

Annexure 2.1: List of Legal Review

Table: Review of relevant Acts, Rules, Regulations and Guidelines

	Articles/rules/clauses, etc.	Related description
Constitution		
Constitution of Nepal	Article 30 (1)	Every person shall have the right to live in clean and healthy environment
	Article 30 (2)	The victim shall have the right to obtain compensation, in accordance with law, for any injury caused from environmental pollution or degradation
	Article 51	Mentions about pursuing policies to develop balanced, environment friendly, quality and sustainable physical infrastructures, while according priority to the regions lagging behind from development perspective. The article also mentions about sustainable development
Policy and Plan		
National Gender Equality Policy 2077	Section 6. Long Term Thought	Gender Equitable Nation Construction
	Section 7. Scenario of Thought	Ensuring substantive and meaningful participation of women in all sectors and maintaining gender equality through economic and social transformation
	Section 8. Target	To establish equality between women, men, gender and sexual minorities in legal and practical terms, including economic, social and political empowerment of women.
	Section 10. Strategy	Changing the tradition of gender-based division of labor and increasing women's participation in the labor market and assessing women's contribution to the economy
	Chapter 2, Long term Vision 2043, Section 2.10 Macroeconomic and Sectoral Vision (d) Infrastructure Sector	Assumes that the development of overall transport sector will create a strong and reliable foundation for the economic and social transformation of the country. Development and expansion of transport infrastructure and services will be carried forward in a planned manner to meet the long term needs of the transport sector.
Fifteenth Plan (2076/77 – 2080/81)	Section 3.4, Table 3.1, S.N. 3.1	Indicators of accessible, safe and modern transportation have been mentioned The status of 2075/76 and target for 2080/81 are mentioned
	Table 3.1 S.N. 7.2	Environmental balance and sustainable use
	Table 3.1 S.N. 7.3	Climate change adaptation
	Section 6. Target	Ensuring citizens' right to live in a clean and healthy environment by pollution control, waste management and green promotion
	Section 7. Objectives	1. Prevention, control and reduction of all types of pollution including water, air, soil, sound, electromagnetic waves, chemical and radioactive 2. Managing waste generated from all sources including domestic, industrial and service sector 3. Mainstreaming environmental concerns in all dimensions of development
National Environmental Policy 2076		

	Articles/rules/clauses, etc.	Related description
National Climate Change Policy 2076	Section 8. Policy, Section 8.2 Environmental mainstreaming	1. Based on the extent, magnitude and duration of the environmental impact, the approval process will be made transparent and simplified by the proponent before implementing the proposal. 2. Arrangements will be made to carry out the project by selecting suitable options so that there is a balance between environment and development. 3. Arrangements will be made to allocate the required funds by the proponent for reducing the adverse effects caused by the environmental impact and enhancing the adaptation effect while preparing the environmental study report.
	Section 8.5 Sustainable Development	1. Environment friendly structures will be built during the construction of physical infrastructures
	Section 7. Objectives	c. To promote green economy by adopting the concept of low carbon emission development f. Mainstreaming or internalizing climate change issues in policies, strategies, plans and programs at all levels and thematic areas of the nation.
	Section 8. Policy 8.2 Forest, Biodiversity and Watershed Conservation	d. An action plan will be formulated and implemented for protection of rare and endangered wildlife and flora and sensitive ecological systems that are at risk of climate change.
	Section 8.5 Industry, Transport and Physical Infrastructure	d. Climate related risk reduction measures will be adopted during design and construction of physical infrastructures
National Occupational Health and Safety Policy, 2076	Section 8. Aim	To ensure the workplace safe through adoption of occupational health and safety standards and measures
	Section 9. Objectives	a) To improve worker's safety, health and work environment b) To minimize occupational safety and health risks in workplace c) To establish a relationship between occupational safety and health and worker's productivity d) To increase production through proper provision of occupational safety and health
	Section 10. Strategies	This section mentions about different strategies to be followed for achieving aim and objectives as mentioned above
National Forest Policy, 2075	Section 6. Objectives	4.Conservation, restoration and sustainable use of forests, flora, fauna and biological diversity. 7.Restoring forests that have been damaged in various ways without reducing the current forest area.

	Articles/rules/clauses, etc.	Related description
National Land Use Policy 2072	Section 8. Policy 8.1 Forest Land Tenure	Strategy and program: If there are no option to use forest to carry out projects of national priority or national pride, the federal government will plan to use forest area based on laws, guidelines and procedures, and in order to compensate the reduced forest area by using forest area, the federal government will also plant trees and restore the forest by coordinating with the provincial and local governments.
	8.4 Biodiversity Conservation	1. Protection and management of rare, endangered and protected wild animals and plants will be done
	Section 5. Long term view	Achieving social, economic and environmental development and prosperity in a sustainable way by optimum utilization of available land and land resources
	Section 8. Policy and Strategy	2.3 (c) Maintaining balance between physical infrastructure development and environment 2.3 (g) Ensuring conservation and promotion of biological diversity 7.2 If forest land is to be used for implementation of national priority projects, then, arrangements for mandatory plantation in equal land without reducing will be done. 9.3 Construction or expansion of roads that promote soil erosion, adversely affect arable land and endanger local settlements will be discouraged. 10.2 While implementing the development construction works, in order to maintain a balance between land, environment and development, the principle of sustainable development will be adopted along with considering the impact of climate change.
Land Acquisition, Resettlement, and Rehabilitation Policy for Infrastructure Development Project 2071	Section 7. Policy	7.1 To create a situation where there is no displacement of local people, families or communities or as little displacement as possible due to the implementation of the project. 7.2 In case of displacement due to the project, minimizing the adverse effects of the project provide opportunities for compensation and economic-social benefits to the affected person, family or community. 7.3 Make land acquisition, compensation, rehabilitation and evaluation work simple, easy, transparent and fair, creating an environment to complete the project within the stipulated time.
National Wetland Policy 2069	Section 11. Policy to Prohibit Wetlands Adverse Actions	3. Prohibition on dumping of chemical and household waste, industrial discharge, use of pesticides, use of electric waves and dumping of explosives in wetlands
Nepal Federation of Indigenous Nationalities (Adivasi Janajati) (NEFIN) 2004,	Section 7.2.7	The policy has prescribed the following key provisions for project affected indigenous people and vulnerable groups (Section 7.2.7): ESS7 of the WB's ESF applies to a distinct social and cultural group identified the term "Indigenous People, Historically

	Articles/rules/clauses, etc.	Related description
		Underserved Traditional Local Communities Indigenous ethnic minorities,” “aboriginals,” “hill tribes,” “vulnerable and marginalized groups,” “minority nationalities,” “scheduled tribes,” “first nations” or “tribal groups.” The term Indigenous People is used in a generic sense to refer exclusively to a distinct social and cultural group
National Child Policy 2069	Section 7. Major Objectives of Policy	7.1 Protecting children from all types of physical or mental violence, harm or abuse, neglect, exploitation and sexual abuse.
	Section 9. Strategy (Related with Objective 7.1)	As child labor can impact on long term physical and psychosocial development, for its redress monitoring mechanism to check whether any industries or enterprises are employing child labor or not should be made effective. If any employer is found using child labor, then immediate rescue of such child should be done and employer should be punished. Integrated relied facilities will be provided for rehabilitation of child.
National Transport Policy 2058	Section 5.8	Construction, improvement and management of the means of transport shall be done in harmony with the environmental effect
	Section 7.1.5	Manage the design, construction and maintenance of the roads with minimal environmental effects
Acts		
Environment Protection Act, 2076	Section 3: Preparation of Environmental Study Report	1. The proponent has to prepare the environmental study report as specified for the proposed proposal. 5. A public hearing should be held while preparing the environmental study report.
	Section 4: Detail Analysis of Alternatives	1. In the environmental study report, the proponent shall make a detailed analysis of the adverse effects that may occur on the environment during the implementation of such a proposal and the various options that can be adopted for its mitigation, and recommend the option that is suitable for the implementation of the proposal.
	Section 12: Environmental Audit	After completion of 2 years from the date of commencement of service of the proposal, within 6 months, the MoFE or designated agency shall carry out an environmental audit and keep the environmental audit up to date.
	Section 13: Prohibition	Anyone who implements a project without the approval of the environmental study report or in a manner contrary to the approved environmental study report can stop such project.
	Section 3 Land Tenure of National Forests	(1) The land ownership of the national forest area shall remain with the Government of Nepal.
Forest Act 2076		

	Articles/rules/clauses, etc.	Related description
		(2) Without the decision of the Cabinet of Ministers of Government of Nepal, it is not possible to change the use of the national forest area, to provide the right of use of the national forest to anyone, to transfer the right through mortgage or other means.
	Section 12 No settlement or resettlement within forest areas	(1) No forest area containing trees shall be used for settlement or resettlement.
	Section 41 Land use of forest areas shall not be changed	No part of the national forest shall be used in such a way as to change the land use of the forest area. However, this arrangement will not be applicable in the case of forest area provided to any project as per the decision of Nepal Government for infrastructure development
	Section 42 use of forest area	Regardless of what is written elsewhere in this Act, if there is no other option than to use the forest area to implement a national priority project, and if there is no significant adverse impact on the environment during the implementation of such project, the Government of Nepal may approve the use of any part of the national forest for such project.
Land Use Act 2076	Section 8 Land use shall not be changed	(1) According to Section 4, the land classified for one purpose cannot be changed to use it for another purpose. (7) Notwithstanding anything contained in sub-section (1), the Government of Nepal may change the existing land use of the following places: (b) Places to establish projects of national pride or priority development projects, industrial areas, special economic zones etc.
The Act Relating to Children, 2075	Section 66: Offences against the child	66. Offences against the child: (1) If any person does any act of violence referred to in sub-section (2) or sexual abuse referred to in sub-section (3), he or she shall be deemed to have committed the offence against the child under this Act. (2) If any person does any of the following acts against a child, he or she shall be deemed to have committed the act of violence against the child: (3) If any person does any of the following acts against a child, he or she shall be deemed to have committed child sexual abuse: www.lawcommission.gov.np 31 (a) To show, or cause to show, him or her an obscene picture, audiovisual recording or other material of similar kind or display, or cause to display, such expression or gesture that reflects obscene or sexual conduct or behaviour to him or her or display, or cause to display, child pornography, (b) To distribute, store or use any actual or fictitious obscene picture or audio-visual material of him or her, (c) To propose, lure, coerce or threaten him or her for sexual activity, (d) To use him or her in

