furthermore, speed control measures and regulations will be implemented, especially in populated areas, near schools and other public places including establishment of traffic signals.

c. Loss of agricultural production and productivity

The improvement/upgrading works will not require additional land beyond RoW. Based on the inventory of affected assets, there will be no impact of loss of agriculture land and standing crops. However, construction plants, storage yards, vehicle parks, labor camps etc will require additional 10.599 ha of land that can damage the crops and reduce production & productivity of the land as well.

To minimize loss of agri-products and productivity of the land, contractor will provide prior notification about construction plan and prevent cultivation of crops to the people along the road alignment. In case of private land for the construction facilities contractor will make formal agreement with the parties including the condition of the compensations for the agriculture loss and final land use reinstatement. Top soil in the project facility area will be collected and stored at safe area for utilization at the reinstatement phase and at road alignment will be used for median and embankment filling.



d. Impact on existing social and cultural practices

During the upgradation of roads, the influx of workers from diverse backgrounds will have to stay together in temporary accommodations which can lead to some challenges. The presence of individuals from different regions or cultural contexts may result in differences in social norms, communication styles, and daily practices, potentially causing conflicts or misunderstandings. Furthermore, there will be an essence to shift the holy place of Tharu community (Diar) from Dumara settlement.

To minimize the impact associated with the social and cultural practices, counseling/ orientation will be provided to workers about local cultural and religious practices. Workers will be encouraged to engage respectfully with the community, honoring local customs and traditions. The project team will also work closely with community leaders to ensure construction activities align with cultural events, minimizing disruptions to local practices. Diar of Tharu community will be relocated with proper religious rituals and forgiveness prayers (kshama puja) in consultation with community leaders and priest of the community.

e. Health and sanitation of workers as well as community health

Workers are usually exposed to physical hazards from use of heavy equipment; 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. Potential health issues on workers are associated with the use of temporary accommodation sites include those relating to sanitation, disease, sleeping space, quality and quantity of food, personal safety and security etc. Workers may be encountered with health hazard during earthwork cutting, handling of hazardous materials, machinery movement, bitumen works, bridge construction and slope stabilization etc., if the personnel protective equipment (PPE) (helmet, gloves, boots, google, ear guard with sponge muffler etc.) will not use. Additionally, workers may suffer from accidents, respiration issues and eye irritation due to exposure to dust and emissions. Health risks are also associated with poor labor camp conditions, unsafe drinking water and unhygienic conditions (poor latrine conditions and washing facilities) which could cause endemic diseases such as dysentery, diarrhea and cholera. Mental stress may increase to the migrant workers due to harassment from the local communities and unfavorable working environment.

The project will establish designated work zones to ensure the safety of workers. Where worker exposure to traffic cannot be completely eliminated, protective barriers will be installed to shield workers from vehicles, along with channeling devices such as traffic cones and barrels to clearly delineate the work zone and guide traffic safely around it. Workers will be trained in safety protocols specific to their activities, including safe practices for night work and operations in low-visibility conditions. Contractor and labour workers will be made responsible to maintain healthy sanitary and hygiene conditions. Provide the training on awareness about sanitation, hygiene, safe-sex and family planning for the workers.



f. Pressure on social services (drinking water, health, school, bank, electricity etc.)

The influx of construction workers can increase the demand for existing social services, such as utilization of drinking water, healthcare, and electricity. This increased demand can exacerbate existing water supply issues and lead to competition for limited resources.

Advance notice will be given to the public before moving any structures and utilities. Necessary actions will be taken such as securing clearances and transferring funds to utility providers, to avoid disruptions for the local community and prevent upgradation delays. Furthermore, contractor will manage other alternative sources (including groundwater or surplus water from the water supply system) or manage separate taps for the camps and workers so that no water deficit will be happen in the project area.

g. Issues on infrastructures such as irrigation channels, water supply pipelines, transmission lines, telephone lines, internet and cable lines etc.

During construction phase problems for existing infrastructure such as irrigation channels, water supply pipelines, transmission lines, and telephone lines may arise. The construction process may involve relocating or modifying these critical systems, which can lead to temporary disruptions in their service. For instance, irrigation channels might be damaged or require rerouting, affecting agricultural activities. Transmission lines and telephone lines may need to be moved or repaired, leading to interruptions in electricity and communication services.

Contractors will restore irrigation canals (near Kharendrapur and other locations) and water pipelines (exists along both sides of the major settlements including Imiliya, Dumara, Kharendrapur, Chandrauta), with project funds in coordination with stakeholders and user groups for relocation of water supply pipelines as well as electric poles. Coordinate with local government to relocate or rebuild the public toilet especially at Chandrauta chowk. Relocation as well as reinstallation of the tube well will be done prior to construction work and assure no disturbance on the water use right of the local community. The relocation of these structures will be treated as emergency work to ensure their repositioning before any disruption to the existing system. It will be classified as an emergency service and implemented accordingly.

h. Risk of Gender-Based Violence (GBV)

The influx of external laborers during the construction phase may affect local communities, particularly increasing the risk of human trafficking and gender-based violence. Women workers may face threats of sexual exploitation and abuse (SEA) and sexual harassment (SH). There is also a risk of wage discrimination, where female workers may receive lower wages than their male counterparts for the same work.



To address these concerns, awareness programs will be conducted to educate women and children about SEA and SH. The project will encourage the reporting of any SEA and SH incidents related to project activities. Additionally, roles and responsibilities of all individuals involved in the project will be clearly communicated. Equal pay for equal work will be ensured for both male and female workers.

i. Issues Related to Community Resources and their Use

Due to construction activities and the presence of workers, there is a likelihood of increased demand for essential resources such as drinking water and electricity. This may impact community facilities like playgrounds, public spaces, and grazing areas-particularly to the east of the Belwagurdawa River.

Reconstruction of structures affected by the project will be carried out in coordination with the local community, grievance redress committee, and relevant stakeholders. Residents will be informed in advance before relocating any structures. A designated area will be allocated in one corner of the playground to ensure local residents are not deprived of its use. To avoid inconvenience to the community and to ensure timely completion of construction activities, all necessary permits will be obtained and funds will be transferred to the respective utility service providers.

ii. Operation Phase

a. Issues related with creation of dead traps on quarry/borrow area

Road upgrading often involves the excavation of materials from quarry or borrow areas, which can lead to the creation of "dead traps" or dangerous pits if not properly managed. These open pits pose safety risks for both humans and wildlife, as they can fill with water, becoming drowning hazards, or collapse, causing accidents. Without proper rehabilitation or filling of these areas after construction, they may remain as permanent hazards, adversely impacting the landscape and community safety.

Proper care will be taken at all sites where sand, gravel, or other materials are extracted to ensure safety and prevent the creation of hazardous conditions. Quarry and borrow areas will be carefully managed, and once extraction is complete, sites will be properly filled and rehabilitated to eliminate any risks. No excavation works will be continued during monsoon period that minimize the possible risk to the community as well as to the environment. Clear sign board will be placed to warn workers and the community of potential dangers in or near these areas.

b. Impact associated with road utility behaviour

People have been using essential facilities such as shops, schools, cultural sites, and clinics located on both sides of the road, relying on proximity and walking access. However, the local population often lacks adequate knowledge of traffic rules related to road crossing and cycling. In addition, there is limited community awareness about the risks associated with higher vehicle speeds on the



upgraded highway. This situation significantly increases the risk of road accidents, leading to physical injuries, fatalities, and long-term dependency within the community.

Community-level awareness campaigns will be launched to educate residents on safe road crossing practices, cycling rules, and the risks associated with high-speed traffic. These campaigns will include training/orientation/awareness sessions in schools and public areas in Imiliya, Dumara, Barkalpur, Champapur, Kharendrapur, Chandrauta, Balapur and Shivpur areas. The awareness will cover distribution of illustrated materials for different age groups and literacy levels and demonstration of road crossing methods; hazards associated with upgraded highway as well as safe use of road etc. Similarly, clear signage indicating speed limits, school zones, and pedestrian crossings will be installed at mentioned locations. Furthermore, street lighting in urban and semiurban areas has provisioned to increase visibility at night. Local schools, health posts, community groups, and traffic police will be actively engaged in ongoing safety education and enforcement programs.

c. Risk associated with use of religious, cultural, and historical sites

Mobility of the prayers to the Supadeurali mandir and Masjid/Madarasa at Chandrauta chowk which are located north of the highway could face accident while crossing the road. Mobility in Supadeurali temple being located at hairpin bend could be more sensitive for the road accident.

For reducing the potential accident in the Supadeurali caution board as well as zebra cross will be provisioned. Similarly, there will be PUP for the access to the Modarasa at Chandrauta chowk.

B. Physical and Chemical Environment

Construction Phase

a. Impacts associated with operation of project components e.g. Crusher plant, batching plant, workshop, asphalt concrete plant etc.

The operation of a crusher plant releases dust particles, produces persistent loud noise and leakage of lubricants can cause air pollution, noise pollution and soil pollution locally. If the crusher plant is established near the water sources, it can cause water pollution too. Lack of PPE use and safety precautions for the plant operation can lead to health hazard or accidents of labors.

The crusher plant will be operated during daytime hours to minimize noise disturbance to surrounding areas. To minimize the dust scheduling will be done in the for-crusher operation and avoid the windy time (if it affects the community is affected). To control dust emissions, materials will be fully covered while transporting. Waste management on-site will be handled by segregating waste into separate bins for degradable and non-degradable materials, ensuring proper disposal. Air quality, noise levels, and vibration will be periodically monitored to ensure they remain within acceptable limits. Additionally, workers will be provided with the necessary personal protective equipment (PPE), including helmets, gloves, masks, and ear protection, to safeguard their health and safety during operations.



b. Construction of bridges/drainage structures

The proposed road upgrading project includes the construction of bridges (2 major bridges, 6 minor bridges, 1 Vehicular Underpass (VUP), 2 Pedestrian Underpasses (PUPs) and 1 Foot Overbridge FOB) and culverts (69 box culverts and 7 pipe culverts), along with side drains, retaining structures, and other protective works. Alteration of natural drainage patterns may change surface runoff flow, potentially causing temporary inundation and flooding during the monsoon season. River diversion will be required for constructing bridge pier foundations, which may increase sedimentation and alter river morphology. Furthermore, direct disposal of construction materials into water bodies could adversely affect aquatic life by increasing sedimentation.

To mitigate these impacts, temporary measures such as the installation of hume pipes will be used to preserve existing natural drainage systems. Excavated excess spoil will be stored at designated sites. Construction activities near or within rivers, streams, or ponds will be strictly avoided during the monsoon season. All existing pipe culverts will be replaced by box culverts to reduce flooding risks and maintain natural water flow. Proper barricading will be implemented along the Bel River and Jwai Khola, as these are key wildlife corridors. Access to the cremation site at Belnadi will be maintained, ensuring no disturbance from the deposition of construction materials in the area.

c. Impacts associated with construction camps establishment and operation

The establishment of workforce camp sites and stockpiling areas can significantly impact local communities. Increased traffic from construction vehicles transporting materials to and from these sites can lead to higher congestion and safety concerns on local roads. The operation of heavy machinery and construction activities will likely generate considerable noise and dust, impacting residents' quality of life and health. Moreover, the influx of construction workers may place additional strain on local resources such as water and sanitation, potentially affecting their availability and quality for residents. The construction materials if not properly stored or stockpiled will lead to dust pollution, siltation and pollution of surface water. This in turn will disturb adjoining community, private property.

To mitigate these impacts, the contractor will prepare a detailed, site-specific Camp Management Plan aligned with the Environmental Management Plan (EMP) of this report. Proposed camp sites must be approved by the supervision consultant. Camps will provide essential facilities, including fire precautions, lavatories, showers, potable water supply, clean eating areas, adequate lighting, safe access, ventilation, and safe fuel storage (LPG/kerosene). Appropriate facilities for women and first aid services will be made available. Construction materials will be stored carefully to prevent dust emissions and ensure safety.

d. Impacts on air quality, construction noise and vibration

Air Pollution: During construction, activities like excavation, quarry operations, and the operation of crusher and asphalt plants can contribute to air pollution along the proposed road alignment.



These activities primarily produce dust particles and smoke, which can significantly degrade air quality. The major sources of energy required is diesel, petrol and kerosene. Burning of such fuels would result in environmental pollution due to emission of Sulphur oxides (SO_x), Nitrogen oxides (NO_x), Carbon dioxide (CO₂). Furthermore, vehicular movement and machinery operation emits smoke and fine particles. Air pollution will cause inconvenience to local people residing close to the construction sites.

Noise Pollution: During the construction phase, noise levels will rise significantly due to increased vehicular traffic, machinery operation, crushing plants, and material transportation. Constant exposure to high noise levels can adversely affect wildlife, the health of workers, and nearby communities. Noise emissions from construction machinery and quarrying operations may disturb local residents and workers.

Vibration: During construction, large machinery and equipment, such as construction vehicles, generators, compressors, and pumps, will be utilized. These machines generate vibrations that will be felt by nearby settlements. While the vibrations may cause temporary disturbances, they are localized and unlikely to cause structural damage to buildings or walls adjacent to the road.

To address impacts on air quality, construction noise and vibration, the project will ensure that stone crushing equipment and cement batching plants are fitted with dust control devices and operated according to the manufacturer's specifications. Similarly, to minimize dust from the area of cross drain as well as side of the upgrading area water browsing will be done at least thrice a day except at monsoon season specially at settlement areas. The plant site has been carefully selected to be away from population centers, drinking water sources, cultivated lands, and water bodies to reduce environmental and social risks. Additionally, operations will be limited to daytime hours to minimize noise and vibration disturbances. After the completion of operations, the site will be restored to its original condition to prevent long-term environmental impacts.

e. Risk associated with road safety

Road upgrading can increase safety risks if not properly managed, especially during construction. The use of heavy machinery and construction equipment on busy roads raises the chances of accidents, while not having enough safety barriers can put workers and the public in danger.

To mitigate and avoid safety risks project will prioritize comprehensive safety measures. The project will install robust safety barriers and reflective markings to separate work zones from traffic. Regular orientation including entry, refresher as well as tool box talk for workers on safety protocols will be assured. Safety priority working environment including the proper use of personal protective equipment (PPE) will be made mandatory. Furthermore, the project will ensure the use of well-maintained machinery and deploy flaggers or spotters in high-risk areas to manage traffic flow and prevent accidents effectively. In the similar manner community members as well as students on the schools along the highway will be aware.



f. Impacts due to quarry/borrow site operation

The extraction and transportation of materials often lead to increased dust and noise, which can disrupt residents' daily lives and impact their health. Additionally, heavy trucks used for transporting materials may cause traffic congestion and safety hazards on local roads. Environmental changes from quarrying can alter landscapes and potentially affect nearby homes and natural habitats.

Water will be sprayed regularly to minimize dust, and materials will be transported covering it to prevent dust and reduce airborne particles. All site operations will be limited to daytime to further mitigate noise and disruption. Workers will be provided with personal protective equipment, including masks, helmets, gloves, and boots, to ensure their safety and well-being. Apart from the mentioned mitigations site specific plan will be prepared by the contractor for each Quarry/ Borrow pit operation including its reinstatement mechanism.

g. Loss of productive soil

During construction activities such as excavation and site clearance result in the loss of topsoil. Converting forested and agricultural land within the right-of-way (RoW) for road expansion and soil borrowing for embankment construction will contribute to the loss of productive topsoil. It is estimated to loss 60.3 ton of topsoil from the road upgradation works.

Top soil from will be collected at particular location and will be used for filling in the embankment and median as top dressing. Construction materials will be placed at designated areas, further topsoil from the project facilities will be used for the reinstatement of the area. Additionally, fair compensation will be provided to landowners for the temporary use of their land during the project.

h. Impacts on surface and groundwater contamination

Widening a road can degrade water quality through leakage from stored construction materials and improper management of camp waste. These leaks can contaminate both surface and groundwater. Increased runoff from expanded paved areas can also carry pollutants into nearby water bodies.

Excavated spoils and wastes will be strictly prohibited from being disposed of in streams or water bodies. Silt fencing and brush barriers will be installed to collect sediments before they are released into water bodies, preventing contamination. All construction waste will be collected, stored, and transported to designated and approved disposal sites to ensure proper waste management and minimize environmental impacts. Assures that no chemical leakage will be done near the water bodies. No vehicular cleaning works will be done in the river. Workers will not be allowed to wash cloths release contaminants to the water bodies especially in Belwagurdawa and Belnadi.



i. Impacts of occupational safety and health

Workers on road widening projects face physical hazards from heavy equipment, working at heights, electrical equipment, and other risks like trips, falls, and exposure to dust, noise, and vibrations. Health issues can arise from poor sanitation and living conditions at temporary accommodation sites, including inadequate food, personal safety, and hygiene. Without proper personal protective equipment (PPE), workers are at risk of accidents, respiratory problems, eye irritation, and diseases from unsafe water and unhygienic conditions, while mental stress may increase due to local harassment and unfavorable work environments.

Workers will be oriented and trained about the occupational hazards in the workplace. Periodic TBT, refresher training as well as supply of adequate preventive measures like use of PPE will be made compulsory. Insurance for each laborer will be done. Provide regular health check up and HIV test of the workers and provide insurance.

j. Community Health and safety

Road upgradation work can adversely affect community health and safety by generating air and noise pollution, increasing the risk of respiratory problems and stress. Additionally, it can lead to traffic hazards, accidents, and disruptions in access to essential services like healthcare. Improper waste management during construction may also contaminate water sources, posing further health risks to local residents.

To mitigate community health and safety risks from road upgradation, regular water spraying and covering of construction materials will be done to reduce dust emissions, provision of noise barriers and restricted working hours will help to control noise pollution specially at the project facilities. Traffic management plans, clear signage, and safety personnel can minimize accident risks and ensure smooth access to essential services. Designating safe pedestrian routes and emergency access paths is crucial. Proper disposal of construction waste and strict control of fuel and chemical handling will be done to prevent water contamination. No disposal of spoil and construction waste will be assured through disposal into designated area and regular monitoring. Community awareness programs will be conducted and local level of grievance redressal committee will be actively engaged to address concerns promptly and ensure safety compliance throughout the construction period.

k. Issues of compaction and turfing during embank stabilization

Widening a two-lane road to a four-lane road can cause issues with embankment stabilization due to soil disturbance and uneven compaction, leading to potential weak spots and instability. Turfing challenges arise as establishing vegetation on slopes can be difficult if the soil is not properly compacted, and erosion can occur before turf is fully established.



To ensure proper stabilization embankments will be constructed in well-compacted layers using appropriate equipment. Turfing will be carried out immediately after embankment formation to prevent surface erosion and dust generation. Pre-grown turf mats or hydroseeding techniques will be applied for faster and uniform vegetation cover. Where necessary, mulching or biodegradable cover materials will be used to protect the turf until it is fully established. The project will ensure regular monitoring and timely maintenance of turf and embankment surfaces.

l. Drainage, soil erosion and sedimentation problem in the river & nearby settlement

Widening a road can alter drainage patterns, leading to increased runoff and potential flooding in nearby areas. The construction process may cause soil erosion, as disturbed soil and removed vegetation make the area more vulnerable to erosion. This eroded soil can lead to sedimentation in nearby rivers, degrading water quality and harming aquatic habitats.