	Articles/rules/clauses, etc.	Related description
		the production of an obscene act and material, (e) To touch, kiss, hold sensitive parts of body of him or her, embrace him or her with sexual intent or cause him or her to touch or hold sensitive parts of own body or body of another person or render him or her unconscious with sexual intent or display, or cause him or her to display sexual organs, (f) To use, or cause to use, him or her for stimulating sexual lust or sexual excitement, (g) To use, or cause to use, him or her for the purpose of sexual gratification, (h) To engage, or cause to engage, in child sexual exploitation, (i) To use, or cause to use, him or her with the intent of providing sexual services, (j) To use, or cause to use, him or her with the intent of engaging in sexual abuse, (k) To use him or her in prostitution or other sexual work. (4) Notwithstanding anything contained in sub-section (3), anything that is expressed by means of writing, speaking, gesturing or displaying any word, picture, audio, visual means and object or material on a sex related matter without displaying obscenity with the aim of imparting information and education or an act done in good faith in the course of making treatment of the child or saving the child from an accident or risk shall not be deemed to constitute an act of sexual abuse.
Local Government Operation Act 2074	Section 11 Rights of Rural Municipality and Municipality	(2) Without prejudice to the generality of subsection (1), the functions, duties and rights of rural municipalities and municipalities shall be as follows: d. Local Taxes, Service Charges and Duties g. Local level development projects j. Local market management, environmental protection and biodiversity t. Local roads, rural roads, agricultural roads and irrigation
Labour Act, 2074	Section 5 Child labor shall not be employed	No one should employ children in any work contrary to law.
	Section 6 Non-discrimination	(1) Employers shall not discriminate against workers on the basis of religion, race, sex, caste, origin, language or ideological belief or any other similar basis.
	Section 7 No discrimination in remuneration for equal work	(1) There should be no discrimination in remuneration for work of equal value between workers on the basis of gender.
	Section 68 To formulate safety and health policy	(1) Subject to this Act, the rules made under this Act and the instructions given in accordance with this Act or the rules made under this Act, the employer shall formulate and implement a policy related to the safety and health of workers and other persons at the workplace.

	Articles/rules/clauses, etc.	Related description
	Section 71 Duties of responsible persons	For work related to any workplace, equipment, material or substance, it will be the responsibility of the responsible person to ensure that it is safe and healthy.
	Section 74 Establishment of Safety and Health Committee	(1) In an organization employing twenty or more workers, the employer shall form a safety and health committee as specified in such a way that the workers are also represented.
	Section 76 Stopping work in case of immediate danger	(1) Any work if not stopped immediately can cause physical injury or danger to the worker or someone else, or if there is a serious impact on his health or there is unexpected damage or loss of any equipment, object or substance, the worker involved in such work shall inform the employer or responsible person according to section 71. (2) Upon receiving the information as per sub-section (1), the employer or the responsible person shall immediately give appropriate instructions in this regard. (3) If the employer or the responsible person is not immediately available to give the information as per sub-section (1), the worker himself can stop such work.
	Section 78: Special provisions relating to occupational safety and health	(1) The safety and health standards to be followed by the organization related to the following subjects shall be as prescribed.
	Section 80: Arrangements should be made for the control of infectious diseases	(1) The employer shall make appropriate arrangements for the prevention and control of infectious diseases at the workplace.
The Act Relating to Rights of Persons with Disabilities, 2074	Section 15. Right of access to services, facilities and justice	(1) The persons with disabilities shall have the right to have easy access to other services and facilities that are open or provided for the public, including educational institutes, housing, workplaces, buildings, roads, transportation, and electronic communication services.
	Section 18. Right to movement	The persons with disabilities shall have the right on an equal basis with others to make movement with their assistant materials and assistance of persons of their choice.
The National Civil (Code) Act, 2074	Chapter 14. Provision relating to wages	Clause 640 mentions any person who has attained at least fourteen years of age may be employed in a work with his or her consent. Similarly, as per clause 641 person who has not attained sixteen years of age shall not be employed in a hazardous business or work. Clause 642 mentions about provision of safety measures to be made and Clause 643 speaks on prohibition of employing for more than eight hours. In case of need to employee more than 8 hours, the consent shall be obtained from him/her.

	Articles/rules/clauses, etc.	Related description
Control of International Trade of Endangered Wild Fauna and Flora Act, 2073	Section 3. Prohibition on Trade or Transaction of Threatened or Vulnerable wild fauna or flora or specimen thereof	(1) No person shall purchase, sell, possess, use, plant, rear, captive breed, transport or import or export or cause to be done so a threatened or vulnerable wild fauna or flora or a specimen thereof.
The Sexual Harassment at Workplace (Prevention) act 2071 (Amendment 2075)	Section 3:Not to commit or cause to Commit Sexual Harassment Section 4. To be considered as Sexual Harassment	No person shall commit or cause to be committed sexual harassment in workspace. (1) If anyone commits or causes to be committed, the following acts by abusing one's position, power or authority to any employee or customer in the workplace by creating any form of pressure, influence or enticement or by discouraging, it shall be considered that sexual harassment has been committed: - (a) To touch or attempt to touch any organ of the body with sexual intent, (b) To use or display word, picture, newspaper, audio, visual, other information technology, medium, object or material related to obscene and sexual activity, (c) To display or express obscene and sexual intent by writing, speaking or gesticulating, (d) To make an offer for sexual activity, (e) To tease or annoy with sexual intent (2) Notwithstanding anything contained in clauses (a), (b) or (c) of sub-section (1), anything done in course of educational, informative, research oriented, treatment or lifesaving activity shall not be considered to be a sexual harassment.
Solid Waste Management Act, 2068	Section 4 Sub-section (1)	According to this Act, the responsibility for managing waste will be at the local level, but in sub-section (2) it is mentioned that the responsibility of processing and managing harmful waste, health institution waste, chemical waste or industrial waste subject to the prescribed standards shall be the responsibility of person or entity generating such waste The local level will do the necessary work to encourage waste minimization, reuse and recycling and can create and implement the necessary guidelines for its effective implementation.
Human Trafficking and Transportation (Control) Act, 2064	Section 4: Acts considered as Human Trafficking and Transportation	Acts considered as Human Trafficking and Transportation: (1) If anyone commits any of the following acts, that shall be deemed to have committed human trafficking: (a) To sell or purchase a person for any purpose, (b) To use someone into prostitution, with or without any benefit, (c) To extract human organ except otherwise determined by law, (d) To go for in prostitution. (2) If anyone commits any of the following acts, that shall be deemed to have committed human transportation: (a) To take a person out of the country for the purpose of buying and selling, (b) To take anyone from his /her home, place of

	Articles/rules/clauses, etc.	Related description
		residence or from a person by any means such as enticement, inducement, misinformation, forgery, tricks, coercion, abduction, hostage, allurements, influence, threat, abuse of power and by means of inducement, fear, threat or coercion to the guardian or custodian and keep him/her into ones custody or take to any place within Nepal or abroad or handover him/her to somebody else for the purpose of prostitution and exploitation.
Child Labor (Prohibition and Regulation) Act, 2056	Section 3: Child shall not be employed	1. No one should employ a child under fourteen years of age as a laborer.
	Section 6: Consent to be obtained	1. If an organization has to employ a child, it must take the approval of the relevant labor office or any other body or official designated by that office and the father, mother or guardian of the child.
	Section 9: Timing of Employment	1. Children should not be employed after 6 pm to 6 am. 2. Children should not be employed for more than 6 hours a day and thirty-six hours a week, with or without additional remuneration. 3. After working for three consecutive hours every day, the child should be given half an hour rest time and one day off every week.
	Section 10: Remuneration and Benefits	1. The Organization shall give equal wages and facilities for equal work to children working as laborers without any discrimination on the basis of gender, race, religion or caste.
Water Resource Act, 2049	Section 19. Water Resources not to be Polluted	(1) Government of Nepal may, by a notification published in the Nepal Gazette, prescribe the pollution tolerance limit for water resources. (2) No one shall pollute water resource by way of using or putting any litter, industrial wastes, poison, chemical or toxicant to the effect that the pollution tolerance limit of the water resource as prescribed pursuant to Sub-section (1) is exceeded. (3) The prescribed officer may, as required, examine or cause to examine to determine as to whether or not the water resource has been polluted or the quality standard as prescribed pursuant to Sub-section (1) of Section 18 has been maintained.
	Section 20. Not to Cause Substantial Adverse Effect on Environment	While utilizing water resources, it shall be done so in such a manner that no substantial adverse effect be made on environment by way of soil erosion, flood, landslide or similar other cause
Soil and Watershed Conservation Act, 2039	Section 10. Prohibited acts in land vulnerable or likely to be vulnerable to natural calamity	Points a, b, c, d, e, f of the legal provisions on prohibited activities on land where natural disasters occur or may occur

	Articles/rules/clauses, etc.	Related description
Land Acquisition Act, 2034	Section 3 Right of Government of Nepal to acquire land for public works	If the Government of Nepal deems it necessary to acquire any land for the purpose of any public work, the Government of Nepal may acquire any amount of land in any place by giving compensation in accordance with this Act.
	Section 4 Provisions related to the acquisition of land for the organization	If any organization requests the Nepal Government to acquire any land for the following works by paying compensation and all other expenses as per this Act, the Nepal Government may decide to acquire the land to such an organization.
	Section 7 Compensation for Damages	(1) In accordance with section 6, compensation will be given for the loss due to cutting or breaking down of crops, trees, walls etc. (2) The amount of compensation as per sub-section (1) shall be determined by the officer conducting the initial investigation and given to the concerned person.
Public Road Act 2031	Section 3 Classification of Public Roads and Road Border Thereof	The Government of Nepal shall, by a notification in the Nepal Gazette, classify the public roads as (a) Highways, (b) Feeder roads, (c) District roads and (d) Urban roads and specify the road border not exceeding Thirty One meters on both right and left hand sides from the central line of such roads. The Government of Nepal may specify the required border also setting out the four boundaries: to limit speed or for the safety of a bridge or the river banks around the bridge.
	Section 3A Power to prohibit the making of building etc. within the prescribed distance	(1) The Government of Nepal may prohibit any person from building any kind of permanent structure or building within such distance by a Notification in the Nepal Gazette, as not exceeding Six meters from the road border where it has been specified pursuant to Section 3 and from the side of the public road where the road border has not been specified.
	Section 14 Power to Requisition other land in developing, expanding or improving roads	The Department of Roads may temporarily requisition any land for different specified purpose until the development, expansion or improvement of a public road is completed
National Parks and Wildlife Conservation Act, 2029	Section 15 Compensation of Land to be requisitioned and Fixation of Compensation	This section deals with different circumstances where compensation can be given and process of compensation. A Compensation Fixation Committee (CFC) determines compensation in case of loss of assets, business or production.
	Section 4. Restriction on entry into national park	No person shall be allowed to enter into a national park or reserve without obtaining an entry permit as prescribed or a written permission from the authorized official.
	Section 5. Prohibited actions within national park or reserve	This section mentions about different activities prohibited within national park or reserve without obtaining a written permission from the authorized official:

	Articles/rules/clauses, etc.	Related description
Ancient Monument Preservation Act 2013	Section 17 A. Preservation of Archaeological Object	(1) Except the one under private ownership, all archaeological objects found anywhere shall be under the custody of the Department of Archaeology. (2) The Department of Archaeology may, on taking surety at the recommendation of the Local Office-Chief, handover the archaeological object under its custody to perform some traditional fair, festival or ceremony for a fixed period of time.
Rules Forest Regulation 2079	Rule 3. Land use of national forest land not to be changed	(2) if land use of forest area is to be changed for national security, then GON can approve any part of the forest land for land use change. (3) as per sub rule (2) land use of the approved land should be used only for what it has been approved.
	Rule 4. Provision of providing area of National Forest	(1) As per rule 3 (2), GON can provide forest land whose land use change has been approved for concerned entity. This description of providing land along with approval of land use should be provided to Provincial Ministry and Directorate. (2) The concerned entity who gets land as per sub rule (1) should allocate budget for plantation and care for five years in the area assigned by Department or Division Forest Office.
	Rule 6. Provision on regulation of entering inside forest area	(1) Divisional Forest Officer can give permission to vehicles and people for movement within the forest area for certain time defining certain condition for implementation of development projects as mentioned in section 9 subsection 4 of the Forest Act.
	Paragraph 22. Provision for providing national forest land to development projects	Rule 87. deals with design of development projects without forest land as far as possible. If forest land is unavoidable, then report with all the alternatives should be prepared, environmental study should be done in coordination with concerned division forest office. Rule 88. deals with letter to be given/forwarded for use of forest land Rule 89. deals with description to be asked Rule 90. deals with approval by GON Rule 91. deals with land to be provided in place of forest land use Rule 92. deals with provision of formation of land attainment facilitation committee Rule 93. deals with amount to be deposited. Sub-rule 4 of Rule 93 states that development projects should deposit amount estimated as per department for propose of section 42 subsection (6) of Forest Act in forest development fund. Further, sub-rule 5 states that when estimating cost as per sub-rule 4, cost required for planting ten times the number to trees and poles to be removed by development projects should also be included.

	Articles/rules/clauses, etc.	Related description
		Rule 94. deals with agreement process Rule 102. deals with removal of trees. As per sub-rule 3 of rule 102, department can approve removal of trees after required investigation for trees within right of way of road or canal expansion of those that have maintained right of way as per Forest Act 42 or before implementation of Forest Act 2049. As per sub-rule 4 of rule 102, after getting approval, such development projects should deposit estimate cost as per rule 93 sub-rule 4 in forest development fund.
Land Use Regulation 2079		This regulation has divided the land into 10 zones based on its geological capacity, usage and features. The land has been categorized as agricultural zone, residential zone, commercial zone, industrial zone, area of mines and minerals, forest zone, public use zone, area of cultural and archaeological importance and others. The regulations prohibit commercial land plotting and its sale in areas except in classified areas for residential purposes The regulations have the provision that the federal level will deal with the land use mapping procedures across the country and hand it to the local level which can revise and update the mapping as per its needs and implement it.
Environment Protection Rule, 2077	Rule 3. Environmental Studies to be done	As per Environment Protection Act, section 3 subsection 1, the proponent has to conduct Brief Environmental Studies for proposals mentioned in schedule 1, Initial Environmental Examination for proposals mentioned in schedule 2 and Environmental Impact Assessment for proposals mentioned in schedule 3. As per schedule 3 pertaining to rule 3 of EPR 2077, EIA is required for upgradation of National Highways or Feeder Roads of more than 50 Km.
	Rule 4. Scoping to be done	Before conducting EIA, the proponent has to conduct scoping as per section 5 subsection 1 of Act.
	Rule 5. ToR to be prepared	For all the environmental studies, the proponent has to prepare Terms of References. For EIA, TOR has to be prepared in the format as provided in schedule 8
Disaster Risk Reduction and Management Regulations, 2076	Rule 9. Liability of Public Institutions and Commercial Organizations	1. Public or commercial organizations should fulfill their obligations to prevent disasters from happening 2. Public or commercial organizations should formulate and implement a business continuity plan to resume their business before a disaster, during a disaster, and after a disaster.

	Articles/rules/clauses, etc.	Related description
		3. Public or commercial organizations should install fire control and disaster mitigation equipment b) To foster or keep specimens (produce, transport or use) of endangered wildlife c) To plant, grow or keep specimens, use, produce or transport endangered plants; e) To carry out controlled breeding of rare or endangered wild animals or plants Provisions relating to determination of working hours Provisions relating to additional time for rest Occupational Safety and related provisions Provisions relating to employer's duties Special provisions relating to occupational safety and health Provisions relating to adoption of protective measures Provisions on not lifting heavy load (for adult male-55 kg and for adult female 45 kg) Other provisions relating to occupational health and safety (1) The Local Body shall, while fixing segregation at least of organic and non-organic solid waste at its source under Section 6, have to make management and segregation of harmful or chemical waste separately. If it is prescribed as above, the individual, organization or agency generating such solid waste, shall have to make segregation as prescribed. (2) The responsibility of managing the chemical or harmful solid waste under Sub-Rule (1) shall be of concerned generator. Eligibility certificate to be submitted in order to employ the child If a child is to be employed, the employer must submit the child's details to the labor office and obtain permission Provisions to be made regarding the health and safety of children 1) If there is a need to carry out any work on the land designated as a natural disaster or where there is a risk of such a work, permission must be obtained from the Watershed Protection Officer by giving reason for such works. This rule describes process to be adopted for operating any services from anybody within National Park of Reserve area.
Control of International Trade of Endangered Wild Fauna and Flora Rule 2076	Rule 3. Application for a permit	
Labour Rule 2075	Rule 16.	
	Rule 17.	
	Rule 34.	
	Rule 35.	
	Rule 39.	
	Rule 41	
	Rule 42	
	Rule 44	
Solid Waste Management Rule 2070	Rule 3. Segregation and Management of Solid Waste	
Child Labor (Prohibition and Regulation) Rule 2062	Rule 4	
	Rule 5	
	Rule 25	
Soil and Watershed Conservation Rule 2042	Rule 11. Approval to be taken	
National Parks and Wildlife Conservation Rule 2030	Rule 3. Services to be operated in a National Parks or a Reserve	
Guidelines		
Wildlife Friendly Infrastructure Construction Guidelines 2078		This guideline assists in constructing wildlife friendly infrastructure in linear nature projects to secure the movement of animals and reduce accidents and conflicts between