To minimize these impacts, the existing natural drainage system will be preserved using temporary measures such as hume pipes. Bridge and cross-drainage construction over rivers and streams will be avoided during the peak monsoon season to prevent disruption. All existing pipe culverts will be replaced with larger box culverts to reduce flooding, waterlogging, and to maintain natural water flow. Silt deposits will be regularly removed from watercourses. The size of each cross-drainage structure has been increased by at least 10% to better cope with climate change impacts. For erosion control at Chandrauta, the Kanchhaniya culvert size has been increased. Additionally, all slab culverts narrower than 1 meter or measuring $1 \times 1 \text{ m}^2$ have been upgraded to $1.5 \times 1.5 \text{ m}^2$, and those between 1 and 1.5 meters have been increased to $2 \times 2 \text{ m}^2$. Four pipe culverts of 0.9 m diameter have been replaced with box culverts measuring $1.5 \times 1.5 \text{ m}^2$.

m. Impacts associated with hazardous, non-hazardous and liquid waste

During the construction phase, non-hazardous waste will be generated mainly from the camps and offices which include food waste, paper and plastic, etc. It is estimated that about 96.16 kg of biodegradable and 64.1 kg of non degradable waste from the construction camps shall be managed properly. Most of the waste will be food waste. Open dumping of such waste can lead to groundwater contamination by the generating leachate. In addition, surface water may be contaminated by the runoff from the waste dump especially in the rainy seasons.

A paved storage area with a containment chamber will be constructed to effectively collect and recover any oil spills, preventing contamination of the surrounding environment. Additionally, oil and grease spills, as well as oil-soaked materials, will be collected and stored in clearly labeled containers to ensure proper disposal and minimize any environmental impact. PPE, emergency services, ventilation, and other sanitary facilities must be provided for workers. Solid wastes like kitchen (organic) waste, paper and plastics (recyclable), and garbage (non-recyclable) must be segregated at the source with different bins. It will be managed to send to municipal waste disposal system or manage separately by the contractor. Biodegradable waste will be disposed off making pit (at least 100 m far from the surface water bodies and not too close to the settlement.



n. Impacts associated with spoil from construction work as well as demolition waste

Excavation works for road widening, bridge and drainage structures and removal of road material from the damaged sections of existing roads will generate cut material. Most of the cut material can be used as fill material for embankment as backfilling for retaining structures and road material can be used as the base or sub base.

Disposal of spoils is not anticipated due to potential reuse of all cut material. Demolition materials, such as concrete, bricks, metals, and wood, will be segregated at the source to facilitate recycling and proper disposal. Scarified top layer of the existing pavement will be reused in the project and reject materials will be provided to the local government for making pavement of the earthen roads along the project affected area.

o. Impacts associated with land use change

The road width is designed as 50m in urban areas, and 24m in rural and forest areas. The ownership of RoW's land has already been transferred to MoPIT/GoN. However, the 50 m RoW (25m on both sides from centre line) of road is almost clear and the existing formation width of the road is 12 to 18 m. Total of 66.76 ha of remaining RoW of the road excluding the existing road. Out of the land in RoW, the road extension will make changes on 24% of agriculture land, 40.6% of forest, 22.7% barren, 11.8% settlement area and 1.4% areas covered by water.

As much possible the forest area will be regenerated into forest through road side plantation. Top soil will be saved into particular area along the road. It will be used for regeneration of grasses along the embankment and also support to establish the turf mat as well as trees in the median. Similarly, open land area will be planted along the highway to maintain greenery.

p. Increased carbon emission due to use of excessive fuel in construction works

Widening of the road led to increased carbon emissions due to the higher fuel consumption of construction machinery and equipment at its construction phase. The expanded use of vehicles, generators, and heavy equipment during the construction process significantly boosts fuel usage. This, in turn, contributes to higher levels of carbon dioxide and other greenhouse gases, impacting air quality and contributing to increased greenhouse gases.

To minimize the fuel consumption and increase efficiency of work the vehicles will be periodically maintained, new equipment with improved technology will be prioritized while purchasing. Furthermore, periodic testing of air quality and vehicular emission testing will be done using handy devices to explore the level of emission and perform maintenance of the project vehicles.

Operation Phase

a. Impacts to air, noise and, water pollution

The upgraded road surface is anticipated to reduce dust and noise pollution from traffic on the asphalt-paved road. However, the rise in vehicle numbers and increased commercial and industrial



activities along the highway will likely lead to higher levels of air and noise pollution. Improved road conditions may attract more people to the area, increasing demand for local services and resources. This influx of new residents can further impact water sources due to higher consumption and potential additional pollution.

Regular maintenance, including pothole repairs, will be carried out to maintain road quality and minimize dust emission due to road degradation. To assure it contract has been designed as PBM system where contractor guaranty perfect performance of the road 5 years from the completion of construction works. Road side plantation will be done and monitoring of the survival will be done to develop trees as noise and dust barrier to the community.

b. Blockage of Cross Drainage cause Inundation/ Impact on drainage system

Road upgradation can block or disrupt cross drainage systems, leading to water flow obstruction and causing inundation or flooding in surrounding areas. Improper design or failure to install adequate drainage structures can exacerbate these issues, especially during heavy rainfall. This can lead to waterlogging, soil erosion, and long-term damage to both infrastructure and nearby ecosystems.

All pipe culverts will be replaced by box culvert to minimize flooding, inundation, and maintain natural flow. Silt deposition will be removed from water course. Regular monitoring of the road condition and maintenance will be necessary especially before and after rainy season. DoR has established a system of employing road maintenance staff that is responsible for routine and recurrent maintenance of roads like cleaning of cross drainage, drains and additional slope protection structures will be constructed.

c. Impacts associated with barrier effect and aesthetics

Construction of the VUP will compel to raise the road structure at least 5m from the existing ground level. It will also cover a long span to elevate the road. Due to this elevated structure, there will be visual obstruction and also make a barrier to reach another edge of the road. It can obstruct the existing natural beauty of the Chandrauta Chowk creating an unsightly appearance, disrupting the natural environmental condition.

Efforts will be made to ensure the restored areas harmonize with the surrounding environment, minimizing long-term visual and functional impacts. Furthermore, vertical gardening will be done in the VUP to increase the beauty of the structure. Furthermore, roadside plantation will be done with the trees having good canopy and flowers in local consultations with forest and local government.

d. Adverse effects caused by headlight glare from high-speed vehicles

After project completion, the glare effect from high-speed vehicles on the improved road can lead to visibility issues, increasing the risk of road accidents. The enhanced road surface may result in



higher traffic speeds, amplifying the glare and making it harder for drivers to see, which can lead to more frequent and severe accidents.

To minimize the glare effect from the vehicle's dense plantation of bushes as well as decorative shrubs will be prioritized to plant into the median. Similarly, greenery will be increased along the road so that the glare effect can be minimized.

C. Biological Environment

i. Construction Phase

a. Loss of forest (forest type and available plant species)

Proposed width of the 4-lane highway to be widened to is 24 m in the forest area. All the activities will be carried within the Right of Way, which falls into the jurisdiction of the DoR. During widening of the road, 9808 trees within RoW will be cleared.

The loss of trees from RoW will be compensated as per rules of Government of Nepal. Compensatory tree plantation will be done carried out in 1:10 ratio of cleared trees (98,080 number) with take care for 5 years and for that cost will be deposited in the forest development fund under Department of Forest and Soil Conservation. Furthermore, the construction contractor will arrange for cooking with LPG gas or electricity for cooking. No temporary structures will be built in the forest area, and workers will be made aware of the need to protect wildlife and vegetation.

b. Obstruction on mobility and potential risk of accident/fatality of wildlife due to construction ignorance

Construction activities can increase the risk of roadkill. Road expansion disrupts wildlife habitats and increases vehicle traffic, leading to more frequent animal crossings. The loss of forest cover and habitat fragmentation compel animals to navigate unfamiliar or altered areas, raising the likelihood of collisions with vehicles. Furthermore, the higher speed and volume of vehicles on expanded roads amplify the risk of wildlife accidents. Construction sites can be a dead trap to the wildlife if the excavated trenches, pits left open similarly leaving electric cables open or other construction related hazards can lead to accidents and also fatal cases to wildlife. On the other hand, clearing trees within the RoW in forested areas degrades wildlife habitats and disturbed them. Clearing trees during the nesting season of birds may disturb the bird's breeding activity in and around the areas. Increased people's mobility and noise during construction might disturb the bird species and affect their behaviors. Beyond forests, many species depend on streams, culverts, trees, climbers, and other natural pathways for movement. The removal of these features during construction can severely disrupt wildlife movement and connectivity.

Modified wildlife crossing facilities especially underpass (culverts) will be constructed in the wildlife movement corridor of forest area for the ease of wildlife movement. There are dedicated wildlife crossing and wildlife friendly structures are proposed at Ch 648+561 (Bel Nadi) and Ch.



649+257 (Jwai khola) for big wildlife species, minor bridge (Dry Nala) at Ch. 648+157 for medium wildlife and Box Culverts at Ch. 645+789, Ch 646+233 and Ch 647+791 for small wildlife including herpeto fauna. The wildlife crossing size standard will be followed as per the wildlife-friendly guidelines endorsed by Government of Nepal in 2022. Arboreal canopy bridge is proposed Ch. 648+900 for Terai Gray Langur, Rhesus Monkey and other arboreal wildlife. Warning signs, speed limits, and wildlife crossing boards will be placed at crossing areas from Barkalpur to Jwaikhola. The existing pipe culverts will be replaced with box culverts of greater length and width will help for the small wildlife movement. No worker camps or other structures will be constructed in the forest area.

c. Possible impact on aquatic ecosystem

Bridge construction and the extraction of sand and gravel from rivers may hinder the free movement of aquatic species. The physical presence of construction activities and equipment can obstruct or alter the natural flow of water, disrupting migration and movement patterns. Additionally, spoil disposal and accidental spills of materials, chemicals, and oils can degrade the quality of stream and river water, adversely affecting aquatic species. Such contamination can harm their health, disrupt habitats, and potentially lead to declines in populations and biodiversity. Furthermore, there is a risk of destructive fishing practices by construction workers, further exacerbating the impact on aquatic ecosystems.

To avoid any impact on the river system during excavation, irrigation systems will be arranged. Sand and gravel will only be excavated from approved locations, and all affected areas will be promptly restored. During bridge construction, hump pipes will be installed to maintain water flow. Construction workers will be prohibited from fishing. All chemicals, bitumen, and fuels will be stored in impervious areas to prevent contamination of water sources. No construction work will be carried out near rivers or streams during the monsoon season. To protect aquatic life, destructive fishing by construction workers will be strictly prohibited. Campsites and worksites will include wastewater treatment facilities such as septic tanks, soak pits, and sedimentation tanks to ensure treated water is released into the environment.

d. Impact on Avifauna

The construction phase is likely to impact avifauna in several ways. The removal of trees, including mature roadside trees, will result in a loss of habitat, foraging grounds, and roosting sites for birds. Additionally, increased human activity and noise during construction may disturb bird species, potentially alter their behavior and disrupt their natural patterns.

Efforts will be made to remove trees with minimal canopy and older trees as much as possible. Tree species that have seed or fruit-bearing capabilities and plants with open or light canopy, such as the Silk Tree, will be planted along the roadside. To increase bird habitats, it will be recommended to plant trees outside the forest area, especially in semi-urban and rural areas, immediately after



construction activities are completed. Speed limit warning signs and display boards will be placed in forest areas.

e. Risk of increasing forest fire

The accumulation of cut trees, branches, and leaves poses a significant fire risk, especially during the dry season, if proper precautions are not taken. These piled materials can easily ignite and spread if left unattended. The risk of fire increases if construction workers have smoking habits. Additionally, occasional camp firing and picnic activities may also increase the chance of forest fire.

Workers will be made aware of the risks associated with forest fires through training and safety briefings. Smoking passing into the forest will be strictly prohibited instead an isolated safe area towards the road will be provisioned as a smoking zone. Workers will be made aware about the possibilities of forest fire as well as consequences and also importance of smoking in special zone. Additionally, the use of forest wood for meeting fuel needs will be banned to protect the natural resources and minimize fire hazards. To further reduce the risk, contractors will provide alternative fuels such as kerosene or LPG for cooking, eliminating the need to use forest wood. Kerosene will also be used for safely heating bitumen, ensuring that the process is controlled and does not contribute to fire risk.

f. Illegal Trade and Poaching of Wildlife

The presence of construction workers may lead to an increased risk of hunting and poaching of wildlife, including species such as deer and wild boar. Some workers might intentionally hunt birds and other animals or seize opportunities to do so. This potential for poaching and trapping during the construction phase could have adverse effects on local wildlife populations, further threatening their survival.

A code of conduct will be prepared for workers and employees to ensure the protection of fauna, including a ban on hunting. The project proponent will monitor the activities of the construction workers, and the contractor will be held responsible if any workers are found involved in trapping or harassing wild animals and birds. Additionally, no construction activities will be permitted during nighttime to minimize disturbance to the surrounding wildlife.

Operation Phase

a. Disturbance to wildlife due to light and noise during vehicular movement and barrier effect.

Increased light and noise from vehicular activity can disrupt natural behaviors such as feeding and breeding, making it challenging for animals to thrive in their habitats. Road expansion also introduces a barrier effect, obstructing wildlife movement and migration, which leads to habitat



fragmentation and limits access to essential resources. These disturbances can have profound effects on the health and survival of local wildlife populations. Even Though the impact is seen during the operation phase shall be addressed the issues from the design phase of the project. Hence, needs to manage wildlife friendly crossings specially in respective places.

In accordance with the guidelines for wildlife-friendly infrastructure issued by the Government of Nepal, modified wildlife crossing facilities, especially underpasses, will be built in forest blocks for wildlife movement. Regular visual inspections of wildlife will be conducted by the ecologists involved in the project. Additionally, regular inspection and maintenance of water sources and pond fencing in forest areas will be carried out. Efforts will be made to improve movement corridors and maintain a proper light index in underpasses to facilitate wildlife passage. Wildlife crossing information and display boards will be installed at 1 km intervals.

b. Depletion of forest resources

During the operation phase, the loss of trees within the Right-of-Way (RoW) may lead to several adverse environmental and social impacts. The removal of vegetation compromises critical ecosystem services such as water regulation, soil stabilization, and carbon sequestration. This may result in increased soil erosion, sedimentation in nearby water bodies, and a rise in greenhouse gas emissions, thereby contributing to climate change. Furthermore, the reduction in forest cover can negatively affect local communities, particularly those reliant on forest resources for livelihoods, subsistence needs, and cultural practices.

To minimize these impacts, several mitigation measures will be implemented:

- Only pre-marked trees will be felled, and minimum necessary road width will be maintained to reduce forest clearance.
- A compensatory tree plantation program will be executed as per rules of Government of Nepal
- To avoid pressure on community forest resources, particularly fuelwood, the contractor will supply LPG gas for cooking at workers' camps if potential conflict with Community Forest User Groups (CFUGs) is anticipated.
- No temporary structures will be constructed within forest areas.
- Awareness programs will be conducted to sensitize construction workers and local residents on the importance of forest conservation and to discourage unnecessary deforestation.

c. Disturbance to the roadside vegetation

Road widening can significantly impact roadside vegetation, primarily due to the clearing of trees and plants required for expansion. This not only leads to a reduction in air quality-as dust and pollutants from construction activities and increased vehicle emissions are no longer filtered by vegetation-but also disrupts the natural water absorption and retention capacity of the soil.



Consequently, this may result in reduced water availability for the remaining flora, increasing stress on roadside ecosystems.

To mitigate these impacts, the project will implement a compensatory tree plantation program, along with roadside greening measures. This includes the replacement of dead plants, regular maintenance, and fencing of plantation areas. Special attention will be given to watering during dry seasons, particularly in the first year, to ensure plant survival and growth.

7.0 Environmental Management Plan and Environmental Monitoring Plan

An Environmental Management Plan (EMP) has been developed, outlining the required mitigation measures, along with their timing, specific locations, estimated costs, and the responsible agencies for both implementation and supervision. In parallel, an Environmental Monitoring Plan has been prepared to guide key monitoring activities and ensure the effective execution of the EMP. Based on the approved EMP, the Contractor will prepare site-specific environmental plans for various components such as construction camps, plant operations (crusher, batching, asphalt), quarry and borrow areas, traffic and waste management, emergency response, and grievance redress mechanisms. These site-specific plans will be submitted to the Construction Supervision Consultant (CSC) for review and approval prior to implementation.

A total budget of NPR. 148,334,192 has been allocated for the implementation of mitigation and enhancement measures, while an additional NPR. 6,700,000 has been earmarked for environmental monitoring activities to ensure compliance with the EMP.

8.0 Institutional Arrangement

The Development Cooperation and Implementation Division (DCID) of the Department of Roads (DoR), under the Ministry of Physical Infrastructure and Transport (MoPIT), will serve as the implementing agency for the project road. DCID will be responsible for overseeing the overall implementation of environmental and social safeguard measures throughout the project. The DoR will be supported by a Construction Supervision Consultant (CSC) team, which will include dedicated environmental and social specialists to ensure effective monitoring and compliance with environmental safeguard requirements.

9.0 Conclusion

The Gorusinge-Chandrauta Road Upgrading Project, part of the ACCESS-Nepal (Phase 1) initiative, is located in Kapilvastu District, western Nepal. The project begins at the Belwagurdawa River Bridge (Chainage 640+000) and ends at Umari/Shivpur Chowk, traversing Buddhabhumi and Shivpur municipalities, and passing through settlements such as Gorusinge, Chandrauta, Imiliya, and Shivpur. The road alignment lies in relatively flat terrain and passes through both community and cooperative forests.

The project aims to enhance the capacity, quality, and safety of the East-West Highway, integrating



it into the Asian Highway network. While environmental impacts are expected to be minimal and localized, the scope of the project includes the felling of 9,808 trees, partial demolition of embankments, and the potential for pollution from construction activities.

All affected private and public structures, including utilities, will be compensated in accordance with existing legal provisions. To ensure sustainable implementation, an Environmental Management Plan (EMP) has been prepared, with a total budget of NPR 148.33 million, outlining mitigation and enhancement measures. The report concludes that an Initial Environmental Examination (IEE) is sufficient to address the environmental considerations of the project.