	Articles/rules/clauses, etc.	Related description
		human and wildlife. This guideline has suggested minimum guideline dimensions for underpass and overpass structures required for different categories of wildlife.
Green Infrastructure Design for Transport Projects, A Road Map to Protecting Asia's Wildlife Biodiversity, 2075, ADB		This report discusses the impacts of transport projects on wildlife and biodiversity in Asia, and how to address them by integrating road ecology principles and green infrastructure to balance construction with environmental conservation.
Gender Equality and Social Inclusion (GESI) Operational Guidelines 2074, MoPIT	1.4 Objectives and Guidelines	The main objective of the guideline is to provide guidance on implementation of gender equality and social inclusion in all aspects of MoPIT policies, institutions and in its program/ project implementation processes in an integrated manner. The specific objectives are to: (1) ensure that a gender and social inclusion responsive approach is adopted and monitored in MoPIT to improve the access of women, poor and the excluded to resources, opportunities and benefits from the programs/ projects and services of the Ministry. (2) ensure GESI issues are addressed both in programmes and in institutions.
Forest Product Collection and Sale Distribution Guidelines 2073		This guideline assists general public in utilizing forest products. Paragraph 2 describes provision about license on pruning, cutting and collection of forest products, paragraph 4 describes about wood measurement and stocking and sales provision of erect and fallen trees.
Nature Conservation National Strategic Framework for Sustainable Development 2072		This Framework addresses topical questions, such as how to carry out conservation of heritage sites such as National Parks and sensitive watershed areas such as Churia, mitigation of water and air pollution and reduction in green gas emissions, while developing physical infrastructure that does not compromise the environment.
Accessible Physical Structure and Communication Service Directive for People with Disabilities 2069		This directive has stated mandatory provisions for making public places accessible for people with disabilities both physically and also in terms of communication. This directive has also stated the proper dimensions on making different structures accessible for people with disabilities.
Environmental and Social Management Framework (ESMF) GESU-DoR, GoN 2064		The framework contains public consultation framework and compendium of environmental and social impacts with mitigation measures that needs to be adopted during road design, construction and operation. Addendum is focused for bridge related cases.

	Articles/rules/clauses, etc.	Related description
Environmental Management Guidelines, Geo Environmental Unit, DoR, 2053 (1997 AD)		This guideline assists to integrate environmental consideration in each phase of project cycle. The guideline consists of environmental mitigation measures to be incorporated into Road projects, procedures for public participation, and socio-economic consideration.
National Environmental Impact Assessment Guidelines 2050		The guideline assists mechanisms for conducting Environmental Assessment. This guideline guides in project screening, scoping, identifying project impacts, adopting mitigation measures, monitoring, evaluating impacts, community participation, and report preparation.
Project Guidelines		
Environmental and Social Management Framework (ESMF), 2077, SRCTIP – Trade Component, MoICS/MoALD		This ESMF forms part of the comprehensive environmental and social management approach that is adopted for addressing potential environmental and social impacts from SRCTIP-trade component. In line with ES Requirements of GoN and applicable 9 out of 10 Environmental and Social Standards (ESS) of WB the ESMF defines (a) the approach for identifying the environmental and social issues associated with the SRCTIP-trade component activities, (b) the requirements for conducting environmental and social screening and environment and social assessment studies, and (c) measures to avoid, minimize, mitigate and manage adverse impacts and enhance positive ones. It includes an exclusion list and simplified tools to be used to determine types of environmental and social assessment required for proposed initiatives. A gender development framework and capacity building measures and a monitoring mechanism are also included in the ESMF.
Indigenous Peoples Planning Framework (IPPF), 2076, SRCTIP, Trade Facilitation Component, MoICS and MoALD		This Indigenous Peoples Planning Framework (IPPF) outlines the policy, process and procedures to understand project impacts on Indigenous Peoples (IPs) under the Strategic Road Connectivity and Trade Improvement Project (SRCTIP)-Trade Facilitation Component, to be implemented by the Ministry of the Industry Commerce and Supply (MoICS) and Ministry of the Agriculture and Livestock Development (MoALD), with financial support from the World Bank.
Labor Management Procedures (LMP), 2076, SRCTIP, DCID, DOR, MoPIT		The LMP is developed to manage labour and working conditions' risks, associated with improvement of Nagdhunga Naubise Mugling (NNM) & KDP Road and periodic maintenance of selected roads to meet World Bank Environment and Social Standards (ESSs), in particular ESS2 on Labour and Working Conditions and ESS4 on Community Health and Safety.

	Articles/rules/clauses, etc.	Related description
Resettlement Policy Framework (RPF), 2076, SRCTIP, DCID, DOR, MoPIT		This Resettlement Policy Framework (RPF) provides the resettlement policy, principles and organizational arrangements and design criteria to be applied to the SRCTIP specifically for the upgrading of the KDP road, under the regional connectivity improvement component of the project. The RPF is prepared according to the standards of GON legislation and policy including the Land Acquisition Act 1977, and according to World Bank's Environmental and Social Standard (ESS) 5 on Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
Stakeholder Engagement Plan (SEP), 2076, SRCTIP, DCID, DoR, MoPIT		This SEP includes details of stakeholders and activities carried out in the preparation phase of NNM road and in feasibility and planning stage of the KDP road. Detailed consultations for the KDP road upgrading will be carried out at the detailed design phase. The details of consultations for the periodic maintenance activities will be determined during project implementation.
Standards		
Standards related with extraction sale and management of stone, aggregates and sand, 2077	Section 3, Determining area for extraction or collection	This section mentions about procedures to be adopted by municipalities and rural municipalities for determining area of extraction or collection of river bed and quarry materials
	Section 4, Collection, extraction and sale of river bed materials	This section mentions about procedures to be adopted by municipalities and rural municipalities for collection, extraction and sale of river bed materials
	Section 5, Arrangements for extraction of quarry materials	This section mentions about procedures to be adopted for collection and extraction of quarry materials
	Section 6, Arrangements regarding forest and chure area	This section mentions about procedures to be adopted for collection and extraction of stones, aggregates, sand and soil from forest and chure area
	Section 12, Special arrangements for big, transformative, national pride and priority projects	This section mentions about procedures to be adopted for collection and extraction of river bed materials for big, transformative, national pride and priority projects
		The permissible exposure limit (PEL) of noise for the workplace is 90 dBA for 8 hours, 95dBA for four hours, 100 dBA for two hours, 105 dBA for one hour, 110 dBA for 30 minutes, and 115 dBA for 15 minutes a day in the workplace.
Maximum Noise Level Standard at workplace, 2073 and National Standards on Light and Noise 2073 BS	Clause 36 (section 12)	The permissible exposure limit for light in lux for different types of activities such as emergency, limited, easy, casual moderate, difficult and very difficult is 10, 20, 50, 100, 300, 500 and 1000 respectively based on the nature of work

	Articles/rules/clauses, etc.	Related description
Standards regarding removal of government trees 2071	Section 4	If road side trees are to be removed for road widening or any other reason than as per decision of DOR and recommendation from committee formed as per section 10 of this standard and approval from Department of Forest, Division Forest Office can give approval for removing those trees.
Nepal Road Standards 2070	Section 1. Introduction	a. Nepal Road Standards -2071 (Second Revision 2070), in short called NRS-2070, shall apply to all Strategic Roads in rural areas being constructed within Nepal. For non-strategic (Local Roads) and urban roads separate standards shall be considered.
National Ambient Air Quality Standards 2069	Section 3. Road Classification	Roads in Nepal are classified as follows: A. Administrative Classification: National Highways, Feeder Roads, District Roads and Urban Roads B. Technical/Functional Classification: Class I, Class II, Class III and Class IV
Noise Level Standard of Nepal 2069		Government of Nepal has formulated noise level standard for different area for day and night time. Project Activities should be within the prescribed limit of noise level. No equipment or activities exceeding limit is allowed.
Nepal vehicle mass emission standard 2069		All the vehicle in the use of the project should be followed the emission standard and limits for the stipulated parameter.
National Diesel Generator Emission Standard 2069		The GoN has introduced the National Diesel Generator Emission Standard (NDGES) for new and in-use diesel generators with a capacity of 8 kW-560 kW. The emissions limits are set for four major pollutants: CO, HC, NOx, and PM. Generators used for the project should comply with the emissions limit.
Nepal Bridge Standards 2067	Section 1.0 Introduction and Background	DOR has formulated these standards with a view to establish a common procedure for design and construction of road bridges in Nepal.
	Section 3.1 Design Life	All permanent bridges shall be designed for a design life of minimum 50 years. Traffic projections shall be made for a period of 30 years.
	Section 3.2 Design Discharge	All permanent bridges shall be designed for a discharge of 100 yrs. return period. For the calculation of design discharge empirical formulas especially developed for other catchments shall not be used.
National Drinking Water Quality Standards, 2079		Government of Nepal has issued this notice of implementation of National Drinking Water Quality Standards, 2079 under the provision of Water Resources Act, 2049, Clause 18 and Sub Clause 1. Water used for drinking purpose within the project should meet this standard

	Articles/rules/clauses, etc.	Related description
Tolerance limits for different industrial effluents discharged into Inland Surface Water, 2058		All the effluents from camps, batching plants, crusher plants etc. should meet this standard before discharging effluent to any inland surface water.
Conventions/Agreements		
Paris Agreement under the United Nations Framework Convention on Climate Change, 2015 A.D.		The Paris Agreement is a legally binding international treaty on climate change. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century.
SIACM (2006) A.D.		The achievement of the sound management of chemicals throughout their life cycles so that the chemicals used in ways that minimize significant adverse impacts on the environment and human health as appropriate, by stakeholders, according to their applicability.
Rio de Janeiro Convention on Biological Diversity (CBD, 1992 A.D.)		The Convention has three main goals including: the conservation of biological diversity (or biodiversity); the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources. In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity.
Convention 182 on The Worst Forms of Child Labour, 1999		Convention 182 outlines the 5 worst forms of labour that must be eradicated in order to step up the fight against child labour. They are as follows: • Slavery or similar practices, such as the sale or trade of children or the use of children in debt bondage or serfdom; • Obligatory or forced work, including the compulsory recruitment of children for use in armed conflicts; • The recruitment, use or offer of a child for involvement in prostitution, pornographic material or pornographic shows; • The use, recruitment or offer of a child for illicit activities, notably in the production or trafficking of drugs, as defined in the specific international treaties; Work which, by its very nature or the conditions in which it is undertaken, is likely to jeopardise the health, safety or morality of children.
Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997 A.D.		The Kyoto Protocol operationalizes the United Nations Framework Convention on Climate Change by committing industrialized countries and economies in transition to limit and reduce greenhouse gases (GHG) emissions in accordance with agreed individual

	Articles/rules/clauses, etc.	Related description
		targets. The Convention itself only asks those countries to adopt policies and measures on mitigation and to report periodically.
United Nations Framework Convention on Climate Change, 1992 A.D.		The ultimate objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." It states that "such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner."
Indigenous and Tribal Peoples Convention 1989 (No. 169) ILO Convention 169		The convention has visionary instrument seeking to ensure that indigenous peoples enjoy human rights without discrimination, exercise control over their own development and participate in decision-making processes that affect their lives. The theme of this convention is the project activities should not harm or disturb any Indigenous and Tribal Peoples
Basel Convention on The Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1989		The provisions of the Convention center around the following principal aims: the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal; the restriction of trans boundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management; and a regulatory system applying to cases where trans boundary movements are permissible.
Convention on International Trade in Endangered Species of wild Fauna and Flora (CITES 1973 A.D.)		It regulates international trade in endangered wild flora and fauna with the aim of reducing or eliminating trade in species whose numbers or conditions suggest that further removal from their natural habitat would lead to their extinction. It urges parties not to allow trade in specimen of species included in the CITES Appendices I, II and III with some exception. As the area holds some CITES listed species, this convention is attracted in case of their trade.
The Ramsar Convention 1971		The Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat is an international treaty for the conservation and sustainable use of Ramsar sites (wetlands). It is also known as the Convention on Wetlands. As per article 3, the Contracting Parties shall formulate and implement their planning so as to promote the conservation of the wetlands included in the list, and as far as possible the wise use of wetlands in their territory. Similarly, as per article 4, Each Contracting Party shall promote the conservation of wetlands and waterfowl by establishing nature reserves on

	Articles/rules/clauses, etc.	Related description
		wetlands, whether they are included in the list or not, and provide adequately for their wardening.

Annexure 3.1: Gazette Mentioning ROW 50 m and ownership

नेपाल राजपत्र

भाग ३

श्री ५ को सरकारद्वारा प्रकाशित

काठमाडौं, असार २० गते २०३४ साल

श्री ५ को सरकार
निर्माण तथा यातायात मन्त्रालयको
सूचना

सावजनिक सडक ऐन, २०३१ को दफा ५ ले दिएको अधिकार प्रयोग गरी श्री ५ को सरकारले महेन्द्र राजमार्ग (हेटौंडा-नारायणगढ खण्ड) निर्माण गर्नको लागि नारायणी अञ्चल मुग्लानपुर जिल्ला हेटौंडा नगर पञ्चायत अन्तर्गत देहायका वडा नम्बरमा पर्ने देहायबमो-को जग्गाहरू प्राप्त गर्ने निर्णय गरेको हुनाले यो सूचना प्रकाशित गरिएको छ।

१ मा पर्ने:-

पूर्व बाटो कि. नं. १५०, १५१, १५२, बाटो, १४७, १४८, १४९, १५७, १५८, १५९, १५९, १६१, १६२, १६३, १६४, १६६, १६७, १६८, १६९, १७०, १७१, १७२, बाटो, ३७२, ३७३, ३७४, ३७५, ३७६, ३७७, ३७८, ३७९, ३८०, ३८१, ३८२, ३८३, ३८४, ३८५, ३८६, ३८७, ३८८, ३८९, ३९०, ३९१, ३९२, ३९३, ३९४, ३९५, ३९६, ३९७, ३९८, ३९९, ४००, बाटो, पश्चिम कि. नं. १५५, १५६, १५७, १५८, १५९, १६०, १६१, १६२, १६३, १६४, १६५, १६६, १६७, १६८, १६९, १७०, १७१, १७२, १७३, बाटो, ४००, ३६४, बगर, ३६३

२०३५/३१२०

नेपाल राजपत्र भाग ३

(१३)

श्री ५ को सरकार

निर्माण तथा यातायात मन्त्रालयको

सूचना

सार्वजनिक सडक ऐन, २०३१ को दफा ३ ले दिएको अधिकार प्रयोग गरी श्री ५ सरकारले देहायको सार्वजनिक सडकहरूलाई देहायबमोजिम वर्गीकरण गरी सडकको रेखादेखि दायाँ बायाँ देहायबमोजिमको सडक सिमा तोकिएको छ ।

(क) राजमार्गहरू:-

१. महेन्द्र राजमार्ग (वनवासा-काकरभित्ता)
२. अरनिको राजमार्ग (काठमाडौँ-कोदारी)
३. सिद्धार्थ राजमार्ग (सुनौली-पोखरा)
४. त्रिभुवन राजमार्ग (काठमाडौँ-रक्सौल)
५. जोगवनी-धरान-धनकुटा राजमार्ग,
६. नेपालगञ्ज-कोहलपुर-सुर्खेत-राजमार्ग,
७. धनगढी-डडेल्धुरा राजमार्ग,
८. पृथ्वी राजमार्ग (नौविसे-पोखरा)
९. पोखरा-सुर्खेत राजमार्ग,
१०. दोललघाट-धनकुटा राजमार्ग,
११. गोरखा-नारायणगढ राजमार्ग,

(ख) सहायक मार्ग:-

१. कुनौली-हुनुमाननगर-भार्दी-फल्तेपुर,
२. काठमाडौँ-त्रिशुली,
३. खुनवा-तौलिहवा-म. रा. मा.,
४. म. रा. मा.-परासी,
५. काकहवा-लुम्बिनी,
६. भद्रपुर-चाशाली-इलाम,
७. म. रा. टनगर-रंगेली-भापा,
८. इला-सिराहा-म. रा. मा.,
९. फिदिम,
१०. राज-सिराहा,
११. रा-लुम्बिनी-तौलिहवा-बहादुरगञ्ज,
१२. परासी-त्रिवेणीघाट,

2038/2/20

(१४)

नेपाल राजपत्र भाग ३

१३. म. रा. मा.-कृष्णनगर,
१४. मझवा-सागु,
१५. म. रा. मा.-गुलरिया-मुर्तिहा,
१६. गौर-म. रा. मा.,
१७. लमही-घोराही-तुलसीपुर,
१८. तुलसीपुर-सल्यान,
१९. लामोसागु-जिरी,
२०. वीरगञ्ज-कलैया-गौर,
२१. दोलालघाट-चौतारा,
२२. म. रा. मा.-मलंगवा,
२३. म. रा. मा.-राजविराज-कुनौली,
२४. त्रिभुवन राजमार्ग-कुलेखानी,
२५. डडेलधुरा-डोटी,
२६. डडेलधुरा-बैतडी,

१८
१९
२०
२१
२२
२३
(६

गौर
प्र
व
प्र
प
प्र
व

(ग) जिल्ला मार्गहरू:-

१. भैसे-भीमफेदी,
२. हनुमाननगर-राजविराज,
३. भगवानपुर-लाहान-उदयपुर-गढी,
४. डुम्रे-बेसी शहर,
५. जलेश्वर-मलंगवा,
६. कोइलावास-म. रा. मा.,
७. नेपालगञ्ज-गुलरिया-धनगढी-राजपुर-बिलौरी-ब्रम्हदेवमाण्डो,
८. भैरहवा-पकिलहवा,
९. तानसेन-रिडी,
१०. पृथ्वी राजमार्ग-रूपाताल-वेगनासताल,
११. त्रिशुली-धुन्चे-सोमदाङ्ग,
१२. ठोरी-भरतपुर,
१३. भक्तपुर-नगरकोट,
१४. जलकुण्डी-दाङ एयरपोर्ट,
१५. सातडोबाटो-टिकाभैरव,
१६. सानोठिमी-अरनिको राजमार्ग,
१७. ब -गोदावरी,

जग
म
म
७.
म.
६. इला
१०.
११.
१२.