कार्यकारी सारांस

१. प्रस्तावक

प्रस्तावित गोरुसिङ्गे-चन्द्रौटा सडक खण्ड स्तरोन्नतिको प्रस्तावक विकास सहायता कार्यान्वयन महाशाखा सडक विभाग, भौतिक पूर्वाधार तथा यातायात मन्त्रालय रहेको छ।

२. प्रस्तावको विवरण

गोरुसिङ्गे-चन्द्रौटा स्तरोन्नति सडक आयोजना नेपालको पश्चिमी भागको कपिलवस्तु जिल्लामा अवस्थित छ। उक्त आयोजना पूर्वी दक्षिण एसियाको द्रुत गतिको यातायात र व्यापार सम्पर्कलाई तीव्र बनाउने उद्देश्यले (ACCESS) आयोजनाको पहिलो चरण अन्तर्गतको आयोजनाको एक खण्ड हो। यो बेलवागुर्दवा नदी पुल (CH. ६४०+०००) अर्थात् बुटवल-गोरुसिङ्गे खण्डको निरन्तरताबाट सुरु भएर चन्द्रौटा बजारबाट पश्चिमतर्फ उमरी/शिवपुर चोकमा (CH. ६५९+२००) पुगेर समाप्त हुनेछ।

क. प्रस्तावको उद्देश्य

प्रस्तावित गोरुसिङ्गे-चन्द्रौटा आयोजनाको मुख्य उद्देश्य ८ वटा पुल, ६४ वटा बक्स कल्भर्ट र ७ वटा पाईप कल्भर्ट सहित गोरुसिङ्गे-चन्द्रौटा १९.२ किलोमिटर सडक खण्डलाई २ लेनबाट राष्ट्रिय राजमार्गको मापदण्डमा सुधार गरी ४ लेनमा स्तरोन्नति गर्नु रहेको छ। यसका साथै नयाँ पुलहरूको निर्माण, जंक्शन सुधार, साइकल लेन र फुटपाथहरू, पैदल यात्रीका लागि क्रसिङ (ओभरहेड ब्रिज/अण्डरपास), वन्यजन्तु क्रसिङ डिजाइनहरू, शहरी क्षेत्रमा सडकको दुवै छेउमा सर्भिस रोड समावेश हुनेछ। त्यसैगरी अन्य कार्यहरूमा निकासी सुधार, संरचनाहरूको मर्मत, माटो संरक्षण तथा स्थिरीकरण, लगायत अन्य अफ-रोड कार्यहरू समावेश हुनेछन्।

ख. आयोजनाको सान्दर्भिकता

प्रस्तावित आयोजनाले प्रस्तावित खण्डमा पूर्व-पश्चिम राजमार्ग (EWH) को क्षमता, गुणस्तर र सडक सुरक्षा सुधारलाई समर्थन गर्नेछ। स्तरोन्नति संगै यस सडक पूर्व तर्फ बुटवल- गोरुसिङ्गे राजमार्ग खण्डसँग जोडिनेछ भने पश्चिम तर्फ प्रस्तावित मिलिनियम च्यालेन्ज अकाउन्ट नेपाल द्वारा प्रस्तावित चन्द्रौटा भालुवाङ सडक सँग जोडिनेछ। यसैले, यस आयोजनाले पूर्व-पश्चिम राजमार्ग का यी दुई खण्डहरू

बीचको यातायात कठिनता हटाउनुका साथै क्षमता, गुणस्तर र सुरक्षामा सुधार गरि अन्तरराष्ट्रिय व्यापार तथा व्यवसाय प्रवर्द्धनका लागि द्रुत राजमार्ग संजाल विस्तार गर्नेछ।

ग. प्रारम्भिक वातावरणीय परिक्षणको उद्देश्य र सान्दर्भिकता

आयोजना कार्यान्वयनका निमित्त प्रारम्भिक वातावरणीय परिक्षण आवश्यक हुन्छ जसले वातावरणमा सकारात्मक प्रभाव वृद्धि गर्न र नकारात्मक प्रभाव न्यून गर्न सहयोग पुऱ्याउँछ। वातावरण संरक्षण ऐन, २०७६ र वातावरण संरक्षण नियमावली, २०७७ को अनुसूची २ को नियम ३ को (घ) सडक क्षेत्रको बुँदा न. (८) अनुसार १० किलोमिटर भन्दा बढी ५० किलोमिटरसम्म लम्बाईको राष्ट्रिय राजमार्ग वा सहायक सडकको चौडाई वृद्धि हुने गरी स्तरवृद्धि, पुनर्स्थापना वा पुनर्निर्माण गर्दा प्रारम्भिक वातावरणीय परीक्षण अनिवार्य रहेको छ। प्रस्तावित सडक स्तरोन्नति आयोजना १९.२ किलोमिटर लामो रहेको छ। तसर्थ प्रस्तावित आयोजनाको लागि प्रारम्भिक वातावरणीय परिक्षण आवश्यक छ। यस आयोजनाको डिजाइन र कार्यान्वयनका लागि विश्व बैंकको आर्थिक सहयोग रहेको छ। तसर्थ, वातावरण संरक्षण नियमावली, २०७७ दफा २, नियम ७, उपनियम ८ बमोजिम प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन अङ्ग्रेजी भाषामा तयार गरिएको छ। सोही नियमको उपनियम ९ बमोजिम प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदनसँगै नेपाली भाषामा कार्यकारी सारांश सहितको संक्षिप्त सारांश प्रतिवेदन पनि तयार गरिएको छ।

ग. आयोजनाको विस्तृत विवरण

सडक आयोजना बुद्धभूमि र शिवराज नगरपालिका हुँदै दुई ठूला बस्तीहरू गोरुसिङ्गे र चन्द्रौटा हुँदै इमिलिया, चम्पापुर, खरेन्द्रपुर, खैरी चोक र शिवपुर आदि साना निर्माण खण्डहरू हुँदै जान्छ। सडक खण्ड पूर्णतया समतल भू-भागबाट (सामान्यतया १००-१५० मिटर) मा अवस्थित छ। यस सडक खण्डको केहि भागमा सामुदायिक वन तथा सहकारी वन रहेको छ। चन्द्रौटा र सहरी क्षेत्रमा अवस्थित सडकको चौडाई १५ मिटर रहेको छ। सडक खण्डमा रहेका सबै पुलहरू डबल लेन स्टाण्डर्डका रहेका छन् भने सडकको औसत उचाई करिब हालको सडक समान वा प्राकृतिक जमिनको स्तर भन्दा ०.५ देखि १ मिटर भन्दा माथिको हुनेछ तर खोला तथा खोल्सो रहेको स्थानमा ६ मि सम्मको उचाई रहनेछ। सडकको केन्द्र रेखाबाट दुवै तर्फ २५ मिटर (कुल ५० मिटर) सडक सिमा रहेको छ। त्यसैले आयोजनाका लागि थप जग्गा प्राप्ति गर्नुपर्दैन।



३. अध्ययन विधि

यो अध्ययनले विभिन्न विधिहरूको संयोजन प्रयोग गरेको थियो जसमा गुगल र टोपोग्राफिक नक्साहरूको समीक्षासहितको डेस्क अध्ययन, सन् २०२४ अगस्ट महिनामा गरिएको फिल्ड सर्वेक्षण, सरोकारवालासँगको अन्तरक्रिया (विशेषगरी स्थानीय सरकारका प्रतिनिधि जस्तै मेयर, वडाध्यक्ष, वन उपभोक्ता समूहहरू), ११ वटा परामर्श बैठकहरू, र प्रमुख व्यक्तिहरूसँगको अन्तर्वार्ता (डिभिजन वन कार्यालयका प्रतिनिधि, मन्दिरका पुजारी, व्यापारीहरू (जसमा कियोक्स पनि समावेश), स्वास्थ्य संस्थाका प्रतिनिधि, विद्यालयका प्रधानाध्यापक आदि) समावेश थिए।

अध्ययनका क्रममा सम्भावित प्रभावहरूको पहिचान गरिएको थियो र मूल्यांकन म्याट्रिक्सको प्रयोग गरी प्रभाव मूल्यांकन पनि विकास गरिएको थियो।

डेस्क अनुसन्धानमा सम्बन्धित साहित्यहरूको समीक्षा गरिएको थियो, जसमा नेपालका कानूनहरू (संविधान, नीतिहरू, ऐनहरू, नियमावलीहरू, मापदण्डहरू) तथा अन्तर्राष्ट्रिय सन्धिहरू आदि, सडक विभागको ESMF 20, पेशागत सुरक्षण निर्देशिका, एडीबी तथा विश्व बैंक का सुरक्षण नीतिहरू, आयोजनाको सम्भाव्यता अध्ययन प्रतिवेदनहरू, र यस्तै प्रकृतिका अन्य आयोजनाहरूका वातावरणीय मूल्यांकन प्रतिवेदनहरू समावेश थिए। त्यस्तै आयोजनाबाट प्रभावित परिवारहरूमा प्रभावली सर्वेक्षण पनि सञ्चालन गरिएको थियो, जसमा ५० वटा आयोजना प्रभावित परिवारहरू सहित कुल ३६२ घरपरिवार समावेश थिए।

त्यसैगरी, जानकारी प्रवाहका लागि बुद्धभूमी नगरपालिकाको कार्यालय तथा शिवराज न.पा को चन्द्रौटामा दुईवटा सार्वजनिक सुनुवाइ कार्यक्रमहरू आयोजना गरिएको थियो। सार्वजनिक सुनुवाइको सूचना डि.सि.आइ.डी. बाट जारी गरिएको एवं सूचना २०८१ साल पुष ११ गतेको आर्थिक अभियान राष्ट्रिय दैनिकमा प्रकाशित गरिएको थियो। त्यसैगरी, सार्वजनिक दस्तावेजहरू तयार पारिसकेपछि, अर्को सार्वजनिक सूचना २०८१ साल माघ २८ गते आर्थिक अभियान राष्ट्रिय दैनिकमा प्रकाशित गरिएको थियो।

भौतिक वातावरण: अध्ययन टोलीद्वारा चेकलिस्टहरू र प्रभावलीहरू प्रयोग गरेर प्रस्तावित आयोजना क्षेत्रमा डेटा सङ्कलन र मूल्यांकन गरेको थियो। स्थलगत अध्ययन गरि भौतिक वातावरणीय प्रभावहरू पहिचान र मूल्यांकन, खानेपानीको गुणस्तर र नदीको पानीको गुणस्तरका लागि पानीको नमूना परिक्षण



गरि विश्लेषण, र High Volume Sampler उपकरण प्रयोग गरेर ३ स्थानहरूबाट २४ घण्टाको वायुको गुणस्तर र ध्वनि मापन गरिएको थियो। स्थलगत भ्रमणका आधारमा पहिरो, स्लोप अस्थिरताको तथ्याङ्क संकलन गरि विश्लेषण, भूगर्भीय र भू-संरचना तथ्याङ्क विस्तृत सर्वेक्षणका आधारमा विश्लेषण गरिएको थियो।

जैविक वातावरण: आयोजना क्षेत्रको रुख बिरुवाहरूको कूल गणना गरि तथ्यांक विश्लेषण, जैविक विविधता र वन्यजन्तुका लागि स्थलगत सर्वेक्षण अवलोकन र विभिन्न सन्दर्भ सामाग्रीको समीक्षा गरि जानकारी सङ्कलन गरिएको थियो। वन सर्वेक्षणका लागि सडकको क्षेत्राधिकार (RoW) भन्दा बाहिर २०x२० वर्ग मिटरका १७ वटा क्वाड्रेट स्थापना गरी सडकसँग जोडिएको वनको अवस्थाको पहिचान गरिएको थियो। त्यसै गरी, सडक स्तरोन्नतिको क्रममा हटाउनुपर्ने रुखहरूको संख्या पत्ता लगाउन तथा त्यसको न्यूनीकरण उपाय प्रस्ताव गर्न कपिलवस्तु डिभिजन वन कार्यालय (बुद्धभूमी) अन्तर्गतका तीनवटा सब-डिभिजन वनका कार्यालयका प्राविधिकहरू परिचालन गरी लगत निर्धारण गरिएको थियो। वन्यजन्तुको जैविक विविधता अध्ययनको क्रममा सार्वजनिक परामर्श र वन्यजन्तुको उपस्थितिलाई ट्रोपिंग/प्यालेट, अवशेष(छाला, प्वाँख, हड्डी र मृत शरिर, गुँड आदिको पहिचान गरेर रेकर्ड गरिएको थियो। प्रमुख वन्यजन्तुको बासस्थान क्षेत्रहरू र तिनीहरूको गतिविधिहरू पहिचान गर्न, साथै आयोजनाबाट वन्यजन्तुमा पर्न सक्ने प्रभावहरू एवं वन्यजन्तुबाट आयोजनामा पर्न सक्ने प्रभावहरूको अध्ययन गर्न IBAT विश्लेषण गरिएको थियो।

वन नियमावली (२०७९) र वातावरण संरक्षण नियमावली (२०७७) अनुसार अध्ययन क्षेत्रका कुल रुखहरूको मात्रात्मक तथ्याङ्कको विश्लेषण गरिएको छ। जैविक विविधता र वन्यजन्तुको क्षेत्र सर्वेक्षणको लागि, साहित्य समीक्षा र सार्वजनिक परामर्श मार्फत थप जानकारी सङ्कलन गरिएको थियो। स्थलगत अध्ययनको क्रममा वन्यजन्तुहरूको अवशेष, छाला, प्वाँख, हड्डी र गुँड आदिको पहिचान गरेर वन्यजन्तुको उपस्थिति रेकर्ड गरिएको थियो।

सामाजिक-आर्थिक र सांस्कृतिक वातावरण: सामाजिक-आर्थिक र सांस्कृतिक वातावरणको लागि जनसांख्यिकीय तथ्यांक, बसोबासको अवस्था लगायत अन्य सामाजिक विशेषताहरू जस्तै प्रभावित घरधुरीको सामाजिक आर्थिक अवस्था, जातजातीहरू, खानेपानी तथा शौचालयको अवस्था, धार्मिक तथा संस्कृति क्षेत्रहरू, प्रभावित निजि तथा सामुदायिक संरचना र अन्य सार्वजनिक सेवा सम्बन्धि तथ्यांकहरू संकलन गरिएको थियो। स्तरोन्नतिका लागि संरचना भत्काउनु पर्ने क्षेत्रमा नम्बर सहित कलर मार्क

राखिएको थियो। मुआब्जा निर्धारण समिति मार्फत आयोजनाले गर्दा हुने क्षतिको मुल्यांकन एवं सो क्षतिपूर्तिका लागि मुआब्जा निर्धारण गरिनेछ। यसबाहेक अन्य क्षेत्रमा लैङ्गिक समानता र सामाजिक समावेशीकरणको स्थिति पहिचान गरिएको थियो।

४. विद्यमान वातावरणीय अवस्था

४.१ भौतिक वातावरण

गोरुसिंगे चन्द्रौटा सडक तराई क्षेत्रमा, समुद्री सतहभन्दा माथि १०० मिटर देखि १५० मिटरको उचाइमा पर्दछ। सडक खण्डको माटो प्रायः स्थिर छ भने आयोजना स्थल समतल क्षेत्रमा भएका कारण यस आयोजना स्थलमा कुनै स्लाइड र अस्थिर क्षेत्रहरू छैनन्। यस क्षेत्रको प्रमुख भू-उपयोगमा मानव बस्ती, कृषि योग्य जमिन, वन क्षेत्र र जलाधार/नदीनाला रहेको छ। सडकको सम्पूर्ण भूभाग DOR को RoW भित्र पर्दछ र त्यहीँ सडकको दुवै छेउमा भूमिको प्रयोग मिश्रित प्रकारको रहेको छ। आयोजनाको सडकसँगै सामुदायिक, साझेदारी वन, बिजुलीका पोल, सौर्य पोल, केबल, टेलिफोन र इन्टरनेट, खानेपानीको पाइप लाइन आदि जस्ता धेरै संख्यामा सार्वजनिक उपयोगिताहरू रहेका छन्। आयोजना क्षेत्रको ईमिलिया, चन्द्रौटा तथा बेल नदि नजिकको वायुको गुणस्तर सामान्य रहेको, त्यस्तै बेलवागर्दुवा, बेल, तथा जवाई खोलामा पानी प्रदूषित नरहेको एवं सो स्थानको माटो तथा ध्वनीको गुणस्तर समेत मापदण्ड भित्र रहेको पाईएको छ। प्रस्तावित सडक खण्ड इमिलियादेखि चन्द्रौटासम्म समतल भूभागमा अवस्थित छ जहाँ जमिनको अस्थिरता सम्बन्धि कुनै समस्या छैन। हावा, पानी तथा ध्वनी गुणस्तर मापन गरि रिपोर्टमा समावेश गरिएको छ।

४.२ जैविक वातावरण

यस आयोजना उष्ण हावापानी क्षेत्रमा अवस्थित छ। यो सडक कुनै पनि राष्ट्रिय निकुञ्ज, संरक्षण क्षेत्र, वन्यजन्तु आरक्षण, शिकार आरक्षण भएर जर्दैन। आयोजना क्षेत्रमा मुख्यतया सालका रुखहरू र खोला बगर क्षेत्रमा खयर-सिसौका रुखहरू र गैर काष्ठ वन पैदावार अन्तर्गत जामुन, बर्रो, हर्रो, साज, बोटघाएरो, टाटरी, आदि रहेको छ। थप प्रजातिमा *Terminalia alata*, *Lagerstroemia parviflora*, *Phyllanthus emblica*, *Pterocarpus marsupium* जस्ता प्रजातिहरू पाउन सकिन्छ। मूल प्रजातिहरू मुख्यतया प्राकृतिक वनहरूमा पाइन्छ जहाँ स्थानीय मानिसहरूले आफ्नो घरमा विभिन्न उद्देश्यका लागि प्रयोग गर्दौं आएका छन्। कुल २४ प्रजातिका वनस्पति र १४ प्रजातिका स्तनधारी एवं ६२ प्रजातिका चरा, ११ प्रजातिका उभयचर तथा सरीसृपहरू र ९ प्रजातिका माछाहरू अभिलेख गरिएको थियो। आयोजना क्षेत्रबाट अभिलेख गरिएका केही विधिव्यापी रूपमा संकटग्रस्त वन्यजन्तुहरूमा चितुवा



(*Panthera pardus*), डंगर गिद्ध (*Gyps benghalensis*), सानो खैरो गिद्ध (*Gyps tenuirostris*), सेतो गिद्ध (*Neophron percnopterus*), अजिगर (*Python bivittatus*) र पदनी कछुवा (*Lissemys punctata*) परेका छन्।

४.३ सामाजिक-आर्थिक र सांस्कृतिक वातावरण

राष्ट्रिय जनगणना २०७८ अनुसार बुद्धभूमि नगरपालिकाको कुल जनसंख्या ७६,५०७ रहेको छ, जसमा ४८.३% (३६,९५१) पुरुष र ५१.७% (३९,५५६) महिला छन्। बुद्धभूमि नगरपालिकाको वडा नं. ९ मा मात्र आयोजना निर्माण खण्डमा पर्दछ। यस वडाको कुल जनसंख्या ११,०४३ छ, जसमा ५,२२२ पुरुष र ५,८२१ महिला छन्। यस नगरपालिकाको लिङ्ग अनुपात ८९.८० रहेको छ। त्यसैगरी वडामा २ हजार ४ सय ४१ घरधुरी रहेका छन् भने औसत घरपरिवारको आकार ४.५२ रहेको छ। त्यसैगरी शिवराज नगरपालिकाको कुल जनसंख्या ८४,८१० रहेको छ जसमा ४८.७% (४१,३२८) पुरुष र ५१.३% (४३,४८२) महिला रहेका छन्। यस नगरपालिकामा १६ हजार २ सय ४१ घरधुरी रहेका छन् भने जनघनत्व प्रति वर्ग किलोमिटर २९९ जना रहेको छ। नगरपालिकाको साक्षरता दर ७२.७ % छ।

यस क्षेत्रका आयोजनामा प्रभावितहरू प्रायः व्यवसायिक गतिविधिमा निर्भर छन्। प्रस्तावित सडक छेउमा चारवटा ठूला वस्ती रहेका छन्। अधिकांश आधारभूत सुविधाहरू जस्तै स्वास्थ्य चौकी, अस्पताल, विद्यालय (प्राथमिक/माध्यमिक), बजार केन्द्र, पशु चिकित्सा केन्द्र, मातृ सुविधा, विद्युत कार्यालय, खानेपानी व्यवस्थाका साथै बैँकिङ सुविधाहरू आयोजना क्षेत्रमा उपलब्ध छन्।

सडकको छेउमा विभिन्न स्थानमा शिव मन्दिर, देवार, सुपादेउराली मन्दिर लगायत हिन्दू धार्मिक संरचनाहरू रहेका छन्। त्यस्तै, चन्द्रौटामा मस्जिद/मदरसा सडकको छेउमा अवस्थित छ। अधिकांश समुदाय पहाडी क्षेत्रबाट बसाई सरेका छन् र समुदाय जाति र जातिको हिसाबले विविधतायुक्त छ। आयोजना क्षेत्रमा ब्राह्मण/क्षेत्री मुस्लिम र मधेसीको बाहुल्यता रहेको छ।