२०२४/३/२०
नेपाल राजपत्र भाग ३

(५)

१८. बनेपा-पनौती,
१९. गोकर्ण-साँखु,
२०. काठमाडौँ-दक्षिणकाली,
२१. काठमाडौँ-बुढानिलकण्ठ,
२२. सितामञ्जल-भक्तपुर,
२३. चतरा-धरान,

(घ) शहरी मार्गहरू:-

नेपाल अधिराज्यका नगर पञ्चायत क्षेत्रभित्रका सबै सडकहरू (राजमार्ग, सहायक मार्ग र जिल्ला मार्ग बाहेक)

१. प्रकरण (क) मा लेखिएका राजमार्ग र उपत्यकाको चक्रपथको केन्द्र रेखादेखि दायाँ बायाँ दुवैतिर पच्चीस पच्चीस मिटर सडक सिमा तोकिएको छ।

२. प्रकरण (ख) मा लेखिएका सहायक राजमार्गको केन्द्र रेखादेखि दायाँ बायाँ दुवैतिर पन्ध्र पन्ध्र मिटर सडक सिमा तोकिएको छ।

३. प्रकरण (ग) मा लेखिएका जिल्ला मार्गको केन्द्र रेखादेखि दायाँ बायाँ दुवैतिर दश दश मिटर सडक सिमा तोकिएको छ।

४. प्रकरण (घ) मा लेखिएबमोजिम सार्वजनिक सडकको न्यूनतम १ मिटर र अधिकतम ५ मिटरसम्मको फूटपाथ समेतलाई सडक सिमा तोकिएको छ।

राजमार्ग (निर्माण व्यवस्था) ऐन, २०२१ को दफा २ को खण्ड (ख) र दफा ५ मोजिम प्रकाशित यस मन्त्रालयको मिति २०२१।११।११, ०२४।१२।१२ र ०२५।०३।०३ को सूचना खारेज गरिएको छ।

आज्ञाले-

नारायणप्रसाद अर्जेल
श्री ५ को सरकारको सचिव

Annexure 3.2: Baseline Household Survey Questionnaire

Socio-economic Baseline Survey Questionnaire Format

नेपाल सरकार सडक विभाग विकास सहायता कार्यान्वयन महाशाखा क्षेत्रीय व्यापारिक मार्ग बिस्तार आयोजना कमला-ढल्केवर-पथलैया सडक खण्ड (महेन्द्र राजमार्ग) सामाजिक-आर्थिक घरधुरी सर्वेक्षण प्रश्नावली

१. सामान्य विवरण

- १.१ आयोजना खण्ड: कमला-ढल्केवर-पथलैया सडक खण्ड
१.३ जिल्ला :-
१.५ बाई नं. १.२ चेनेज:-
१.४ गाउँपालिका /नगरपालिका /उप /महानगरपालिका :-
१.६ वस्ती:- १.७ घर नम्बर:

२. परियोजना क्षेत्रको घरधुरीको पारिवारिक जानकारी

- २.१ घरमूलीको नाम (क. स. २.७ बाट लेख्नुहोस्)
२.२ उत्तरदाताको नाम: (क. स. २.७ बाट लेख्नुहोस्)
२.३ जाती / जनजाती: २.४ धर्म: २.५ बोल्ने भाषा: २.६ प्रमुख धार्मिक पर्वहरु : .
२.७ कृपया तपाईंको आफ्नो परिवारको विस्तृत विवरण दिनुहोस् (घरमूलीबाट सुरु गर्ने)

(१) क्र.सं.	(२) नाता (घरमूलि सँग)	(३) लिङ्ग (कोड हेर्नुहोस्)	(४) उमेर	(५) बसोवासको स्थिति कोड हेर्नुहोस्)	(६) शिक्षा	(७) सिप/तालिम (१० वर्ष र सो भन्दा माथी) (कोड हेर्नुहोस्)	(८) मुख्य पेशा (१० वर्ष र सो भन्दा माथी) (कोड हेर्नुहोस्)	(९) आम्दानीको प्रमुख स्रोत (१० वर्ष र सो भन्दा माथी) (कोड हेर्नुहोस्)	(१०) वर्षको औषत आम्दानी रु	(११) वर्षको औषत खर्च रु
१	घरमूलि									
२										
३										
४										
५										
६										
७										
८										
९										
१०										

कोडहरु :-

(३) लिङ्ग	(५) बसोबासको कोड	(६) शिक्षा	(७) शीप/तालिम	(८) पेशा	(९) आम्दानीको प्रमुख स्रोत	(१०) वर्षको औषत आम्दानी
(१) पुरुष (२) महिला (३) अन्य	(१) तत्काल घरमै रहेको (२) ६ महिना भन्दा बढि समय देखि नेपाल भित्र (अन्यत्र) रहेको (३) ६ महिना भन्दा बढि समयदेखि नेपाल बाहिर रहेको	(१) स्कूलजाने बेला नभएको (२) अशिक्षित (३) स्कूल नगएको तर सामान्य लेख-पढ गर्न जान्ने (४) स्कूल स्तरमा अध्ययन गरेको (१ देखि १० सम्म) (५) SLC/SEE पास गरेको (६) १२ कक्षा वा प्रमाण-पत्र तह पास गरेको (७) स्नातक तह पास गरेको (८) मास्टर्स वा सो भन्दा माथि पास गरेको	(१) डकर्मी (२) सिकर्मी (३) सुचिकार (४) फलाम औजार (५) जुत्ता, चप्पल सिलाउने (६) सिलाई बुनाई (७) ड्राइभर (८) प्राविधिक काम (९) कम्प्युटर (१०) केही नभएको (११) अन्य भए खुलाउने	(१) कृषि (२) पशुपालन (३) व्यापार/ उद्योग (४) नोकरी (५) विद्यार्थी (६) घरायसी काम (७) बालक असक्षम (८) वृद्ध असक्षम (९) मजदुरी (१०) वैदेशिक रोजगार (११) निवृत्तिभरण (१२) अन्य भए खुलाउने	१) केहीनभएको २) कृषि उपज ३) पशु चोपाया ४) कूखुरा/हाँस पालन ५) तलब ६) पेन्सन ७) मजदुरी ८) सानु पसल/चिया पसल ९) ब्यापार १०) ठेक्का पट्टा ११) अन्य भए खुलाउने	महिनाको औषत आम्दानी कोआधारमा वर्षको औसत आम्दानी निकाल्ने। १) एक लाख सम्म २) एक लाख देखी दुई लाख सम्म ३) दुई लाख तीन लाख सम्म ४) अन्य

२.८ घर जग्गा भएको/नभएको :

१) घर र जग्गा दुवै भएको : २) घरमात्र भएको : ३) जग्गा भएको : ४) घरजग्गा कहि नभएको :

५) जग्गा भएमा :

जग्गाको प्रकार	क्षेत्रफल विघा, कठ्ठा, धुर	सिँचाई सुविधा भएको/नभएको	आफैले गरेको	अरुलाई कमाउन दिएको	कैफियत
खेत					
बारी					
पाखो					
अन्य					

६) घरको प्रकार :

७) पशुपंक्षी पालन गर्ने गोठ/खोर आदि भए/ नभएको (भएमा प्रकार खुलाउने) : १. कच्चि २. पक्कि ३. अन्य

८) घरमा शैचालयको व्यवस्था छ/छैन (भएमा प्रकार खुलाउने) : १. कच्चि २. पक्कि ३. अन्य

९) खाना पकाउने चुलोको प्रकार: १. भुसे २. आधुनिक चुलो ३. अन्य

१०) खाना पकाउनको प्रयोग गर्ने इन्धनको प्रकार : १. विद्युत २. दाउरा ३. अन्य

११) इन्धनको श्रोत : १. विद्युत २. मट्टीतेल ३. अन्य

१२) पिउने पानीको श्रोत : १. धारा २. कुवा ३. अन्य

२.९ गतवर्ष कृषिउपजबाट उत्पादन भएको बाली र यसबाट प्राप्त आम्दानीको विवरण दिनुहोस् ।

क्र.सं.	कृषि उपज	उत्पादन (के.जी.)	गत वर्षको बिक्री	
			परिमाण (के.जी.)	आम्दानी रु.
१	धान			
२	मकै			
३	गहुँ			
४	ऊखु			
५	दाल तथा गोडागुडी			
६	तेलहन			
७	आलु			
८	फलफूल			
९	तरकारी			
१०	दुध/घिउ			
११	कुखुरा/अण्डा			
१२	माछा			
१३	मासु /पशु			
१४	अन्य भए खुलाउने			
जम्मा				

२.१० पशु/गाईवस्तु पनि पाल्नु भएको छ ? यदि पाल्नु भएको भए तलका मध्ये संख्या के कति होलान् ?

१) गाई २) गोरु ३) भैसी ४) राँगा

५) बाख्रा ६) सुँगुर ७) कुखुरा ८) अन्य. (उल्लेख गर्ने).....

२.११ तपाईंको आफ्नो कृषि / पशु उपज र खेतीपातीको उब्जनीबाट कति महिनासम्म खाद्यान्न पर्याप्त हुन्छ ? खुलाउनुहोस् ।

१) ३ महिना भन्दा कम २) ३ देखि ६ महिना भन्दा कम ३) ६ - १२ महिना ४) १२ महिना भन्दा बढी

२.१२ नपुगेको अवधिमा तपाईंले के गरेर गुजारा चलाउने गर्नुहुन्छ?

(१) अन्य क्षेत्रबाट हुने आम्दानी (व्यापार, पारिश्रमीक आदि)

(२) ज्यालादारी

(३) अन्य सामान आदि बेचेर

(४) ऋण लिएर

(५) वैदेशिक रोजगार

(६) अन्य (उल्लेख गर्ने)

२.१३ यो बाहेक तपाईंको आफ्नो अन्य व्यापार व्यावसाय/उद्योग के के गर्नुहुन्छ ? ती व्यावसायबाट वार्षिक के कति आम्दानी हुन्छ ? खुलाउनुहोस्

क्र.सं.	व्यापार व्यावसाय	वार्षिक आम्दानी (रु)
१		
२		
३		
४		
जम्मा		

३ आम्दानी तथा खर्चको विवरण

३.१ तपाईंको परिवारको गतवर्षको आम्दानी र यसका श्रोतहरू बताईदिनु हुन्छ कि ?