५. विकल्पहरूको विश्लेषण

बैकल्पिक विश्लेषण अन्तर्गत डिजाइनको विकल्प र प्रविधि, कार्यान्वयन प्रक्रिया, समय तालिका र वन विनास कम गर्ने विकल्पहरू अध्ययन गरिएको छ। हाल यो सडक संचालनको अवस्थामा रहेको र स्तरोन्नतीका लागि प्रस्ताव गरिएकोले बैकल्पिक सडकको विकल्प विश्लेषण गरिएको छैन साथै अन्य विकल्पहरू जस्तै डिजाइन, बैकल्पिक प्रविधि, समय तालिका र संचालन प्रक्रिया, कम वन विकल्पहरू

विधिवत विश्लेषण गरिएको छ। ग्रेड, फुटपाथ सामाग्री, लेनको चौडाई र संख्या, नालाहरुको मर्मत सम्भार जस्ता डिजाइनहरु विश्लेषण गरिएको छ र यी संयोजनहरु वित्तीय, आर्थिक र प्राविधिक हिसाबले उपयुक्त रहेको छ। निर्माण कार्य खण्डगत रूपमा संचालन गरिने र आवश्यक रुखहरुको मात्र कटान गरिनेछ। यसका साथै यस आयोजनामा अपनाईएका विकल्पहरु वातावरणीय दृष्टिकोणले उपयुक्त रहेकोछन्। यस आयोजनाका लागि छनोट गरिएका विकल्पहरुलाई वातावरणीय दृष्टिकोणबाट उत्तम मानिन्छ।

६. वातावरणीय प्रभावहरु

६.१ सकारात्मक प्रभावतथा अभिवृद्धिका उपायहरु

यस सडक खण्डलाई चार लेन मापदण्डमा स्तरोन्नति गर्नु क्षेत्रीय विकासका लागि मात्र नभई यातायात सुविधामा सुधार र यात्रा समय घटाउने दृष्टिले समेत महत्वपूर्ण हुनेछ। यसका साथै, आयोजनासँग सम्बन्धित सहायक गतिविधिहरु जस्तै इमिलिया र चन्द्रौटामा सार्वभौमिक शौचालय निर्माण, स्थानीय बजार (हाटबजार) सुदृढीकरण, तथा स्थानीय समुदायलाई जीविकोपार्जनसम्बन्धी अतिरिक्त तालिम प्रदान गर्नु आदि कार्यहरुले आयोजनालाई स्थानीय स्तरमा अझ सहज र समन्वित बनाउन यस सडकले ठूलो सहयोग पुऱ्याउनेछ। आयोजनाका लाभदायी प्रभावहरु तिनिहरुको अभिवृद्धिका उपायहरु निम्नानुसार रहेको छ।

क. रोजगारीका अवसरहरुको सृजना

प्रस्तावित सडक स्तरोन्नति आयोजना, लगभग ४००,००० व्यक्ति अदक्ष र ५६,००० व्यक्ति दक्ष जनशक्तिको आवश्यक रहनेछ। यसले स्थानीय समुदायका लागि महत्त्वपूर्ण रोजगारी अवसर प्रदान गर्दछ। यस आयोजनाले विभिन्न रोजगारीका अवसरहरु सिर्जना गर्न सक्छ जसले गर्दा स्थानीय रोजगारी तथा आर्थिक वृद्धिलाई बढावा गर्न सक्छ। स्थानीय जनतालाई रोजगारीमा विशेष प्राथमिकता दिइनेछ। थप रूपमा, बढ्दो रोजगारीले स्थानीय आम्दानीको स्तर उच्च गराई सामुदायिक विकास र स्थानीय व्यवसायहरुको वृद्धिमा योगदान पुऱ्याउँछ।

ख. नयाँ आम्दानीका स्रोतको अवसर

यस आयोजनाले स्थानीय व्यवसायहरु जस्तै चिया पसलहरु, पान पसल, तरकारी, फलफुल तथा मासु पसलहरु, साना भोजनालयहरु संचालनमा उत्प्रेरित गर्न सक्छ, जसले बासिन्दाहरुलाई आफ्नो उद्यमहरु

विस्तार गर्न सक्षम बनाउँछ। तरकारी, दुग्ध र मासु जस्ता स्थानीय उत्पादनहरूको बढ्दो मागले स्थानीय अर्थतन्त्रलाई उल्लेखनीय रूपमा बढाउँदै नयाँ आय सृजना गर्नेछ।

ग. प्राविधिक सीपमा वृद्धि

यस सडक निर्माण आयोजनाले आयोजना प्रभावित समुदायका अर्धदक्ष र अदक्ष कामदारको संख्या परिचालन गर्नेछ। यी कामदारहरूले ग्याबिन बाल, तार बुनाई, संरचना र पुलहरूको लागि बार वाइन्डिङ, र बायो-इन्जिनियरिङ कार्य जस्ता क्षेत्रमा पूर्ण रूपमा दक्षता विकास गर्ने अवसर पाउनेछन्। यी सीपहरूले स्थानीयहरूका लागि दीर्घकालीन रोजगारीका अवसरहरू प्रदान गर्दै स्थानीय जनशक्तिको विकासमा पनि ठूलो योगदान पुर्याउँछ।

घ. सुधारिएको यातायात सुविधा/पूर्वाधार

सडक आयोजनाले पूर्वाधारमा सुधार, यात्राको समयावधिमा कमी ल्याउने र यातायातको लागत घटाएर यातायात सुविधा र अन्तर्राष्ट्रिय कनेक्टिभिटीमा उल्लेख्य वृद्धि गर्नेछ साथै व्यापार व्यवसायलाई सहज बनाउने, स्थानीय व्यवसायहरूलाई राष्ट्रिय र अन्तर्राष्ट्रिय बजारहरूमा अझ राम्रो पहुँच प्रदान गर्दै थप पर्यटकहरू आकर्षित गर्न आर्थिक वृद्धिलाई बढावा दिनेछ। सुधारिएको कनेक्टिभिटीले अन्तर्राष्ट्रिय स्तरमा राम्रो पहुँच प्रदान गर्नुका साथै सांस्कृतिक आदानप्रदानलाई समेत बढावा दिनेछ।

ङ. यात्रा, समय र लागतमा कमी हुने

२ लेनको सडकलाई ४ लेनको सडकमा स्तरोन्नति गर्नाले यात्राको समय र लागतमा उल्लेख्य कमी आउनेछ। बढेको क्षमताको साथै ट्राफिकमा थप सहज र उच्च गतिमा प्रवाह गर्न सक्छ, जसले विशेष गरी व्यस्त समयमा भीडलाई कम गर्न मद्दत गर्दछ। यस सुधारिएको ट्राफिक प्रवाहले यात्राको समय ३० प्रतिशत छोटो बनाउछ साथै ड्राइभरहरूलाई गन्तव्यहरूमा छिटो पुग्न उल्लेखनीय सहायता प्रदान गर्दछ। थप रूपमा यात्राको दुरी छोटो हुदाँ समयको साथसाथै सवारी साधनहरूले कम इन्धन खपत गर्दछ जसको परिणामस्वरूप इन्धनको लागतमा कमी र मर्मत खर्च समेत कम हुन आउछ जसले गर्दा यात्रुहरूको यात्रामा सहजता प्रदान गर्नेछ।

च. आर्थिक गतिविधि र व्यापारमा वृद्धि

यस सडक स्तरउन्नतिको कार्य क्षमताले व्यापारिक र औद्योगिक क्षेत्रहरूमा राम्रो पहुँचको सुविधा दिन्छ। यसले व्यवसायहरू व्यवसाय सञ्चालन गर्न र ग्राहकहरूलाई तिनीहरूसम्म पहुँच पुर्याउन सजिलो बनाउँछ। सुधारिएको सडक पूर्वाधारले नयाँ व्यवसाय र लगानीकर्ताहरूलाई आकर्षित गरी रोजगारी सृजना गरी क्षेत्रीय आर्थिक वृद्धिलाई प्रोत्साहित गर्न सक्छ। थप रूपमा छिटो र अधिक भरपर्दो यातायातले व्यवसायहरूको लागि समग्र लागत घटाउँछ साथै सम्भावित रूपमा उपभोक्ता मूल्यहरू घटाउने र आयआर्जनमा वृद्धि हुने देखिन्छ।

छ. औद्योगिक विकासको सम्भावना बढाउने

प्रस्तावित सडक आयोजनाले पहुँच र कनेक्टिभिटीमा सुधार गरी औद्योगिक विकासको सम्भावनालाई उल्लेख्य रूपमा बढाउन सक्छ। ठुलो र स्तरीय सडकको साथै उद्योगहरूले कच्चा माल र तयार मालसामानको उत्पादनहरू अझ सजिलै र लागत-प्रभावकारी रूपमा ढुवानी गर्न सक्छन् जसले गर्दा यस क्षेत्रमा नयाँ व्यवसायहरू आकर्षित हुन सक्नेछन्। यातायात क्षेत्रमा यस्तो सहज पहुँचले स्थानीय साना उद्यमहरूको लागि पनि राम्रो अवसर प्रदान गर्नेछ।

ज. ट्राफिक सुविधा र सडक संरचना सुधार

सडक क्षमतामा वृद्धि भएपछि विश्रामस्थल तथा सेवा सुविधाहरू जस्ता थप भौतिक पूर्वाधार समावेश गर्ने थप अवसरहरू उपलब्ध हुन्छन्। उपयुक्त आकारको मेडियन, सडक बत्ती, पैदलयात्रीका लागि छुट्टै बाटो जस्ता सुविधाहरू तथा शहरी क्षेत्रको थप सर्भिस लेनका कारण गाडिहरू पार्किङ, सामान ओसारपसारजस्ता कार्यहरू व्यवस्थित भई राजमार्गको मुख्य लेनमा पर्ने अवरोधमा न्यून प्रभाव हुन्छ। त्यसै गरी सडक विस्तारसँगै यातायात व्यवस्थापन अझ प्रभावकारी बनाउन गाडी फर्काउने मोडका लागि निश्चित स्थानहरू, सुधारिएको ट्राफिक सिग्नल, उपयुक्त सडक चिन्हहरू, पम्प तथा पार्किङ स्थल सम्बन्धि विभिन्न सम्बन्धित स्थानहरूमा सडक सम्बन्धित बोर्ड आदि समावेश छन्। चन्द्रौटा चौकमा गाडीका लागि VUP निर्माण गरिने छ जसले राजमार्गका गाडिलाई सिधै पुलमाथि बाट बाटो दिनेभएको हुँदा उक्त गाडिका कारण हुने प्रभाव न्यूनीकरण हुनेछ भने पैदल यात्रुलाई २ वटा अण्डरपास भएको हुँदा सडक बारपार गर्न सुरक्षित र सहज हुनेछ जसले गर्दा यात्रुलाई थप सुरक्षित र सहज हुन्छ। त्यसैगरी सुधारिएको सडक सुरक्षा संकेतहरू, क्यास बेरियरहरू र निर्धारण गरिएका पैदलयात्री क्रसिङ बिन्दुहरूको



स्थापना गर्दा ट्राफिकको प्रवाह अझ राम्रो हुनेछ र भीडभाड घट्नेछ, जसले गर्दा दुर्घटनाको सम्भावना र यात्रा समयमा कमि हुनेछ, र यात्रालाई सबैका लागि अझै सहज र प्रभावकारी बनाउनेछ।

६.२. नकारात्मक प्रभाव तथा न्यूनीकरणका उपायहरू

सडक निर्माण तथा सञ्चालन एवं मर्मतका क्रममा सम्भावित प्रतिकूल प्रभावहरू भौतिक, रासायनिक, जैविक, सामाजिक-आर्थिक र सांस्कृतिक पक्षहरूमा पहिचान गरिएको छ र तिनका लागि उपयुक्त न्यूनीकरण उपायहरू सिफारिस गरिएको छ। आयोजनाको कार्यान्वयनबाट पर्न सक्ने सम्भावित प्रतिकूल प्रभावहरू निम्न उपशीर्षकहरूमा संक्षेप गरिएको छ।

अ. सामाजिक-आर्थिक तथा सांस्कृतिक वातावरण

i. निर्माणको चरणमा पर्न सक्ने प्रभावहरू

क. जग्गा अधिग्रहण तथा भौतिक संरचनाको क्षति व्यवस्थापन

प्रस्तावित सडक आयोजनाबाट सडकसिमा भित्रका जम्मा ५३ वटा निजी संरचना, ८२ वटा सार्वजनिक संरचनाहरू र १२०२ वटा सार्वजनिक उपयोगिताहरू प्रभावित हुनेछन्। ती मध्ये ५ वटा निजी संरचना पूर्ण रूपमा प्रभावित भई भत्काउनुपर्नेछ। बाँकी संरचनाहरू आंशिक रूपमा मात्र प्रभावित हुनेछन्। आयोजनाले प्रभावित ५० घरधुरीलाई नगद क्षतिपूर्ति प्रदान गर्नुका साथै स्थानान्तरण तथा जीविकोपार्जनका लागि थप लागत उपलब्ध गराउनेछ। आयोजनाले प्रभावित परिवारका सदस्यहरूलाई विभिन्न प्रकारका सीपमूलक तालिमहरू जस्तै खेलौना तथा कुशन बनाउने, होटल संचालन, साना तथा हलुका सवारी साधन चलाउने, ब्यूटी पार्लर संचालन, मोबाइल फोन मर्मत सम्बन्धि तालिम प्रदान गर्नेछ। प्रभावित घरधुरीमा पर्ने असरलाई सम्बोधन र न्यूनीकरण गर्न पुनर्स्थापना कार्ययोजना तयार पारिएको छ।

ख. सडक सुरक्षा तथा सडक दुर्घटनामा सम्भावित वृद्धि

यस सडक सुधार कार्यका कारण सुरुमा सडक सुरक्षा सम्बन्धी चिन्ता तथा दुर्घटनाको सम्भावना बढ्न सक्छ। निर्माणको समयमा ट्राफिकको स्वरूप परिवर्तन हुनु, लेन बन्द हुनु जस्ता अवस्थाहरूले सवारी चालकहरूमा भ्रम र असहज अवस्था सिर्जना गर्न सक्छ। भारी निर्माण उपकरणहरूको ढुवानी तथा कामदारहरूको सडकमा वा सडकछेउमा उपस्थिति पनि सुरक्षा जोखिमको कारण बन्न सक्छ।

सडक सुविधा र सुरक्षाको लागि सामुदायिक प्राथमिकताहरूमा आधारित छनोट गरिएका स्थानहरूमा पैदल यात्री क्रसिङहरू (स्टिलको पुल-१ ईमिलियामा, पैदल यात्रीको लागि अन्डरपासहरू PUPs-२

चट्टौटा चौकमा, साथै विभिन्न स्थानमा जेब्रा क्रसिङहरू सहितका सडक सुरक्षाका सुविधाहरू स्थापना र मर्मत गरिनेछ। अतिरिक्त संकेत, संकेत चिन्ह, र अन्य ट्राफिक-नियमन उपकरणहरू पैदल यात्री सुविधाहरूमा ध्यान केन्द्रित गरी स्थापना र मर्मत गरिनेछ। सवारी साधनको गति नियन्त्रण र नियमहरू लागू गरिनेछ। विशेष गरी विद्यालयहरू नजिक, र अन्य सार्वजनिक स्थानहरूमा मुख्य ध्यानाकर्षण गरिनेछ।

ग. कृषि भूमि/उत्पादन र उत्पादकताको हानी

सडक सुधार तथा स्तरोन्नति कार्यका लागि RoW बाहिरको अतिरिक्त भूमि आवश्यक पर्ने छैन। ५० मिटर सडक अधिकार क्षेत्रभित्रको भूभाग प्रायः वन क्षेत्र बाँझो जमिन तथा कृषिमा प्रयोग गरिएको जमिन रहेको र सर्वेक्षणका क्रममा उक्त खेतहरूमा कुनै वाली लगाईएको थिएन। तर, निर्माण सामग्री प्रशोधन केन्द्र, भण्डारण स्थल, सवारी साधन पार्किङ, श्रमिक शिविर आदि प्रयोजनका लागि आयोजना प्रभावित क्षेत्रभित्र अस्थायी रूपमा थप भूमि प्रयोग गर्नु पर्ने हुन सक्छ। यस्ता अस्थायी प्रयोगले भूमिको उर्वरता र गुणस्तरमा केही परिवर्तन आउने सम्भावना रहन्छ।

प्रस्तावित सडक स्तरोन्नति कार्यका लागि RoW भन्दा बाहिरको जग्गाको आवश्यकता पर्दैन। निर्माण व्यवसायीले स्तरोन्नतिको क्रममा हटाउनु पर्ने जुनसुकै जमिन र वालीहरूको लागि क्षतिपूर्ति प्रदान गर्नेछ। यस आयोजनामा जमिन अधिग्रहण गर्नु पर्ने आवश्यक पर्दैन तर, संरचना तथा सम्पत्तिको क्षतिको क्षतिपूर्ति भूमि अधिग्रहण ऐन, २०३४ अनुसार प्रदान गरिनेछ। कुनै पनि अस्थायी जग्गा अधिग्रहण गर्नु अघि निर्माण व्यवसायीद्वारा जग्गाधनि संग एक सम्झौता स्थापित गरिनेछ। आयोजना सम्पन्न भइसकेपछि अस्थायी जग्गाको आवश्यकता नपर्ने भएपछि जग्गालाई पुरानै अवस्थामा पुर्नस्थापनाका लागि पुनःप्राप्ति कार्यहरू सञ्चालन गरिनेछ।

घ. विद्यमान सामाजिक र सांस्कृतिक अभ्यासहरूमा प्रभाव

सडक स्तरोन्नतिको क्रममा विभिन्न पृष्ठभूमिका कामदारहरू अस्थायी आवासमा सँगै बस्नुपर्ने हुन्छ जसले केही चुनौतीहरू उत्पन्न गर्न सक्छ। फरक-फरक क्षेत्र वा सांस्कृतिक सन्दर्भबाट आएका व्यक्तिहरूको उपस्थितिले सामाजिक मान्यता, सञ्चार शैली, र दैनिक अभ्यासहरूमा भिन्नता ल्याउन सक्छ, जसका कारण गलत बुझाइ वा विवाद उत्पन्न हुन सक्छ। साथै, डुमरा बस्ती स्थित थारु समुदायको महत्वपूर्ण पवित्र स्थान देवारलाई सार्नु पर्ने आवश्यकता देखिन्छ।

आयोजना क्षेत्र वरपरका सामाजिक र सांस्कृतिक मूल्यमान्यता र अभ्यासहरू बारे सबै श्रमिकहरूलाई जानकारी दिइनेछ। कामदारहरूलाई समुदायमा शान्तिपूर्ण वातावरण कायम राख्न प्रोत्साहित गरिनेछ। धार्मिक स्थल सार्नका लागि स्थानीय तथा चौधरी समुदायका प्रमुख समेतको सल्लाहमा धार्मिक क्षमापुजा सहित स्थानान्तरण गरिनेछ।

ड. श्रमिकहरूको स्वास्थ्य र सरसफाइका साथै सामुदायिक स्वास्थ्य

सडक स्तरोन्नतिको कार्यमा संलग्न कामदारहरू उच्च भौतिक जोखिमको सामना गर्छन्, जसमा उचाइमा काम, भारी उपकरणको प्रयोग, विद्युत् झटका, खस्ने वस्तुहरू, धुलो, आवाज र कम्पनको असर तथा खतरनाक रसायनसँग सम्पर्क सामेल छन्। व्यक्तिगत सुरक्षा उपकरण (PPE) प्रयोग नगर्दा जमिन खन्ने, विटुमिनको काम, ढलान स्थिरीकरण, र पुल निर्माणका बेला गम्भीर पेशागत स्वास्थ्य जोखिम देखा पर्न सक्छ। अस्थायी श्रमिक शिविरमा यथोचित बसोबास अभाव, सफा पिउने पानीको अभाव र कमजोर सरसफाइले डाइरेहा, हैजा जस्ता रोगको सम्भावना बढाउँछ। विभिन्न सांस्कृतिक पृष्ठभूमिका श्रमिकहरू एकै स्थानमा बस्दा सामाजिक असमझदारी र विवाद उत्पन्न हुनसक्छ। स्थानीय समुदायबाट दुर्व्यवहार तथा कार्यस्थलको प्रतिकूल वातावरणले मानसिक तनाव थप्ने सम्भावना रहन्छ। साथै, श्रमिकहरूको आगमनले पिउने पानी, स्वास्थ्य सेवा, शिक्षा, बिजुलीजस्ता सामाजिक सेवामा अतिरिक्त दबाव सिर्जना गर्छ।

निर्माण व्यवसायीले व्यावसायिक स्वास्थ्य र सुरक्षा (OHS) योजना विकास गर्ने, स्वीकृति प्राप्त गर्ने र कार्यान्वयन गर्नेछ। यस योजनाले विभिन्न कार्य गतिविधिहरूसँग सम्बन्धित पहिचान गरिएका खतराहरू र निर्माणको क्रममा रोकथामका उपायहरू सहित साइट-विशिष्ट OHS खतराहरू र जोखिमहरूलाई सम्बोधन गर्न मार्गदर्शन प्रदान गर्नेछ। दैनिक वा साप्ताहिक टुलबक्स वार्ताहरू सहित व्यावसायिक स्वास्थ्य र सुरक्षामा कामदारहरूको लागि नियमित प्रशिक्षण कार्यक्रमहरू सञ्चालन गरिनेछ। दुर्घटनाहरू रोक्न, व्यवस्थापन गर्न र कर्मचारीहरूलाई आपतकालिन अवस्थाहरू ह्यान्डल गर्न सुरक्षा प्रशिक्षणमा विशेष जोड दिइनेछ। आयोजनाका सबै कर्मचारी र आगन्तुकहरूको सुरक्षा सुनिश्चित गर्न निर्माण व्यवसायीले कामदारहरूलाई सेफ्टी ब्रुट, हेल्मेट, मास्क, पञ्जा, बडी हार्नेस, सुरक्षात्मक कपडा, चशमा जस्ता व्यक्तिगत सुरक्षा उपकरण (पीपीई) उपलब्ध गराउनेछ। आकस्मिक खतराहरू र जोखिमहरूलाई सामना गर्न फायर फाइटिंग, एम्बुलेन्स, मेडिकल र उद्धार सुविधाहरू निर्माणस्थलमा उपलब्ध हुनेछन्। प्राथमिक उपचार सुविधा कार्यस्थल र शिविरहरूमा पनि पहुँचयोग्य हुनेछ।

च. सामाजिक सेवाहरूमा दबाव (पिउने पानी, स्वास्थ्य, विद्यालय, बैंक, बिजुली, आदि)

निर्माण कार्यका लागि श्रमिकहरूको आगमनले सामाजिक सेवाहरू (पिउने पानी, स्वास्थ्य सेवा, विद्युत् आदिको) मा माग बढाउँछ। यो बढ्दो मागले हालको पानी आपूर्तिमा थप समस्या सिर्जना गर्न सक्छ र सीमित स्रोतहरूमा प्रतिस्पर्धा बढाउन सक्छ।

कामदारहरूलाई कम प्रयोग, पुनः प्रयोग तथा पुनर्चक्रण सम्बन्धि तालिम प्रदान गरिनेछ। सीमित स्रोतहरूको उपयुक्त प्रयोग तथा दुरुपयोग नगर्न प्रोत्साहन गरिनेछ। स्वास्थ्य सेवाको पहुँच र क्षमता बढाउन मोबाइल स्वास्थ्य क्लिनिकहरू स्थापना गर्नुका साथै निजी साझेदारीहरूको प्रयोग गर्न सुझाव दिइनेछ। बिजुलीको अनावश्यक प्रयोग कम गर्न सौर्य ऊर्जा र अन्य पुनःनवीकरणीय स्रोतहरूको प्रयोगलाई प्रोत्साहन गरिनेछ।

छ. सिँचाइ च्यानल, प्रसारण लाइन, टेलिफोन लाइन आदि जस्ता पूर्वाधारहरूमा समस्या

निर्माण चरणमा सिँचाइ नाला, प्रसारण लाइन र टेलिफोन लाइन जस्ता विद्यमान पूर्वाधारहरूमा समस्या उत्पन्न हुन सक्छ। निर्माण प्रक्रियामा यस्ता महत्वपूर्ण प्रणालीहरूलाई स्थानान्तरण वा परिमार्जन गर्नुपर्ने हुन सक्छ, जसले गर्दा तिनको सेवामा अस्थायी अवरोध आउन सक्छ। उदाहरणका लागि खानेपानी पाइप साथै सिँचाइ नाला बिग्रिन सक्ने वा बाटो फेर्नुपर्ने हुन सक्छ, जसले कृषिका गतिविधिहरूमा असर पार्न सक्छ। त्यस्तै, प्रसारण लाइन र टेलिफोन लाइनहरू सार्न वा मर्मत गर्नुपर्ने हुन सक्छ, जसले विद्युत् आपूर्ति र सञ्चार सेवामा अवरोध ल्याउन सक्छ।

निर्माणको क्रममा, सम्भावित अवरोधहरूको बारेमा वासिन्दाहरूलाई अग्रिम सूचित गरिनेछ। आवश्यक परेमा प्रसारण लाइन, टेलिफोन लाइन र अन्य केबलहरूलाई समयमै स्थानान्तरण वा परिमार्जन गरी निरन्तर सेवा सुनिश्चित गर्न वैकल्पिक व्यवस्था मिलाइनेछ।

ज. लैङ्गिक हिंसाको जोखिम

योजनाको निर्माण कार्यमा बाहिरी श्रमिकहरूको आगमनले स्थानीय वासिन्दाहरूलाई असर गर्न सक्छ। निर्माण चरणमा महिलाहरूको तस्करीका घटना बढ्न सक्ने सम्भावना हुन्छ। विशेषगरी महिला श्रमिकहरूप्रति यौन शोषण तथा दुर्व्यवहार (SEA) र यौन उत्पीडन (SH) को खतरा रहन्छ। साथै,



महिला श्रमिकहरूलाई निर्माण कम्पनि द्वारा दैनिक पारिश्रमिकमा विभेद हुन सक्ने सम्भावना पनि रहन्छ।

महिला र बालबालिकाहरूलाई यौन शोषण तथा दुर्व्यवहार (SEA) र यौन उत्पीडन (SH) बारे सचेत गराउन सचेतना कार्यक्रमहरू सञ्चालन गरिनेछ। आयोजनासँग सम्बन्धित SEA र SH का घटनाहरू रिपोर्टिङ गर्न प्रोत्साहन गरिनेछ। यसका साथै आयोजनामा संलग्न व्यक्तिहरूको भूमिका र जिम्मेवारीहरू बारे जानकारी गराइनेछ। एउटै प्रकारको काम गर्ने महिला र पुरुषलाई समान पारिश्रमिक सुनिश्चित गरिनेछ।

झ. सामुदायिक स्रोत र उपयोगका सवालहरू

निर्माण कार्यका कारण श्रमिक तथा गतिविधिबाट पिउने पानी, बिजुलीजस्ता स्रोतमा माग बढ्ने सम्भावना रहन्छ, जसले खेलमैदान, सार्वजनिक ठाउँ तथा चरन क्षेत्र (विशेष गरी बेलगाडवा खोलाको पूर्वपट्टि) जस्ता सामुदायिक संरचनाहरूमा प्रभाव पार्न सक्छ। यसले मूल्य बृद्धि र सेवा पहुँचमा असर पुर्याउन सक्छ।

आयोजनाबाट प्रभावित संरचनाहरूको पुनर्निर्माण स्थानीय समुदाय, गुनासो व्यवस्थापन समिति र सरोकारवाला निकायहरूसँग समन्वयमा गरिनेछ। कुनै पनि संरचना सार्नु अघि स्थानीय बासिन्दालाई पूर्व जानकारी दिइनेछ। खेल मैदानको एक कुनामा स्थान छुट्याइनेछ, जसबाट स्थानीय बासिन्दाहरू वञ्चित नहोस्। समयमै निर्माण कार्य सम्पन्न गर्न र स्थानीयलाई असुविधा नहोस् भन्नका लागि आवश्यक अनुमतिपत्रहरू लिइनेछन् र सेवा प्रदायक निकायलाई बजेट पनि स्थानान्तरण गरिनेछ।

ii. सञ्चालन चरण

क. खानी उत्खनन् क्षेत्रमा डेड ट्रयाप सिर्जना सम्बन्धी समस्या

सडक स्तरोन्नतिको क्रममा निर्माण सामग्री (जस्तै बालुवा, गिट्टी) तथा माटो उत्खनन क्षेत्रहरूबाट निकालिन्छ जहाँ जोखिमयुक्त खाल्डाहरू सिर्जना गर्न खाडल बन्ने सम्भावना रहन्छ। यसको उचित व्यवस्थापन नगरिएमा सोहि खाडलमा दुर्घटना हुने तथा वर्षाको समयमा "डेड ट्रयाप" समेत बन्न सक्छ। यसले गाई बस्तु, वन्यजन्तु तथा मानिसमै खतरा पुऱ्याउँछ। निर्माणपश्चात् यी क्षेत्रहरूको पुनःस्थापना वा भराई नगरेमा स्थायी खतरा बन्न सक्छ र भू-दृश्य एवं भूस्थिरिकरण लगाएत सामुदायिक सुरक्षामा नकारात्मक असर पर्न सक्छ।



यसकारण, बालुवा, गिट्टी लगायतका सामग्री संकलन हुने सबै स्थलहरूमा सुरक्षाका उपायहरू अवलम्बन गरिनेछ। खानी तथा उत्खनन् क्षेत्रहरूलाई व्यवस्थित रूपमा सञ्चालन गरी काम सकिएपछि भराई र पुनःस्थापना गरिनेछ साथै जोखिमयुक्त स्थानहरूमा चेतावनी संकेत राखिनेछ। वर्षातको समयमा कुनै पनि उत्खनन कार्य नगर्ने प्रावधान रहनेछ, जसले वातावरण र समुदाय दुवैको सुरक्षामा सहयोग पुग्नेछ।

ख. सडक उपयोग व्यवहारसँग सम्बन्धित प्रभावहरू

स्थानिय बासिन्दाहरूले सडक दुवै किनारामा रहेका पसल, विद्यालय, सांस्कृतिक तथा स्वास्थ्य संस्थाहरूमा दैनिक पहुँचका लागि प्रयोग गर्दै आएका छन्। तर, उनीहरूमा सडक पार गर्ने र साइकल चढ्ने नियमहरूको जानकारी पर्याप्त नभएकाले स्तरोन्नत सडकमा सवारीको उच्च गतिको जोखिमबारे सचेतना कम छ। यसले सडक दुर्घटनाको सम्भावना बढाउँछ जसले शारीरिक चोटपटक, मृत्युदर र दीर्घकालीन निर्भरता बढाउन सक्छ।

यसको समाधान स्वरूप इमिलिया, डुमरा, बरकलपुर, चम्पापुर, खरेन्द्रपुर, चन्द्रौटा, बालापुर र शिवपुर क्षेत्रमा विद्यालय र सार्वजनिक स्थानहरूमा सडक सुरक्षा, साइकल प्रयोग, र उच्च गतिको सवारीबारे सचेतना कार्यक्रम सञ्चालन गरिनेछ। फरक उमेर र साक्षरता भएका समुहहरूलाई लक्षित गरी सचित्र सामग्री वितरण गरिनेछ। सडक पार गर्ने तरिका, जोखिमहरू र सुरक्षासम्बन्धी उपायहरूको प्रदर्शन गरिनेछ। साथै, स्पीड लिमिट, विद्यालय क्षेत्र, र पैदल यात्री क्रसिङ सङ्केत गर्ने संकेतहरू जडान गरिनेछन्। अर्धशहरी तथा शहरी क्षेत्रमा सडक बस्तीको व्यवस्था पनि गरिनेछ। स्थानिय विद्यालय, स्वास्थ्य चौकी, समुदाय समुह तथा ट्राफिक प्रहरीलाई सक्रिय रूपमा सुरक्षा शिक्षामा संलग्न गरिनेछ।

ग. धार्मिक, सांस्कृतिक तथा ऐतिहासिक स्थलहरूको प्रयोगसँग सम्बन्धित जोखिमहरू

सुपादेउराली मन्दिर र चन्द्रौटा चोकमा रहेको मस्जिद/मदरसामा प्रार्थनाका लागि जाने व्यक्तिहरूलाई सडक पार गर्ने क्रममा दुर्घटनाको जोखिम रहन्छ। सुपादेउराली मन्दिर Sharp मोडमा रहेकाले यो क्षेत्र अझै संवेदनशील मानिन्छ।

सुपादेउराली मन्दिरमा सम्भावित दुर्घटनालाई कम गर्न चेतावनी बोर्ड र जेब्रा क्रसिङको व्यवस्था गरिनेछ। चन्द्रौटा चोकको मदरसा पहुँचका लागि PUP (पैदल यात्रु मार्ग) को व्यवस्था गरिनेछ।

भौतिक तथा रासायनिक वतावरण

१. निर्माण चरण

क. परियोजना सम्बन्धित प्लान्टहरू) जस्तै :कसर प्लान्ट, व्याचिड प्लान्ट, अस्फाल्ट प्लान्ट (तथा बर्कसप सञ्चालनसँग सम्बन्धित प्रभावहरू

आयोजनाका प्लान्टहरू सञ्चालन गर्दा धुलोका कणहरू फैल्ने, उच्च आवाजको प्रदूषण हुने र लुब्रिकेन्ट चुहावटले स्थानीय स्तरमा वायु, ध्वनि तथा माटो प्रदूषण निम्त्याउने सम्भावना रहन्छ। यदि प्लान्टहरू पानीका स्रोतहरू नजिक स्थापना गरियो भने पानी प्रदूषण पनि हुन सक्छ। यस्ता प्लान्ट सञ्चालन गर्दा यदि श्रमिकहरूले व्यक्तिगत सुरक्षा उपकरण (PPE) प्रयोग नगरेमा वा सुरक्षा उपायहरू नअपनाएमा स्वास्थ्यमा असर पुग्न सक्छ वा दुर्घटना हुनसक्छ।

कसर प्लान्ट आसपासको क्षेत्रलाई ध्वनि प्रदूषणबाट जोगाउन दिनको समयमा मात्र सञ्चालन गरिनेछ। धुलो कम गर्न कसर सञ्चालनको समय तालिका बनाइनेछ र यदि स्थानीय समुदाय प्रभावित हुने सम्भावना भएमा हावाहुरी हुने समयमा सञ्चालन नगरिनेछ। निर्माण सामग्री ढुवानी गर्दा पूरै छोपेर मात्र लैजाने व्यवस्था गरिनेछ। साइटमा फोहोर व्यवस्थापनका लागि जैविक र अजैविक फोहोर छुट्याएर बेग्लाबेग्लै राखिनेछ र उचित रूपमा निस्तारण गरिनेछ। वायु गुणस्तर, ध्वनि स्तर, र कम्पनलाई समय-समयमा अनुगमन गरिनेछ ताकि तिनीहरू स्वीकृत सीमा भित्रै रहून्। साथै, श्रमिकहरूको स्वास्थ्य र सुरक्षाको लागि हेलमेट, पञ्जा, मास्क, कान थुन्ने जस्ता व्यक्तिगत सुरक्षा उपकरण (PPE) उपलब्ध गराइनेछ।

ख. पुल/निकास संरचनाको निर्माण:

प्रस्तावित सडक स्तरोन्नति परियोजनामा २ ठूला पुल, ६ साना पुल, १ VUP, २ PUPs, ६४ बक्स कल्भर्ट, ७ पाइप कल्भर्ट, साइड ड्रेन्स, र संरक्षणात्मक संरचनाहरू निर्माण समावेश छन्। यसले प्राकृतिक पानी बग्ने धारामा परिवर्तन ल्याई सतही बहाव अवरुद्ध भई मनसुन समयमा अस्थायी ढुवान वा बाढीको सम्भावना बढ्न सक्छ। पुलको पिल्लर निर्माणका लागि नदी मोड्ने कार्य गर्दा नदीको ढलान तथा माटोको बहावमा परिवर्तन हुनसक्छ। साथै, निर्माण सामग्री पानीमा फाल्दा जलजीवहरूमा प्रतिकूल असर पर्न सक्छ।



यसलाई न्यूनीकरण गर्न हाम्रै पाइप जस्ता अस्थायी माध्यमद्वारा प्राकृतिक बहाव कायम राखिनेछ। खनिएको माटो पूर्वनिर्धारित स्थानमा मात्र राखिनेछ। नदी, खोला, वा पोखरी क्षेत्र वरपर कुनै निर्माण कार्य मनसुन समयमा गरिने छैन। बाढी न्यूनीकरण गर्न सबै पाइप कल्भर्टहरू बाकस कल्भर्टले प्रतिस्थापन गरिनेछ। बेलबागुर्दवा नदी र ज्वाइ खोलालाई बन्यजन्तु आवतजावतको प्रमुख मार्ग भएकाले उपयुक्त बार लगाइनेछ। बेलनदीको शवदाह स्थलमा पहुँच कायम गरिनेछ र वरपर निर्माण सामाग्री नथुपारिने व्यवस्था गरिनेछ।

ग. निर्माण शिविर स्थापना र सञ्चालनका प्रभावहरू:

श्रमिक शिविर र निर्माण सामाग्रीको भण्डारण स्थलहरू स्थानीय समुदायमा प्रतिकूल प्रभाव पार्न सक्छ। ती स्थानमा निर्माण सामाग्री लाने-ल्याउने सवारीको चाप बढ्दा स्थानीय सडकहरूमा दुर्घटना जोखिम र जामको समस्या हुन सक्छ। भारी उपकरणको सञ्चालनले धुलो र ध्वनि प्रदूषण बढाउँछ, जसले स्थानीय बासिन्दाको स्वास्थ्य र जीवनस्तरमा असर पार्न सक्छ। बाह्य श्रमिकको आगमनले पानी र सरसफाइ जस्ता स्थानीय स्रोतहरूमा अतिरिक्त दबाव सिर्जना गर्न सक्छ। यदि निर्माण सामाग्री सही तरिकाले संकलन नगरिएमा धुलो, सतही पानी प्रदूषण र आसपासको निजी तथा सार्वजनिक सम्पत्तिमा असर पर्न सक्छ।