क्र.सं.	विवरण(आम्दानीका श्रोत)	वार्षिक आम्दानी रु.
१	कृषि उपज बिक्री (२.७ नं.को आम्दानी)	
२	नोकरी	
३	मजदुरी	
४	निवृत्तिभरण	
५	घरभाडा	
६	आफ्नो व्यापार /व्यावसाय /उद्योग (२.११ नं.को आम्दानी)	
७	सम्पत्ति बिक्री	
८	विदेशबाट प्राप्त आय	
९	ब्याज आम्दानी (Interest)	
१०	अन्य अन्य भए खुलाउने	
जम्मा		

३.२ कृपया तपाईंको घरमा गतवर्ष भएको खर्चको विवरण दिनुहोस् ।

क्र.सं.	विवरण	वार्षिक खर्च (रु.)	क्र.सं.	विवरण	वार्षिक खर्च(रु)
१	खाद्यान्न (दाल, चामल, तरकारी, नुन, मसला, आदि)		२	माछामासु, फलफूल आदि	
३	दुध, दहि, घिउ आदि		४	ईन्धन (दाउरा, मट्टितेल, ग्याँस आदि)	
५	विजुली, खानेपानी, संचार (फोन, कम्प्युटर, इन्टरनेट आदि)		६	औषधि उपचार	
७	चाडपर्व		८	शिक्षा, कपडा, यातायात	
९	कृषि तथा खेतिपाती(खनजोत, मल, औषधि आदि)		१०	मर्मत संभार/कर	
११	जन्म, वर्तवन्ध, विवाह, मृत्यु आदि		१२	अन्य (खुलाउने).....	
जम्मा					

४.१ यस आयोजनाले घर जग्गामा के कस्तो प्रभाव पार्छ/परेको छ ?

- १) घरमा क्षति (पूर्ण/आंशिक)
- २) जग्गामा क्षति (पूर्ण/आंशिक)
- ३) अन्य क्षति

४.२ आयोजनाले बाली-नालीमा के कस्तो प्रभाव पार्छ/परेको छ ?

- १) पूर्ण क्षति
- २) आंशिक क्षति
- ३) अन्य क्षति

४.३ आयोजनाले अरु क्षेत्रमा के कस्तो प्रभाव पार्छ/परेको छ ?

- १) धुलो धुँवा हुने
- २) बाढी जाने
- ४) खानेपानी/कुलोमा क्षति
- ५) अन्य क्षति

१. महिला र केटाकेटी सम्बन्धि विषेश कार्यक्रम
४. आय आर्जनको लागि बिउपूजि

२. चेतनामुलक शिक्षा र तालिम
५. अन्य (खुलाउने).....

३. रोजगारी

- १)
- २)
- ३)

फाईदा

बेफाईदा

१. छु २. छैन

१. सक्छ २. सक्दैन

१. महिला समूह २. स्थानिय युवा क्लब ३. उपभोक्ता समिति ४. अन्य (खुलाउने)

.....

9.

2.

3.

9.....
2.....
3.....

अन्तरवार्ता लिनेको नाम :
मिति :
सुपरिवेक्षकको नाम:.....

नेपाल सरकार

सडक विभाग

कमला-ढल्केवर-पथलैया सडक खण्ड (महेन्द्र राजमार्ग)

घरधुरी सर्वेक्षण प्रश्नावली

१. अन्तवार्ता लिनेको नाम:.....

२. अन्तवार्ता मिति:.....

१. परिचयात्मक र साधारण जानकारी

१.१ उत्तरदाताको नाम:

१.२ जिल्ला :

१.३ गा. पा. /न.पा. /उप-म.न.पा.:.....

१.४ वार्ड नं:.....

१.५ गाउँ/टोल:.....

१.६ घरमूलीको नाम:

१.७ नागरिकता नं:.....

१.८ टेलिफोन नं:.....

१.९ घरमूलीको प्रकार (यदि निमुखा परिवारमा पर्ने भएमा): बृद्धा [] विधुवा [] अपाङ्गता [] विदुर [] दलित [] जजजाती []

१.१० घर/जग्गाधनीको बाबु/आमा वा पति/पत्नीको नाम :.....

१.११ जग्गाधनीको ससुरा/बाजेको नाम :.....

१.१२ जात/जाती:..... १.१३ भाषा..... १.१४ धर्म:

१.१५ तपाईंको परिवार कहाँबाट कहिले यस ठाउँमा बसाँदै सरी आउनु भएको हो ? १. कहाँबाट..... २. कहिले.....

२ परिवारक विवरण

२.१ जम्मा परिवार संख्या (घरमूलीबाट सुरु गर्ने)

क्र.सं.	(१) (२) नाता (घरमूलि संग)	(३) लिङ्ग (कोड हेर्नुहोस्)	(४) उमेर	(५) बसोवासको स्थिति कोड हेर्नुहोस्)	(६) शिक्षा	(७) सिप/तालिम (१० वर्ष र सो भन्दा माथी) (कोड हेर्नुहोस्)	(८) मुख्य पेशा (१० वर्ष र सो भन्दा माथी) (कोड हेर्नुहोस्)	(९) आम्दानीको प्रमुख श्रोत (१० वर्ष र सो भन्दा माथी) (कोड हेर्नुहोस्)	(१०) वर्षको औषत आम्दानी रु
१	घरमूलि								
२									
३									
४									
५									
६									
७									
८									
९									
१०									
११									
१२									

कोडहरु :-

(३) लिङ्ग	(५) बसोवासको कोड	(६) शिक्षा	(७) सीप/तालिम	(८) पेशा	(९) आम्दानीको प्रमुख श्रोत	(१०) वर्षको औषत आम्दानी
(१) पुरुष (२) महिला (३) अन्य	(१) तत्काल घरमै रहेको (२) ६ महिना भन्दा बढि समय देखि नेपाल भित्र (अन्त्यत्र) रहेको (३) ६ महिना भन्दा बढि समयदेखि नेपाल बाहिर रहेको	(१) स्कूलजाने बेला नभएको (२) अशिक्षित (३) स्कूल नगएको तर सामान्य लेख-पढ गर्न जान्ने (४) स्कूल स्तरमा अध्ययन गरेको (१ देखि १० सम्म) (५) SLIC पास गरेको (६) १२ कक्षा वा प्रमाण-पत्र तह पास गरेको (७) स्नातक तह पास गरेको (८) मास्टर्स वा सो भन्दा माथि पास गरेको	(१) डकर्मी (२) सिकर्मी (३) सुचिकार (४) लोहार (फलाम औजार) (५) साकी, चमार (जुता, चप्पल सिलाउने) (६) सिलाई बुनाई (७) ड्राइभर (८) प्राविधिक काम (९) कम्प्युटर (१०) केही नभएको ११) अन्य.....	(१) कृषि (२) पशुपालन (३) व्यापार/ उद्योग (४) नोकरी (५) विद्यार्थी (६) घरपरसी काम (७) असक्षम (८) मजदुरी (९) ब्यापार (१०) ठेक्का पट्टा (११) अन्य.....	(१) केही नभएको (२) कृषि उपज (३) पशु चौपाया (४) कुखुरा/होस पालन (५) तलब (६) पेन्सन (७) मजदुरी (८) सान्नु पसल/ घिया पसल (९) ब्यापार (१०) ठेक्का पट्टा (११) अन्य.....	महिनाको औषत आम्दानी को आधारमा वर्षको औसत आम्दानी निकाल्ने ।

२.२ विगत १ वर्षमा परिवारमा कसैको जन्म वा मृत्यु भएको थियो कि ?

जन्म: १ थियो २ थिएन * [मृत्यु: १ थियो २ थिएन यदि थियो भने, को..... कति वर्षको उमेरमा..... कुन रोगको कारण.....]

३. जिविकोपार्जन सम्बन्धि

३.१ तपाईं र तपाईंका अन्य सदस्यहरुको नाममा के कति जग्गा रहेको छ ? विवरण दिनुहोस् ।

क्र.सं.	जग्गाधनीको नाम	लिङ्ग	जम्मा क्षेत्रफल	आयोजनामा क्षेत्रफल	पर्ने	कित्ता नम्बर	जग्गाको प्रकार*	सिचाई सुविधा	जग्गाको उपयोग**	उपयोगको तरिका***
१										
२										
३										
४										
परिवारको नाममा भएको जम्मा क्षेत्रफल (प्रचलित ईकाइमा)										
जम्मा क्षेत्रफल (ब.मी.)										

संकेत: जग्गाको प्रकार*: १=अब्बल, २ = दोयम, ३=सीम, ४=चाहार, ५=अन्य भए । सिचाई सुविधा: १=छ, २=छैन ।

जग्गाको उपयोग*: १=घरघडेरी, २=खेत, ३=वारी, ४=व्यापारिक क्षेत्र, ५=खरवारी/बुट्यान, ६=

उपयोगको तरिका***: १=आफ्नो जग्गा आफै कमाएको, २=आफ्नो जग्गा अरुलाई अधियामा दिएको, ३ =वन्दकी दिएको, ४= माही, ५= अरुको जग्गा अधियाँ ठेकामा कमाएको

३.२ तपाईंको आफ्नो खेतीपातीको उब्जनीबाट कति महिना खानपुग्छ ?

१) ३ महिना भन्दा कम २) ३ देखि ६ महिना भन्दा कम ३) ६ - १२ महिना ४) १२ महिना भन्दा बढी

३.३ यदि तपाईंको परिवारलाई आफ्नो जमिनमा उत्पादनले नपुग्ने भएमा तलका मध्ये के बाट गुजारा गर्नु हुन्छ ?

- (१) अन्य क्षेत्रबाट हुने आम्दानी (व्यापार, पारिश्रमीक आदि) (२) ज्यालादारी
(३) घरका गाई वस्तु/अन्य सामान आदि बेचेर (४) ऋण लिएर
(५) वैदेशिक रोजगार (६)अन्य (उल्लेख गर्ने).....