निर्माण व्यवसायीले यस प्रतिवेदनको बातावरण व्यवस्थापन योजना (EMP) अनुसार विस्तृत स्थल विशेष शिविर व्यवस्थापन योजना तयार गर्नेछ। प्रस्तावित स्थलहरू पर्यवेक्षण परामर्शदाता (Supervision Consultant) बाट स्वीकृति लिएपछि मात्र प्रयोग गरिनेछ। शिविरहरूमा आगलागी नियन्त्रण, शौचालय, नुहाउने सुविधा, पिउने पानी, सफा भोजन क्षेत्र, बत्ती, सुरक्षित आवतजावत, हावाको प्रवाह, ग्यास/मट्टितेलको व्यवस्था लगायतका आधारभूत सेवा प्रदान गरिनेछ। महिला श्रमिकको लागि छुट्टै व्यवस्था गरिनेछ। प्राथमिक उपचार सुविधा प्रत्येक शिविरमा उपलब्ध गराइनेछ। साथै, निर्माण सामाग्री उचित स्थानमा सुरक्षित रूपमा राखिनेछ जसबाट धुलो नउडोस् र सुरक्षा मापदण्डहरू पालना होस्।

घ. वायु गुणस्तर, निर्माणजन्य आवाज र कम्पनको प्रभावहरू

वायु प्रदूषण: निर्माण कार्यको समयमा खन्ने काम, खानी सञ्चालन, क्रसर तथा डामर प्लान्टको सञ्चालनले प्रस्तावित सडकको आसपास वायु प्रदूषण गर्न सक्छ। यस्ता गतिविधिले मुख्यतः धुलो तथा धुवी उत्पादन गर्छन्, जसले वायु गुणस्तरमा गम्भीर असर पार्छ। डीजेल, पेट्रोल र मट्टितेल जस्ता इन्धन

जलाउँदा सल्फर अक्साइड (SO_x), नाइट्रोजन अक्साइड (NO_x), कार्बन डाइअक्साइड (CO_2) जस्ता प्रदूषकहरू उत्सर्जन हुन्छन्। साथै, सवारी साधन तथा मेसिनको सञ्चालनले पनि धुवी र सूक्ष्म कणहरू उत्सर्जन गर्छन्, जसले स्थानीय बासिन्दाहरूलाई असहज पार्न सक्छ।

ध्वनि प्रदूषण: निर्माण अवधिमा सवारीको आवाज, मेसिनरी सञ्चालन, कस्टर प्लान्ट र सामग्री यातायातको कारणले आवाजको स्तर धेरै बढ्नेछ। निरन्तर उच्च आवाजको सम्पर्कले बन्धुजन्तु, श्रमिक तथा स्थानीय बासिन्दाको स्वास्थ्यमा असर पुऱ्याउन सक्छ।

कम्पन: निर्माणमा प्रयोग हुने ठूला उपकरणहरू, निर्माण सवारी, जेनरेटर, कम्प्रेसर, पम्पहरू आदिले कम्पन उत्पन्न गर्छन्, जुन नजिकका बस्तीमा महसुस हुन सक्छ। यस्ता कम्पनहरू अस्थायी असहजता ल्याउने भए पनि ती स्थानीय स्तरका हुनेछन् र भवन वा पर्खालमा संरचनात्मक क्षति पुऱ्याउने सम्भावना न्यून हुनेछ।

यी प्रभाव न्यूनीकरण गर्न कस्टर र सिमेन्ट मिक्सिड प्लान्टहरूमा धुलो नियन्त्रण उपकरणहरू जडान गरिनेछ र निर्माणकर्ताको निर्दिष्ट अनुसार सञ्चालन गरिनेछ। कस्टर ड्रेन र सडक विस्तार क्षेत्रको आसपास धुलो न्यूनीकरण गर्न मनसुन बाहेक अन्य समयमा दैनिक तीनपटक पानी छर्किनेछ, विशेषगरी बसोबास क्षेत्रहरूमा। प्लान्ट साइट जनसंख्या केन्द्र, खानेपानी स्रोत, खेतीयोग्य जमिन र जलाशयहरूबाट टाढा चयन गरिएको छ। सञ्चालन केवल दिनको समयमा मात्र गरिनेछ। निर्माणपछि क्षेत्रलाई पूर्ववत अवस्थामा पुनःस्थापना गरिनेछ।

ड. सडक सुरक्षासम्बन्धी जोखिमहरू

सडक स्तरोन्नति उचित रूपमा व्यवस्थापन नभएमा निर्माण अवधिमा विशेष गरी सुरक्षासम्बन्धी जोखिम बढ्न सक्छ। व्यस्त सडकमा ठूला मेसिनहरूको प्रयोगले दुर्घटनाको सम्भावना बढाउँछ भने पर्याप्त सुरक्षा अवरोध नहुनुले श्रमिक र सर्वसाधारणलाई खतरा उत्पन्न गर्न सक्छ।

यी जोखिम न्यूनीकरणका लागि परियोजनाले समग्र सुरक्षाको प्राथमिकता दिनेछ। काम क्षेत्र र ट्राफिकबीच छुट्याउन सुरक्षात्मक अवरोध तथा रिफ्लेक्टिभ चिन्हहरू राखिनेछन्। श्रमिकहरूलाई कार्यस्थलमा प्रवेश, ताजा जानकारी (Refresher), र टुलबक्स टक मार्फत नियमित रूपमा सुरक्षा तालिम दिइनेछ। व्यक्तिगत सुरक्षा उपकरण (PPE) प्रयोगलाई अनिवार्य बनाइनेछ। साथै, राम्रो अवस्थामा रहेको मेसिनरीको प्रयोग गरिनेछ र उच्च जोखिम भएका क्षेत्रमा ट्राफिक व्यवस्थापन गर्न



पल्यागरहरू/स्पटर्स परिचालन गरिनेछ। सडक छेउका विद्यालयहरूका विद्यार्थी र स्थानीय समुदायलाई समेत सडक सुरक्षा सम्बन्धी जानकारी दिइनेछ।

च. खानी/माटो उत्खनन कार्यबाट हुने प्रभावहरू

निर्माण सामाग्रीको उत्खनन र यातायातका कारण धुलो तथा आवाजको मात्रा बढ्न सक्छ, जसले स्थानीयको दैनिक जीवन र स्वास्थ्यमा असर पार्छ। सामाग्री ढुवानीमा प्रयोग हुने भारी ट्रकहरूले सडकमा ट्रफिक जाम र सुरक्षासम्बन्धी खतरा उत्पन्न गर्न सक्छ। खानी सञ्चालनबाट भौगोलिक स्वरूपमा परिवर्तन भई वरपरको घर र प्राकृतिक आवासमा असर पर्न सक्छ।

धुलो नियन्त्रणका लागि नियमित रूपमा पानी छर्किने व्यवस्था गरिनेछ, साथै ढुवानी गरिने सामाग्रीलाई छोपेर लैजाने व्यवस्था गरिनेछ। सबै कार्यहरू दिनको समयमा मात्र सञ्चालन गरिनेछन्। श्रमिकलाई मास्क, हेल्मेट, पञ्जा, बुटसहित व्यक्तिगत सुरक्षा उपकरण उपलब्ध गराइनेछ। प्रत्येक खानी/माटो उत्खनन क्षेत्रको लागि निर्माण व्यवसायीद्वारा विशेष योजनासहित पुनःस्थापना योजना तयार गरिनेछ।

छ. उत्पादक/मलिलो माटोको क्षति

निर्माणको क्रममा खन्ने काम र साइट क्लियरेन्स गर्दा सतही माटो (topsoil) हराउन सक्छ। सडक विस्तारको लागि वनजङ्गल र कृषि जमिन प्रयोग गर्दा वा Embankment निर्माणको लागि माटो लिनु पर्दा उत्पादनशील माटोको क्षति हुन्छ। सडक स्तरोन्नति कार्यबाट अनुमानित रूपमा ६०.३ टन मलिलो माटो (टपसोएल) नष्ट हुन सक्ने अनुमान गरिएको छ।

सो क्षति न्यूनीकरणका लागि सतही माटोलाई छुट्टै स्थानमा संकलन गरिनेछ र तटबन्ध तथा मध्यभागमा ढाक्न प्रयोग गरिनेछ। निर्माण सामाग्री तोकिएका क्षेत्रमा मात्र राखिनेछ र परियोजनाका सुविधा क्षेत्रको सतही माटो पुनःस्थापनाको लागि प्रयोग गरिनेछ। साथै, अस्थायी रूपमा प्रयोग गरिने जमिनको लागि जग्गाधनीहरूलाई उचित क्षतिपूर्ति उपलब्ध गराइनेछ।

ज. सतही तथा भूमिगत पावी प्रदूषण

सडक चौडाइ विस्तार गर्दा निर्माण सामाग्रीबाट हुने चुहावट तथा शिविरबाट उत्पादन हुने फोहोरको असक्षम व्यवस्थापनले जलको गुणस्तरमा असर पार्न सक्छ। सडकको सतह विस्तारसँगै हुने बहाबले प्रदूषक तत्वहरूलाई नजिकैको जलाशयमा बगाएर लैजान सक्छ।



निर्माण संग सम्बन्धित माटो वा फोहोर लाई पानीको स्रोत नजिक फाल्न पूर्णरूपमा प्रतिबन्ध गरिनेछ। बिकल्पविहिन अवस्थामा पानीका स्रोतहरू भन्दा न्यूनतम १०० मिटरको दुरीमा विसर्जन गरिनेछ। नदी वा पोखरीमा फोहोर जान नदिन सिल्ट फेन्स र बुट्टे बारहरू राखिनेछ। सम्पूर्ण निर्माणजन्य फोहोरहरू संकलन, भण्डारण र अनुमोदित स्थानमा लैजाने व्यवस्था गरिनेछ। रासायनिक पदार्थहरू पानीको स्रोतको नजिक प्रयोग गर्न पाइने छैन। नदी वा खोलामा सवारी वा उपकरण सफा गर्ने काम गरिने छैन। विशेषगरी बेलगडवा र बेलनदीमा लुगा धोइ वा प्रदूषक फाल्न पाइने छैन।

झ. श्रमिकहरूको व्यावसायिक सुरक्षा र स्वास्थ्य प्रभाव

सडक स्तरोन्नति कार्यमा संलग्न श्रमिकहरू भारी मेसिन, उचाइमा काम, विद्युतीय उपकरण तथा धुलो, ध्वनि, कम्पन आदि जोखिममा पर्ने गर्छन्। अस्थायी आवासमा सरसफाइ, खाना, व्यक्तिगत सुरक्षा र स्वास्थ्य सेवा पर्याप्त नहुनुका कारण स्वास्थ्य समस्या देखा पर्न सक्छ। PPE बिना काम गर्दा दुर्घटना, घासप्रधास समस्या, आँखा जल्ने, पानीजन्य रोगहरूको जोखिम बढ्छ। स्थानीय दुर्व्यवहार तथा खराब कार्य वातावरणले मानसिक तनाव पनि बढाउन सक्छ।

श्रमिकहरूलाई कार्यस्थलमा हुने सम्भावित जोखिम बारे तालिम दिइनेछ। नियमित TBT, Refresher तालिम तथा पर्याप्त PPE उपलब्ध गराइनेछ। प्रत्येक श्रमिकको बीमा गरिनेछ। नियमित स्वास्थ्य जाँच तथा एचआईभी परीक्षण गरिनेछ र बीमा गरिनेछ।

ञ. सामुदायिक स्वास्थ्य तथा सुरक्षा

सडक स्तरोन्नतिको कार्यले धुलो तथा आवाज प्रदूषण उत्पन्न गरी समुदायको स्वास्थ्य तथा सुरक्षामा नकारात्मक असर पार्न सक्छ, जसले घासप्रधासका समस्या र मानसिक तनावको जोखिम बढाउँछ। यसका अतिरिक्त, ट्राफिक दुर्घटना, आवागमनमा अवरोध, र स्वास्थ्य सेवासम्मको पहुँचमा कठिनाई पनि उत्पन्न हुन सक्छ। निर्माण चरणमा फोहर व्यवस्थापन असहज हुँदा जलस्रोतहरू प्रदूषित हुनसक्छन्, जसले स्थानीय बासिन्दाहरूको स्वास्थ्यमा थप जोखिम पुर्याउन सक्छ।

यी जोखिमलाई न्यूनीकरण गर्न नियमित रूपमा पानी छर्कने, निर्माण सामग्री छोप्ने, ध्वनि नियन्त्रणका लागि साउण्ड बेरियर र निश्चित कार्य तालिका को प्रावधान गरिनेछ। ट्राफिक व्यवस्थापन योजना, स्पष्ट संकेत चिह्न र सुरक्षा कर्मचारीको व्यवस्था गरी दुर्घटना न्यूनीकरण र सेवाको सहज पहुँच सुनिश्चित गरिनेछ। पैदल यात्रुका लागि सुरक्षित मार्ग तथा बैकल्पिक पहुँच मार्ग तोकिनेछ। निर्माण फोहोरको



उचित व्यवस्थापन, इन्धन तथा रसायनहरूको सुरक्षित ह्यान्डलिङ गरिनेछ। फोहोर तथा बाँझ जमिन तोकिएको स्थानमा मात्र फालिनेछ र नियमित अनुगमन गरिनेछ। समुदायमा जनचेतना कार्यक्रम सञ्चालन गरिनेछ र गुनासो व्यवस्थापन समितिलाई सक्रिय रूपमा संलग्न गरिनेछ।

ट. बाँधको स्थिरीकरणमा संकुचन र हरियो घाँस बिच्छ्याउने (टर्फिङ) सम्बन्धी समस्या

दुई लेनको सडकलाई चार लेनमा विस्तार गर्दा माटोको असमान संकुचन तथा स्थिरीकरणको समस्या देखा पर्न सक्छ। कमजोर सतह र ढल्केको भू-भागमा घाँस जमाउन कठिनाई हुन्छ, जसले गर्दा टर्फिङ सफल नभई माटो क्षय हुनसक्छ।

यस समस्याको समाधानका लागि बाँध राम्रोसँग संकुचित तहमा निर्माण गरिनेछ। बाँध बनेपछि तुरुन्तै टर्फिङ गरिनेछ, जसले माटो क्षय र धुलो उत्पन्न हुन नदिन सहयोग पुर्याउँछ। पहिलेबाट तयार टर्फ म्याट वा हाइड्रोसिडिङ प्रविधि प्रयोग गरिनेछ। आवश्यकता अनुसार मल्चिङ वा जैविक आवरण सामग्री प्रयोग गरिनेछ। टर्फ तथा बाँधको नियमित अनुगमन र समयमै मर्मत गरिनेछ।

ठ. नदी तथा बस्तीमा ढल निकास, माटो क्षय र अवसादन सम्बन्धी समस्या

सडक विस्तारले ढल निकास प्रणालीमा परिवर्तन ल्याएर आसपासको क्षेत्रमा बाढीको जोखिम बढाउन सक्छ। निर्माण कार्यले माटो हटाएर क्षय हुने सम्भावना हुन्छ, जसको असर नदीहरूमा अवसादनका रूपमा देखिन्छ, जसले जलगुणस्तर बिगार्छ र जलजीव प्रणालीलाई असर गर्छ।

यसको समाधानस्वरूप अस्थायी निकास (जस्तै ह्युम पाइप) दिइनेछ र नदी/खोल्सामा वर्षायामको समयमा कुनै पनि पुल वा क्रस ड्रेनेजको काम गरिने छैन। सबै पाइप कल्भर्टहरूलाई वक्स कल्भर्टबाट प्रतिस्थापन गरिनेछ, जसले जलवहाव र बाढी नियन्त्रणमा सहयोग पुर्याउँछ। सिल्ट हटाउने कार्य पनि गरिनेछ। क्रस ड्रेनेजहरूको आकार न्यूनतम १०% भन्दा बढि वृद्धि गरिएको छ। चन्द्रौटामा कटान रोक्न कञ्चनिया कल्भर्टको आकार बढाइएको छ। <१ वा १x१ m² चौडाइ भएका स्ल्याब कल्भर्टहरूलाई १.५x१.५ m² र १-१.५ m² भएका कल्भर्टहरूलाई २x२ m² मा परिवर्तन गरिएको छ। त्यसैगरी ०.९ मिटर व्यास भएका ४ वटा पाइप कल्भर्टहरूलाई वक्स कल्भर्टमा रूपान्तरण गरिएको छ। यसले कुनैपनि स्थानमा पानी निकासमा बाधा हुने छैन।

ड. खतरनाक, गैर-खतरनाक र तरल फोहोरसँग सम्बन्धित प्रभाव

निर्माण चरणमा शिविर तथा कार्यालयबाट गैर-खतरनाक फोहोर उत्पादन हुन्छ (जस्तै खाना फोहोर, कागज, प्लास्टिक आदि)। अनुमानित रूपमा शिविरहरूबाट ९६.१६ किलोग्राम जैविक फोहोर र ६४.१ किलोग्राम अजैविक फोहोर निस्कनेछ। खुला रूपमा यस्ता फोहोर फाल्दा भूगर्भीय जल प्रदूषण हुन सक्छ, विशेष गरी वर्षायाममा सतही पानी पनि प्रदूषित हुन सक्छ।

फोहोर व्यवस्थापनका लागि पक्की भण्डारण क्षेत्र र तेल चुहावट संकलन कक्ष निर्माण गरिनेछ। तेल वा ग्रीस चुहावट वा सोसिएको सामग्री छुट्टै चिह्नित कन्टेनरमा राखिनेछ। श्रमिकहरूका लागि PPE, आपतकालीन सेवा, भेन्टिलेसन र सरसफाई सुविधा उपलब्ध गराइनेछ। फोहोरहरूलाई स्रोतमै छुट्याउने व्यवस्था गरिनेछ जैविक, पुनःप्रयोग योग्य र गैर-पुनःप्रयोग योग्य गरी छुट्टाछुट्टै डस्टबिनमा संकलन गरिनेछ। यी फोहोरहरूलाई नगरपालिका फोहोर व्यवस्थापन प्रणालीमा पठाइने वा निर्माण व्यवसायीले छुट्टै व्यवस्थापन गर्नेछ। जसका लागि जैविक फोहोर फोहरबाट मल बनाउने वा सतह जल निकास वा बस्ती बाट न्यूनतम १०० मिटर टाढा खाल्डोमा दुर्गन्ध नहुने गरी व्यवस्थापन गरिनेछ।

ड. निर्माण फोहोर तथा भत्काउने फोहोरसँग सम्बन्धित प्रभाव

सडक विस्तार, पुल तथा ढल संरचना निर्माणका क्रममा खनिएको माटो वा पुरानो संरचना हटाउँदा धेरै कट सामग्री उत्पादन हुन्छ। यस्ता कट सामग्रीहरू प्रायः बाँधमा भराइ वा सडकको सब-बेसमा पुनःप्रयोग गर्न सकिनेछ।

तसर्थ, अधिकांश कट सामग्री पुनः प्रयोग गरिने भएकाले फोहोर व्यवस्थापनको आवश्यकता न्यून रहनेछ। भत्काइएका सामग्री (कंक्रीट, इट्टा, फलाम, काठ आदि) स्रोतमै छुट्याइनेछ ताकि पुनःप्रयोग/रिसाइकल गर्न सकियोस्। पुरानो सडकको स्कारिफाइ गरिएको तह परियोजनामा पुनः प्रयोग गरिनेछ र बाँकी सामग्री स्थानीय सडक सुधार वा अन्य उपयोगमा लागि प्राथमिकता दिईनेछ।

ण. भू-प्रयोग परिवर्तनसँग सम्बन्धित प्रभावहरू

शहरी क्षेत्रमा सडकको चौडाइ ५० मिटर र ग्रामीण तथा वन क्षेत्रमा २४ मिटर तोकिएको छ। सडकको अधिकार क्षेत्र (RoW) पहिले नै MoPIT सरकारको नाममा सारिएको छ। तर, हालको सडक



चौडाइ १२ देखि १८ मिटर मात्र छ र बाँकी ६६.७६ हेक्टर RoW को भू-भाग प्रयोग गरिनेछ। यस क्षेत्रमा २४% कृषि, ४०.६% वन, २२.७% बाँझो, ११.८% बस्ती र १.४% जल क्षेत्र पर्नेछ।

कटान भएको सडक किनारमा वृक्षरोपण गरी पुन हरियाली कायम गरिनेछ। सडक छेउको क्षेत्रको टपसोईल संकलन गरिनेछ जसलाई निर्माणका सिलशिलामा Embankment को किनारामा घाँस उमार्न तथा सडकको मध्य भागको median मा प्रयोग गरिनेछ।

त. निर्माण कार्यमा अत्यधिक इन्धन प्रयोगले कार्बन उत्सर्जनमा बृद्धि

सडक विस्तारको क्रममा निर्माण मेसिन, जेनरेटर तथा गाडीहरूबाट अत्यधिक इन्धन प्रयोग हुनाले कार्बनडाइअक्साइड र अन्य हरितगृह ग्यासहरू उत्सर्जन बढ्न सक्छ, जसले वायु गुणस्तरमा असर पुर्याउँछ।

इन्धन खपत घटाउन र कार्यक्षमता बढाउन निर्माण उपकरणको नियमित मर्मत गरिनेछ, प्रविधि उन्नत उपकरण प्राथमिकतामा राखिनेछ। साथै, ह्यान्डी उपकरणमार्फत वायु गुणस्तर र सवारी साधनको उत्सर्जन जाँच गरिनेछ र आवश्यक मर्मत गरिनेछ।

२. सञ्चालन चरण

क. वायु, ध्वनि र जल प्रदूषणसँग सम्बन्धित प्रभावहरू

चारलेनमा स्तरोन्नति गरिएको सडक सतहले गर्दा वायु प्रदूषण हालको सडकको तुलनामा न्यूनीकरणमा सहयोग पुऱ्याउने अपेक्षा गरिएको छ। तर, सवारीसाधनको संख्यामा बृद्धि र सडकछेउका व्यावसायिक तथा औद्योगिक क्रियाकलापमा बृद्धिले वायु र गाडीको अत्याधिक गतिले सृजित ध्वनिका कारण प्रदूषणको स्तर अझै बढ्न सक्दछ जसले निजिकका बस्तीलाई प्रदुषित गर्न सक्दछ।

धुलो न्यूनीकरण तथा सडक गुणस्तर कायम राख्न पाँच वर्ष सम्म नियमित मर्मत (जस्तै खाल्डाखुल्डी सुधार) गर्ने गरि आयोजना कार्यन्वयन गरिनेछ। त्यसैगरी सडक छेउ वृक्षारोपण गरिनेछ र ती बोटहरूलाई ध्वनि तथा धुलो नियन्त्रण गर्ने प्राकृतिक अवरोधका रूपमा विकास गरिनेछ।



ख. क्रस ड्रेनेज प्रणालीमा अवरोधले जलमग्नता तथा ढल व्यवस्थापनमा असर

सडक स्तरोन्नतिको क्रममा क्रस ड्रेनेज प्रणालीमा अवरोध आउन सक्नेछ, जसले जल प्रवाहमा बाधा पुऱ्याएर वरपरका क्षेत्रहरूमा जलमग्नता वा बाढीको अवस्था सिर्जना गर्न सक्छ। कमजोर डिजाइन वा अपर्याप्त ढल संरचना निर्माणका कारण वर्षायाममा समस्या झनै गम्भीर बन्न सक्छ। यसले जमिन चोपिने, माटो क्षय हुने, र संरचना तथा पारिस्थितिकीय प्रणालीहरूमा दीर्घकालीन क्षति पुऱ्याउन सक्छ।

बाढी र जलमग्नता न्यूनीकरणका लागि सबै पाइप कल्भर्टहरूलाई बक्स कल्भर्टमा रूपान्तरण गरिनेछ। र जल प्रवाहलाई स्वाभाविक रूपमा बहन दिने व्यवस्था मिलाइनेछ। जल मार्गमा जम्मा भएको सिल्ट हटाइनेछ। सडक अवस्थाको नियमित अनुगमन र मर्मत कार्य, विशेष गरी वर्षायाम अघि र पछि, अनिवार्य रूपमा गरिनेछ। सडक विभाग (DoR) ले क्रस ड्रेनेज सफा गर्ने, नालीहरूको सरसफाइ गर्ने र ढलान संरक्षण संरचना निर्माण गर्नका लागि नियमित मर्मत गर्ने कर्मचारीको व्यवस्था गरिसकेको छ।

ग. संरचनागत अवरोध र सौन्दर्य प्रभाव

VUP निर्माणका क्रममा सडक संरचना कम्तीमा ५ मिटरले उठाउनु पर्नेछ, जसले लामो दूरीसम्म सडक माथि उठाउने आवश्यकता पर्छ। यस संरचना कारण देखिने दृश्य अवरोध हुने र सडकको अर्को किनारसम्म पुग्न अवरोध सिर्जना हुने सम्भावना छ। चन्द्रौटा चोकको स्वाभाविक सौन्दर्यमा प्रभाव पार्न सक्दछ।

यस समस्यालाई न्यूनीकरण गर्न पुनःस्थापित क्षेत्रहरूलाई वरपरको वातावरणसँग मेल खाने गरी रुखहरू विकास गरिनेछ ताकि दीर्घकालीन दृश्य तथा कार्यात्मक असर कम परोस सार्थै, VUP मा भर्तिकल गाडेनिड गरिनेछ जसले संरचनाको सौन्दर्य बढाउनेछ। सडक छेउका भागहरूमा छायाँ दिने र फूल आउने प्रजातिका बोटबिरुवा स्थानीय वन कार्यालय तथा स्थानीय तहसँगको समन्वयमा रोपिनेछ।

घ. उच्च गतिका सवारी साधनको हेडलाइट चमकबाट उत्पन्न हुने असरहरू

आयोजना संगै स्तरोन्नत सडकमा उच्च गतिका सवारी साधनहरूको हेडलाइटको चमकले दृष्टि कमजोरिका कारण बनाउने सम्भावना रहन्छ, जसले सडक दुर्घटनाको समेत जोखिम बढाउँनेछ। राम्रो



सडक अवस्थाले सवारीको गति बढाउने हुँदा प्रकासको प्रभाव झन तीव्र हुने र चालकहरूले अगाडि देखेको गाडी हुने अवस्था सिर्जना हुन्छ।

यस समस्या न्यूनीकरण गर्न सडक सिमामा वृक्षरोपण गरिनेछ जसले समुदायलाई प्रकास प्रभाव बाट जोगाउँछ। त्यसैगरी सडकको Median भागमा बुट्यानहरू रोपिनेछन जसले दिपरित दिशाको गाडीको लाई प्रकासबाट जोगाउनेछ।

इ. जैविक वातावरण

१. निर्माण चरण

क. वनसम्पदाको क्षति (वनको प्रकार र उपलब्ध वनस्पति प्रजातिहरू)

प्रस्तावित ४ लेनको राजमार्गको चौडाई वन क्षेत्रभित्र २४ मिटर रहनेछ। सबै निर्माण गतिविधिहरू सडक विभागको अधिकारक्षेत्रमा रहेको सडक सिमाक्षेत्र (RoW) भित्र गरिनेछ। सडक विस्तारको क्रममा RoW भित्र रहेका ९८०८ रुखहरू काटिन सक्नेछन्।

वन क्षेत्रबाट हटाइएका रुखहरूको क्षतिपूर्ति नेपाल सरकारको नियम अनुसार गरिनेछ। क्षतिपूर्ति वृक्षारोपण कार्यका लागि वन ऐन, २०७६ र वन नियमावली, २०७९ को प्रावधान अनुसार वन विभाग संगको सहमति अनुरूप गरिनेछ। साथै, निर्माण कार्यमा संलग्न निर्माण व्यवसायीले खाना पकाउन एलपी ग्याँस वा विद्युतको व्यवस्था गर्नेछ। वन क्षेत्रमा अस्थायी संरचना निर्माण गरिने छैन र श्रमिकहरूलाई वनस्पति तथा वन्यजन्तु संरक्षणको महत्वबारे जानकारी दिइनेछ।

ख. निर्माण कार्य एवं लापरवाहीका कारण वन्यजन्तुको आवागमनमा अवरोध तथा दुर्घटना

निर्माण कार्यले सडकमा वन्यजन्तु दुर्घटनाको जोखिम बढाउँछ। सडक विस्तारले वन्यजन्तुको बासस्थानमा अवरोध पुऱ्याउँछ र सवारीसाधनको चाप बढाउँछ, जसका कारण जनावरहरूको सडक पार गर्ने क्रम बढ्ने सम्भावना हुन्छ। जंगलको आच्छादन हराउनु र बासस्थान टुक्रिनुका कारण जनावरहरू अपरिचित वा फेरिएको क्षेत्रमा जान बाध्य हुन्छन्, जसले सवारीसँग ठोक्किने सम्भावना बढाउँछ। साथै वन क्षेत्रमा लामो निर्माणकार्य गर्दा वा निर्माण पश्चात समेत निर्माणस्थल क्लोजर नभएका कारण त्यस्तै विजुलिका तारहरू व्यवस्थित नभएर वा समयमा निर्माण बन्ध गराउन नसक्दा वन्यजन्तुको आवागमनमा कठिनाई संगै दुर्घटना हुन सक्ने करेन्ट लागेर समेत मृत्यु हुन सक्ने देखिन्छ।

सडक विस्तारपछि सवारीको गति र संख्या दुवै बढ्ने भएकाले वन्यजन्तु दुर्घटनाको जोखिम अझ बढ्छ। वन क्षेत्रमा पर्ने RoW भित्र रूख कटान गर्दा वन्यजन्तुको बासस्थानमा क्षति पुग्छ र तिनीहरूमा असहजता उत्पन्न हुन्छ। चराहरूको गुँड बनाउने मौसममा रूख कटान गर्दा चराहरूको प्रजनन गतिविधिमा अवरोध पुऱ्याउन सक्छ। निर्माण अवधिमा मानिसहरूको चाप र आवाजले चराहरूमा डर वा असामान्य व्यवहार देखिन सक्छ। जंगल बाहेक, धेरै वन्य प्रजातिहरू नदी, कुलो, रूख, झारजङ्गल र प्राकृतिक मार्गहरूमा निर्भर हुन्छन्। निर्माणको क्रममा यस्ता विशेषता हटाउँदा वन्यजन्तुको आवागमन तथा आपसी सम्बन्धमा गम्भीर अवरोध आउन सक्छ।

वन क्षेत्रमा पर्ने वन्यजन्तु आवागमन मार्गमा विशेष गरी वन्यजन्तु अनुकूल निर्माण संरचना (जस्तै अन्डरपास/कल्भर्ट) निर्माण गरिनेछ, जसले वन्यजन्तुलाई सहज आवागमनमा सहायता पुऱ्याउनेछ। ठूला वन्यजन्तु प्रजातिका लागि Ch. ६४८+५६१ (बेल नदी) र Ch. ६४९+२५७ (ज्वाइ खोला) मा विशेष वन्यजन्तु क्रसिङ संरचना प्रस्ताव गरिएको छ। मध्यम आकारका वन्यजन्तुका लागि Ch. ६४८+१५७ मा सानो पुल प्रस्ताव गरिएको छ। साना वन्यजन्तु र सरीसृप (herpetofauna) प्रजातिहरूको लागि Ch. ६४५+७८९, Ch. ६४६+२३३, र Ch. ६४७+७९१ मा कल्भर्ट निर्माण गरिनेछ। यी संरचनाहरूको आकार वन्यजन्तु मैत्री पूर्वाधार निर्देशिका (Guidelines for Wildlife-Friendly Infrastructure, 2022) अनुसार हुनेछ, जुन नेपाल सरकारद्वारा अनुमोदित गरिएको छ। Ch. ६४८+९०० मा रूखमा विचरणा गर्ने वन्यजन्तुहरू, जस्तै तराई ग्रे लंगुर, रातो बाँदर आदि को लागि क्यानोपी ब्रिज (canopy bridge) प्रस्ताव गरिएको छ। बरकलपुर देखि ज्वाइखोला सम्मको क्षेत्रमा वन्यजन्तु चेतावनी संकेत, गति सिमा बोर्डहरू, र क्रसिङ बोर्डहरू राखिनेछ। साना वन्यजन्तुको आवागमन सहज बनाउन हालका पाइप कल्भर्टहरूलाई बढी चौडा र लामा बक्स कल्भर्टमा प्रतिस्थापन गरिनेछ। वन क्षेत्रमा कुनै पनि कामदार शिविर वा अन्य संरचना निर्माण गरिने छैन।

ग. जलचर पारिस्थितिक प्रणालीमा सम्भावित असर

पुल निर्माण र नदीबाट बालुवा, गिट्टी उत्खननले जलचर प्रजातिको आवागमनमा अवरोध पुऱ्याउन सक्छ। निर्माण कार्य र उपकरणको उपस्थितिले पानीको प्राकृतिक बहाव प्रभावित पार्न सक्छ, जसले जलचर प्रजातिको बसोबास र आवागमनमा असर गर्छ। त्यस्तै, फोहोर व्यवस्थापन र रसायन तेल आदि चुहावटले नदीको पानीको गुणस्तर खस्काउँछ, जसले जलचर प्रजातिको स्वास्थ्य र जैविक



विविधतामा नकारात्मक प्रभाव पार्न सक्छ। निर्माण मजदुरबाट माछा तथा अन्य जलिय जीवहरूमा असर पर्ने जोखिम पनि रहन्छ।

यस्ता प्रभाव न्युनिकरण गर्न, उत्खननको क्रममा नदी प्रणालीमा प्रभाव नपरोस् भनेर प्राकृतिक बहावको बैकल्पिक व्यवस्था गरिनेछ। बालुवा, गिट्टी स्वीकृत स्थानबाट मात्र उत्खनन गरिनेछ र असर परेका क्षेत्रहरू तुरुन्त पुनःस्थापना गरिनेछ। पुल निर्माणका बेला पानीको बहाव कायम राख्न हयुम पाइप राखिनेछ। मजदुरलाई माछा मार्न निषेध गरिनेछ। रसायन, बिटुमिन र इन्धनजस्ता पदार्थहरू अपवहन रोक्ने स्थानमा भण्डारण गरिनेछ। मनसुनमा नदी/खोला नजिक कुनै काम गरिने छैन। जलजीव संरक्षणका लागि मजदुरद्वारा विनाशकारी माछा मार्न कडाईका साथ निषेध गरिनेछ। कामदार शिविर र कार्यस्थलमा सेप्टिक ट्यांकी, सोक पिट र सेडिमेन्टेसन ट्यांकी जस्ता फोहोर पानी प्रशोधन संरचना राखिनेछन्।

घ. चरा प्रजातिमा असर (Avifauna Impact)

निर्माण चरणले चराचुसंगीहरूमा विभिन्न तरिकाले असर गर्न सक्छ। परिपक्व रुखहरू हटाउँदा चराहरूको आवास, आहार खोज्ने स्थान र बस्ने ठाउँ गुम्नेछ। निर्माणको क्रममा मानवीय गतिविधि र आवाज बढ्नाले चराहरूलाई तनाव दिन सक्छ र उनीहरूको व्यवहारमा असर पार्न सक्छ।

जति सकिन्छ, कम संख्यामा रुखहरू हटाइनेछ। सिङ वा फलफूल लाग्ने प्रजातिका तथा हल्का छायाँ दिने वनस्पतिहरू सडक किनारमा वृक्षारोपण गरिनेछ। चराको आवास वृद्धि गर्न, निर्माणपछि अर्धशहरी तथा ग्रामीण क्षेत्रमा रुख रोप्न सिफारिस गरिनेछ। वन क्षेत्रमा गति सीमा र चेतावनी बोर्डहरू राखिनेछन्।

ङ. जंगलमा आगलागीको जोखिम

काटिएका रुख, हाँगा र पातको थुप्रोले विशेष गरी सुख्खा मौसममा आगलागीको उच्च जोखिम पैदा गर्छ। यस्ता थुप्रिएका सामग्रीहरू सजिलै बल्न सक्छन्। निर्माण मजदुरको धूम्रपान बानी, क्याम्प फायर वा पिकनिक जस्ता गतिविधिले पनि जंगलमा आगलागीको सम्भावना बढाउँछ।

मजदुरहरूलाई आगलागीको जोखिमबारे तालिम र सुरक्षा जानकारी मार्फत सचेत गराइनेछ। वन क्षेत्रमा धूम्रपान प्रतिबन्धित गरि सुरक्षित दूरीमा छुट्टै धूम्रपान क्षेत्र व्यवस्था गरिनेछ। मजदुरहरूलाई वन डडेलोको सम्भावना, असर र सुरक्षित धूम्रपान क्षेत्रको महत्वबारे जानकारी दिइनेछ। इन्धनको लागि वनको काठ



प्रयोगमा प्रतिबन्ध लगाइनेछ। जोखिम घटाउन निर्माण व्यवसायीले खाना पकाउन मट्टीतेल वा एलपी ग्याँसको व्यवस्था गर्नेछन्। बिटुमिन तताउन पनि सुरक्षित रूपमा मट्टीतेल प्रयोग गरिनेछ।

च. वन्यजन्तुको अवैध व्यापार र सिकार

निर्माण क्षेत्रमा मजदुरहरूको उपस्थितिले वन्यजन्तु, विशेष गरी मृग, बँदेल जस्ता प्रजातिहरूको अवैध सिकार र फन्दाबाट मारिने जोखिम बढाउँछ। केही मजदुरहरूले जानाजान चराहरू वा अन्य जनावरहरूको सिकार गर्न सक्छन्, वा मौका पाउँदा यस्तो गर्न सक्छन्। निर्माण चरणमा हुने यस्ता सिकारले वन्यजन्तुको संख्यामा गम्भीर असर पार्न सक्छ। यसलाई रोक्न मजदुरहरूका लागि आचारसंहिता तयार गरिनेछ, जसमा सिकार निषेध गरिनेछ। आयोजनाले मजदुरहरूको गतिविधि अनुगमन गर्नेछ र कुनै मजदुर वन्यजन्तु वा चराचुरुङ्गी समाज वा दुःख दिन संलग्न पाइएमा निर्माण व्यवसायी जिम्मेवार ठहरिनेछ। वन्यजन्तुमा असर नपरोस् भनेर रातको समयमा कुनै पनि निर्माण कार्य गरिने छैन।

ii. सञ्चालन चरण

क. सवारी साधनको आवागमन, प्रकाश र आवाजका कारण वन्यजन्तुलाई बाधा

सवारीसाधनको बढ्दो बत्ती र आवाजले जनावरहरूको प्राकृतिक व्यवहार जस्तै आहार संकलन र प्रजननमा असर पार्न सक्छ। सडक विस्तारले वन्यजन्तुको आवागमनमा अवरोध गरी आवास बिखण्डन गराउँछ र स्रोतहरूमा पहुँच सीमित बनाउँछ। यस्ता असरले वन्यजन्तुहरूको स्वास्थ्य र दैनिकीमा प्रभाव पार्न सक्छ।

यी असरहरू सञ्चालन चरणमा देखिए पनि समाधानको तयारी आयोजनाको डिजाइन चरणमै गर्न आवश्यक हुन्छ। त्यसैले, आवश्यक स्थानमा वन्यजन्तु अनुकूल क्रसिङ व्यवस्थापन गरिनेछ। नेपाल सरकारले जारी गरेको वन्यजन्तु अनुकूल संरचना सम्बन्धी दिशानिर्देशन अनुसार वन क्षेत्रमा विशेषगरी अन्डरपास जस्ता संरचना निर्माण गरिनेछन्। आयोजनासँग संलग्न वन्यजन्तु विज्ञले नियमित रूपमा वन्यजन्तुको दृश्य अनुगमन गर्नेछन्। वन क्षेत्रमा रहेका जलस्रोत र पोखरी वरिपरि बारको मर्मत तथा निगरानी गरिनेछ। अन्डरपासमा पर्याप्त प्रकाश राखी वन्यजन्तुको सहज आवागमन सुनिश्चित गरिनेछ। वन्यजन्तु क्रसिङको सूचना र संकेत बोर्डहरू प्रत्येक १ किलोमिटरको दूरीमा राखिनेछन्।

ख. वन स्रोतको विनाश

आयोजना सञ्चालन चरणको समयमा राइट-अफ-वे (RoW) बाट रूखहरूको क्षतिले प्रतिकूल प्रभाव पार्न सक्छ। यसले पानीको प्रवाह नियन्त्रण, माटोको स्थिरता जस्ता पारिस्थितिक प्रणाली कमजोर पारेर कटानी र अवसादनको जोखिम बढाउँछ। वनक्षेत्र घट्दा कार्बन डाइअक्साइड सोस्ने क्षमतामा कमी आउँछ, जसले हरितगृह ग्यास वृद्धि र जलवायु परिवर्तनमा योगदान पुऱ्याउँछ। वन स्रोतमा आश्रित स्थानीय समुदायको जीवनयापन र सांस्कृतिक अभ्यासमा पनि असर पर्न सक्छ।

वनमा असर न्यून पार्न, पहिल्यै चिनिएका रूख मात्र काटिनेछ र सडकको चौडाइ कम राखिनेछ। वन नियमावली, २०७९ अनुसार वन विभागसँग सहमति गरेर क्षतिपूर्ति वृक्षारोपण गरिनेछ। सामुदायिक वन प्रयोगकर्ताबाट काठ खरिद गर्दा विवादको सम्भावना भएमा मजदुर शिविरमा खाना पकाउन एलपी ग्यासको व्यवस्था निर्माण व्यवसायीले गर्नेछ। वन क्षेत्रमा अस्थायी संरचना निर्माण गरिने छैन। वन स्रोत संरक्षण र अनावश्यक रूख कटानी रोक्न मजदुर र स्थानीयवासीलाई लक्षित जनचेतना कार्यक्रम सञ्चालन गरिनेछ।

ग. सडक किनारको वनस्पतिमा बाधा

सडक विस्तार गर्दा सडक किनारको वनस्पतिमा असर पर्न सक्छ। रूख बिरुवा हटाउँदा धुलो र सवारी प्रदूषण बढ्न सक्छ, जसले वायु गुणस्तर घटाउँछ। वनस्पति हटाउँदा पानी सोस्ने र रोक्ने प्रक्रिया प्रभावित भई बाँकी बोटबिरुवामा पानीको कमी हुन सक्छ।

यसलाई समाधान गर्न क्षतिपूर्ति वृक्षारोपणसँगै सडक किनारमा वृक्षारोपण, मरेका बिरुवाको प्रतिस्थापन, सुख्खा मौसममा पहिलो वर्ष नियमित सिचाइ, बारहरूको मर्मत सम्भार गरिनेछ।

वातावरण व्यवस्थापन योजना र वातावरण अनुगमन योजना

आयोजनाका लागि एक पर्यावरण व्यवस्थापन योजना (EMP) तयार गरिएको छ, जसमा न्यूनीकरण उपायहरू, तिनीहरू लागू गरिने समय र स्थान, सम्बन्धित लागत तथा कार्यान्वयन र अनुगमन गर्ने निकायहरूको विवरण समेटिएको छ। साथै, वातावरण अनुगमन योजना (EMoP) पनि तयार गरिएको छ जसले EMP को प्रभावकारी कार्यान्वयन सुनिश्चित गर्न आवश्यक अनुगमन कार्यहरूलाई मार्गदर्शन गर्नेछ। तयार गरिएको EMP को आधारमा निर्माण व्यवसायीले शिविर, प्लान्ट सञ्चालन (क्रसर,



व्याचिग, एस्फाल्ट), खानी तथा उधारो क्षेत्र सञ्चालन, ट्राफिक व्यवस्थापन, फोहोर व्यवस्थापन, आपतकालीन व्यवस्थापन, गुनासो समाधान योजना आदि को लागि Site Specific वातावरणीय व्यवस्थापन योजना तयार गर्नेछ। उक्त योजना CSC (Construction Supervision Consultant) समक्ष स्वीकृतिका लागि पेश गरिनेछ र स्वीकृति प्राप्त भएपछि कार्यान्वयनमा ल्याइनेछ। आयोजनाको कार्यान्वयनको क्रममा न्यूनीकरण तथा प्रबर्द्धन उपायहरूका लागि रु. १४,८३,३४,१९२ विनियोजन गरिएको छ भने, वातावरण अनुगमनका लागि रु. ६७,००,००० प्रस्ताव गरिएको छ।

संस्थागत संरचना

आयोजना सडक कार्यान्वयनको जिम्मेवारी सडक विभाग (DoR) अन्तर्गतको विकास सहयोग तथा कार्यान्वयन महाशाखा (DCID), भौतिक पूर्वाधार तथा यातायात मन्त्रालय (MoPIT) अन्तर्गत रहनेछ। यसले आयोजनाको सम्पूर्ण पर्यावरण तथा सामाजिक सुरक्षात्मक उपायहरू कार्यान्वयनमा समन्वय गर्नेछ। निर्माण सुपरिवेक्षण परामर्शदाता (CSC) टोलीले वातावरण तथा सामाजिक विशेषज्ञलाई समेटेर आयोजनाको वातावरणीय तथा सामाजिक सुरक्षणका क्रियाकलापहरूको अनुगमनमा सहयोग गर्नेछ।

निष्कर्ष

ACCESS-Nepal (Phase 1) अन्तर्गतको गोरुसिङ्गे-चन्द्रौटा सडक स्तरोन्नति आयोजना पश्चिम नेपाल स्थित कपिलवस्तु जिल्लामा पर्दछ। यो बेलबागुर्दबा खोलाको पुल (CH. ६४०+०००) बाट सुरु भई उमरी/शिवपुर चोकसम्म पश्चिमतर्फ विस्तार हुन्छ, जसले बुद्धभूमि र शिवपुर नगरपालिकाका गोरुसिङ्गे, चन्द्रौटा, इमिलिया र शिवपुर बस्तीहरू हुँदै जान्छ। सडक समथर भू-भाग हुँदै जान्छ र सामुदायिक तथा सहकारी वन क्षेत्रहरू पार गर्दछ। आयोजनाले पूर्व-पश्चिम राजमार्गको क्षमता, गुणस्तर र सुरक्षा अभिवृद्धि गर्ने र यसलाई एशियाली राजमार्ग सञ्जालमा समावेश गराउने लक्ष्य राखेको छ।

यद्यपि आयोजनाबाट हुने वातावरणीय तथा सामाजिक प्रभावहरू न्यून र स्थानियकरण भएका छन्, निर्माण कार्यबाट ९,८०८ वटा रुख कटान, केही किनाराहरूको भत्काइ, तथा सम्भावित प्रदूषण हुने अवस्था रहेको छ। आयोजनाबाट प्रभावित निजी तथा सार्वजनिक संरचना र सेवा सुविधाहरूको क्षतिपूर्तिको व्यवस्था प्रचलित कानुनी प्रावधानअनुसार गरिनेछ। न्यूनीकरण र प्रबर्द्धन उपायहरूको सुनिश्चितताका लागि रु. १४.८३ करोडको बजेटसहितको EMP तयार गरिएको छ। यस प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन (IEE) ले उक्त स्तरको अध्ययन आयोजनाका लागि पर्याप्त भएको देखाएको छ।



Initial Environmental Examination (IEE) for Upgrading Gorusinghe-Chandrauta (19.2 Km) Road and Associated Bridges

CHAPTER-1: ORGANIZATION RESPONSIBLE FOR THE PREPARATION OF REPORT

1.1 Project Proponent

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

Contact Details of Proponent

Department of Roads

Development Cooperation Implementation Division, (DCID)

Babarmahal, Kathmandu, Nepal

Phone No: 015903753

Email: dorfcib@dor.gov.np

1.2 Project Consultant

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

Contact Address of Consultant

Joint venture of LEA, Geocom & Material

Test (P) Dhobighat, Lalitpur

Contact: 01-5153049

Email: accgeocom@gmail.com

Terms of References (ToR) for IEE of proposed road upgrading was approved by the Ministry of Physical Infrastructure and Transport on 2081/04/21 BS. The ToR approval letter and approved ToR report is attached in **Annex I**. Initial Environmental Examination (IEE) has been carried out in consultation with experts from different disciplines. The details of the experts involved in the IEE study is presented in Table 1.1. Signed self-declaration form of team of experts with CVs is attached in **Annex III**.

Table 1-1: List of experts involved in IEE study

Name	Position in IEE study Team	Qualification	Number of Environmental Studies	Area (s) of study in IEE
Mr. Yubraj Dhakal	Team Leader for Safeguard Documentation	MSc. in Environment Science	> 30 EA reports	Overall, IEE Formulation
Mr. Krishna Prasad Bhushal	Biologist	MSc. in Zoology	>10 EA reports	Biological Environment
Mr. Krishna Khadka	Sociologist/Resettlement Expert	MA in Sociology	> 8 EA reports	Socioeconomic Environment
Mr. Rupam Kumar Singh	Highway Engineer	MSc. Transportation Engineering Ongoing	> 5 EA reports	Roadway
Mr. Bhabuk Raj Aryal	Bridge Engineer	MSc. Structural Engineer	> 3 EA reports	Bridge-Structure
Mr. Suran Manandhar	Geologist/Geo-tech Engineer	MSc. Civil Engineer	>4 EA reports	Physical Environment
Mr. Rupak Bastola	Hydrologist	MSc. Water Resource Engineer	>7 EA reports	Hydrology



CHAPTER-2: PROPOSAL OF THE PROJECT

2 General Introduction of the Proposal

Government of Nepal has approved proposal for upgrading the Goringhe-Chandrauta section of the EWH. It has proposed to be upgraded through mobilization of contractor for the road/ bridge construction as well as supervision consultant for construction supervision. The Government of Nepal under Accelerating Transport and Trade Connectivity in Eastern South Asia (ACCESS) – Nepal Phase 1 Project intends to hire consulting services for supervision of Butwal-Goringhe-Chandrauta road section (69 Km) as well as to conduct a detailed design of Goringhe- Chandrauta (19.2 km) road improvement works including Environment and Social Study and technical design review of Butwal-Goringhe Road section. The road is 19.2 km in length and includes construction of road as well as the bridges and culverts in proposed section.

Table 2. 1: Name of district and local bodies lies in the road

District	Project affected Municipalities	Length (km)
Kapilvastu	Buddhabhumi Municipality and Shivraj Municipality	19.2

Government of Nepal (GoN) has received funding from International Development Association (IDA) for upgrading Goringhe-Chandrauta (19.2 km) road section of EWH. The project road is part of Accelerating Transport and Trade Connectivity in Eastern South Asia (ACCESS) - Nepal Phase 1 Project located in the Western Part of Nepal in Kapilvastu District. It starts from Belwagurdawa Nadi Bridge (CH 640+000) i.e., continuation of Butwal-Goringhe Section and ends at Umari/Shivpur Chowk. The project road passes through Buddhabhumi and Shivpur municipality crossing through two major settlements viz Goringhe and Chandrauta via small built sections such as Imiliya, Champapur, Kharendrapur and Shivpur etc. The road section passes entirely through plain terrain (generally varies from 100-150 masl). This road section passes through three community forests and one collaborative forest. At Chandrauta and urban area existing road is 15 m wide. All existing bridges in the section are of double lane configurations. In an average, the finished road level rises 0.5-1 m above the natural ground level, except at embankment for bridge approaches where it reaches above 6 meters. The existing RoW is 25 m each side (total of 50 m RoW) from central line. As such there will be no need to acquire additional land for the project except in case of improving of reverse curves. The pavement condition of most of the section of project corridor is not fully satisfactory. The project highway runs through flat



Initial Environmental Examination (IEE) for Upgrading Goringhe-Chandrauta (19.2 Km) Road and Associated Bridges

terrain and the horizontal and vertical geometry for almost the entire length appears to be generally acceptable. However, at few major junctions and reverse curves it needs to be an improvement. It is estimated that the road upgradation cost will be NRs 5 Arab and 68.45 crore with VAT, of which 29.60 crore rupee per km cost.

2.1 Relevancy of the Proposal

The access to road transport is key determinant of economic opportunity and delivery of social services. In this context, GoN has received funding from International Development Association (IDA) for upgrading Goringhe-Chandrauta (19.2 km) road section of EWH. The ACCESS project is jointly funded by the Government of Nepal and the World Bank in September 2022. The proposal is for upgrading of existing road of the national highway from existing two-lane road to four lanes from Goringhe - Chandrauta with the total length of approximately 19.2 km. Hence, it will be the westward extension and will also be connectivity to the Chandrauta-Dhankhola road proposed for upgradation. This project will not only support capacity, quality, and safety improvements but also avoid bottleneck of traffic between these two sections of the East-West Highway (EWH) for improving the international connectivity as well as promoting the trade and business. Therefore, the DoR's EWH upgradation activity will further link with Butwal-Goringhe Highway section that is a part of Asian Highway Standard that provides connectivity between India, Nepal, Bhutan and Bangladesh.

2.2 Objectives of the Project

The main objective of the project is to improve Goringhe- Chandrauta (19.2 km) road section of EWH from 2 lanes into 4 lanes national highway standard including construction of bridges (2 major bridges and 6 minor bridges, 1 VUP, 2 PUPs & 1 FOB) and culverts (64 box culverts and 7 pipe culverts) in proposed section. Widening and improvement components will include pavement upgrading, geometry improvement, construction of new bridges, junction improvements, service roads on both sides of the road in urban areas including cycle lanes and footpaths, pedestrian crossing (overhead bridges/underpass), wildlife crossings designs, drainage improvement, retaining structures; slope protection and stabilization, other off-road works, and bus bays and installation of adequate road safety measures etc.

2.3 Rationality of Conducting IEE

As per the legal requirement of Environment Protection Act (EPA) 2076 (2019 AD), and



Initial Environmental Examination (IEE) for Upgrading Gorusinghe-Chandrauta (19.2 Km) Road and Associated Bridges

Environment Protection Rule (EPR), 2077 (2020 AD) (addendum 2078); Schedule 2, Rule 3, transport sector E (8); Initial Environmental Examination (IEE) is required for upgrading of national highways or feeder roads of length 10-50 km. This project consists of 19.2 km upgrading works including bridges. The road doesnot pass through any protected areas (National Parks, Conservation areas, Wildlife Reserve, Hunting Reserve and Chure Conservation area) Therefore, an IEE must be conducted and approved.

This project is funded by World Bank (WB) and IEE report has been prepared in English language as per EPR 2077 (2020 AD), Section 2, Rule 7, Sub rule 8. A brief synopsis report in nepali including executive summary in Nepali language is also prepared along with the IEE report as per the provision of same sub-rule.

2.4 Objectives of Initial Environmental Examination (IEE)

The main objective of IEE is to ensure the sustainability of the proposed project by enhancing the positive effects and minimizing the negative effects on to the Environment. In addition to this, it aims to achieve the following objectives:

- To collect the baseline information on existing physical, biological, socio-economic and cultural environmental of the project affected areas.
- To analyze, identify, and determine the potetial beneficial and adverse impacts due to project on physical, biological, socio-economic, cultural aspects of the environment
- To propose practical and site-specific mitigation measures for significant adverse impacts and measures for augmentation of beneficial impacts and selected alternatives
- To ensure that IEE is sufficient for implementation of the proposed road
- To prepare the IEE report according to the GESU, 2077, EPA, 2076 and EPR, 2077 and submit it to the concerned bodies, including the opinions and suggestions received from the various concerned agencies.

2.5 Change in Land Use Pattern

Land acquisition for this alignment has already been acquired by Department of Road (DoR). The Government of Nepal announced 50 meter right of way (25 m each side) from the center line in 4th July, 1977, thus GoN has declared the RoW throughout the east west highway (former Mahendra Highway). Hence, no land acquisition is required for this project and there will be minimal or no impact on current land use.



Initial Environmental Examination (IEE) for Upgrading Gorusinghe-Chandrauta (19.2 Km) Road and Associated Bridges

2.6 Loss of Greenery of RoW

The road section passes entirely through plain terrain (generally varies from 100-150 masl). This road section passes through the three community forests and one collaborative forest in Kapilvastu district. The details of the trees that will be lost from the project implementation are listed in **Annex XVII**. Tree enumeration was conducted in July, 2024.

2.7 Project Affected Households and Population

About 50 households with 316 populations are affected by the Gorasinghe- Chandrauta Road upgrading project. Among them 161 are male and 155 are female. The average family size in the project affected area is 6.3.

Table 2. 2: Project affected households and population

S. N	Settlement	No. of HHs	Population	Male	Female	Average Family size
1	Imaliya	7	52	27	25	7.4
2	Kharendrapur	13	71	33	38	5.4
3	Bankatti	10	73	36	37	7.3
4	Chandrauta	20	120	65	55	6.0
Total		50	316	161	155	6.3

Source: Census Survey/Baseline survey, 2024

2.8. Project Affected Private and Public Utilities

A total of 53 private structures, 82 public structures (Including 35 Handpumps) and 1202 public utilities are getting affected by the Gorusinghe- Chandrauta road upgrading works. They are located within the 50 m RoW. The detail list of affected private structures is attached in **Annex IV**.

Table 2. 3: Affected Private structures

Affected Private structure	Partially Affected	Fully Affected	Total No. of Structures	HHs
Residential Structures	9	2	11	11
Small Business Structure	4	1	5	3
Residential/Business structure	33		33	33
Other structures (Shed-1, and temple-1)	2	2	2	3
Total	48	5	53	50

Source: Field Survey, 2024

Altogether 82 public structures including Chautaro, Waiting Place, Temple/Compound Wall, Police Check post /Bit, Entrance gate, School Gate, Toilet and Hand Pump, Roundbout etc. shall be removed for construction of the road as listed below.



Initial Environmental Examination (IEE) for Upgrading Gorusinghe-Chandrauta (19.2 Km) Road and Associated Bridges

Table 2. 4: Project affected public structures

S. N	Types of structures	Nos
1	Chautaro	16
2	Waiting Place	16
3	Temple/Compound Wall	6
4	Police Check post /Bit	5
5	School Gate	1
6	Toilet	1
7	Roundabout	2
8	Handpump	35
	Total	82

Source: Field Survey, 2024

Table 2.5: Project affected public utilities

S. N	Types of utilities	Nos
1	Solar street light	21
2	Telephone pole/Cable pole (147 metal+7 wood)	154
3	Transformers	24
4	Electric pole (concrete)	805
5	Electric pole (steel)	193
6	Electric pole (wooden pole)	5
	Total	1202

Source: Field Survey, 2024

The cost estimation for water supply pipeline to be relocated is included in Annex-V.