३.४ नपुगा खाद्यान्न किन्न मासिक कति रुपैया खर्च लाग्छहोला? रु.....

३.५ गाईवस्तु पनि पाल्नु भएको छ ? यदि पाल्नुभएको भए तलका मध्ये के कति होलान् ?

- १) गाई २) गोरु ३) भैसी ४) राँगा
५) बाख्रा ६) सुँगुर ७) अन्य.....

३.६ यस बाहेक तपाईंको आफ्नो व्यापार व्यावसाय पनि छ? छ भने, त्यसबाट वार्षिक के कति आम्दानी हुन्छ ? खुलाउनुहोस् वार्षिक रु.....

४ पारिवारिक आम्दानी तथा खर्चको विवरण

४.१ तपाईंको परिवारको गतवर्षको आम्दानी र यसका श्रोतहरू बताईदिनु हुन्छ कि ?

क्र.सं.	विवरण (आम्दानीका श्रोत)	वार्षिक आम्दानी रु.
१	कृषि उपज बिक्री (अन्न, उखु, फलफूल, दुध/घिउ, कुखुरा/अण्डा, आदी)	
२	नोकरी	
३	मजदुरी	
४	निवृत्तिभरण	
५	घरभाडा	
६	आफ्नो व्यापार/उद्योग	
७	विदेशबाट प्राप्त आय	
८	अन्य	
	जम्मा	

४.२ कृपया तपाईंको घरमा गत वर्ष भएको खर्चको विवरण दिनुहोस् ।

क्र.सं.	विवरण	वार्षिक खर्च (रु.)	क्र.सं.	विवरण	वार्षिक खर्च (रु.)
१	खाद्यान्न (दाल, चामल, तरकारी, नुन, मसला, आदि)		२	माछामासु, फलफूल आदि	
३	दुध,दहि,घिउ आदि		४	ईन्धन (दाउरा, मट्टितेल, ग्याँस आदि)	
५	विजुली, खानेपानी, संचार (फोन, कम्प्युटर, इन्टरनेट आदि)		६	औषधि उपचार	
७	चाडपर्व		८	शिक्षा, कपडा, यातायात	
९	कृषि तथा खेतिपाती (खनजोत, मल, औषधि आदि)		१०	मर्मत संभार/कर	
११	अन्य (खुलाउने).....		१२	जम्मा	

५. आयोजनाबाट प्रभावित घर/संरचनाको स्वामित्व र विवरण दिनुहोस् ।

५.१ के यो घर तपाईंको आफ्नै हो ? १. हो २. होइन यदि, हो भने कसको हो? नाम लेख्नुहोस्.....

क्र.सं.	घर/संरचना धनीको नाम	बस्ती /वाड	चेनेज	तर्फ (दायाँ /बायाँ)	संरचनाको प्रकार	निर्माणमा प्रयोग भएको सामग्री	जम्मा क्षेत्रफल (ल X चौ)	तला संख्या	प्रभावित क्षेत्रफल (ल X चौ)	हालको उपयोग	अनुमानित मूल्य (रु.)	निर्माण वर्ष
१	घरधनी.....											
२												
३												
४												

० संरचनाको प्रकार: १= बस्ने घर, २= व्यापारिक टहरो, ३= सामुदायिक भवन, ४=शौचालय, ५=पर्खाल, ६=अन्य भएमा उल्लेख गर्ने.....
 ०० निर्माण सामग्री: १=ढुङ्गा र माटोको गारो सहित खर र जस्ता छाना २= ढुङ्गा र माटोको गारो सहित जस्ता वा स्लेटको छाना, ३=ढुङ्गा र माटो बाहिरी भागमा सिमेन्ट प्लस्टर सहित जस्ता वा भिँगटीको छाना, ४= RCC, ५ बाँस वा टिनले बारेको संरचना
 ००० हालको उपयोग: १=आँफै बसोबास गरिरहेको, २= व्यापार व्यवसायमा प्रयोग भएको, ३= बसोबास र व्यापार व्यवसायमा दुवैमा प्रयोग भएको, ४= अन्य कसैलाई भाडामा दिएको

(भवन वा संरचनाको जम्मा क्षेत्रफल वा प्रभावित क्षेत्रफल तलाको क्षेत्रफल (लम्बाई x चौडाई) लाई तला संख्याले गुणन गरि निकाल्नुपर्नेछ ।)

५.२ यदि भाडामा बस्नु भएको हो भने, भाडामा बस्ने परिवारको विवरण दिनुहोस्

क्र.सं.	परिवारमुलीको नाम	ठेगाना	जात जाती	जम्मा परिवार संख्या	मुख्य पेशा	कति समयदेखि बसिरहेको	उपयोग गरिरहेका कोठा संख्या	भाडा प्रति महिना	बस्ने विकल्प
१									
२									
३									

५.३ आयोजनामा पर्ने कुनै पल्टबाट कुनै रुख बोट विरुवा हटाउनु पर्नेछ ?

१. पछि २. पदैन

५.४ यदि हटाउनु पर्ने भएमा, निम्नानुसारको विवरण दिनुहोस्

चेनेज		तर्फ (R/L)	नाम/जात	प्रकार	गोलाई (से.मी.)	उचाई (मी.)	संख्या	हटाउन लाग्ने समय	कैफियत
देखि	सम्म								

संकेत: प्रकार: १= काठकालागि प्रयोग हुने रुख, २=दाउराकालागि प्रयोग हुने रुख ३= बहु प्रयोगको रुख, ४=गैर काष्ठ वन पैदावार ५= अन्य भए उल्लेख गर्ने.....

६. मुआब्जा सम्बन्धी जानकारी

६.१ आयोजनाको कारणले तपाईंको घर/टहरा आदि हटाउनु पर्ने भएमा मुआब्जा के मा चाहानुहुन्छ ?

(क) नगद (ख) जग्गाको सट्टा जग्गा
 (ग) घरको सट्टा घर (घ) घर तथा जग्गाको सट्टा घर र जग्गा दुवै
 (ङ) अन्य उल्लेख गर्ने.....

६.२ यदि तपाईंले मुआब्जा नगदमा लिने भनी छान्नु भएको हो भने किन त्यसो गर्नु भएको हो ?

(क) आफु खुसि जग्गा किन्न (ख) घर बनाउन (ग) ऋण तिर्न

- (घ) व्यापार गर्न (ङ) अन्य (उल्लेख गर्ने).....
- ६.३ यदि आयोजनाको कारणले तपाईंले घर/टहरा हटाउनु पर्ने भएमा आयोजनाले प्रभाव नपार्ने तपाईंको अन्य घरहरु पनि छैन ?
- १) छ २) छैन यदि, छ भने कहाँ छ ?
- ६.४ परियोजनाले यो घर लिएमा उक्त घरमा आफ्नो सबै परिवार सहित बस्न सक्नु हुन्छ ?
- १) सक्छु २) सकिदैन
- ६.५ यदि अर्को घर छैन भने, यस्तै घर किन कति जति रकम चाहिएला ? रुपैया.....
- ६.६ पुनर्वासको लागि कुनै ठाउँ सोच्नु भएको छ ? (१) छ (२) छैन
- ६.७ यदि छ भने, (क) नजिकै (ख) टाढा
ठाउँ उल्लेख गर्ने दुरी (कि.मि.).....
- ५.८ आयोजनाबाट प्रभावित परिवारका हैसियतले आयोजना कार्यान्वयन गर्दा कस्तो प्रकारको सहयोगको अपेक्षा राख्नुहुन्छ ? (बहुउत्तर)
- (क) रोजगारीको अवसर (ख) सिपमुलक तालिम
(ग) सहूलियत दरमा ऋण (घ) अन्य भए (उल्लेख गर्ने).....
- ५.९ आयोजना निर्माणको क्रममा तपाईंको आय र सम्पत्तिमा पर्ने क्षतिलाई कसरी कम गर्न सकिन्छ ? सुभाब भए,
.....

अन्तरवार्ता लिनेको नाम :
मिति:
सुपरिवेक्षकको नाम:.....

Annexure 3.3: FGD Checklist

Checklists for FGD

नेपाल सरकार
सडक विभाग
विकास सहायता कार्यान्वयन महाशाखा
क्षेत्रीय व्यापारिक मार्ग बिस्तार आयोजना
कमला-ढल्केवर-पथलैया सडक खण्ड (महेन्द्र राजमार्ग)
लक्षित समुह छलफलकालागि तथ्यांक संकलन सम्बन्धि चेकलिष्ट
(Checklist for FGD)

१. सामान्य विवरण

१.१ आयोजना खण्ड : कमला-ढल्केवर-पथलैया सडक खण्ड

१.२ जिल्ला :- १.३ नगरपालिका/उप/महानगरपालिका:.....

१.४ वार्ड नं. १.५ बस्ती:-..... १.६ स्थान :.....

१.७ सहजकर्ताको नाम : १.८ मिति :.....

१.९ सूचना प्रदायकहरुको परिचय :

क्र.सं.	नाम	लिंग	ठेगाना	पद, संस्थाको नाम	सम्पर्क नं
१					
२					
३					
४					
५					
६					
७					
८					
९					
१०					
११					

2. Settlement Pattern:
3. Number of households:
4. Population of the cluster/ Ward (Total, Male % and Female %)
5. Caste/Ethnicity (Bramin/Chhetri/Dashnami %,Janajati%, Dalit%, Others%)
6. Religions:....
7. Language spoken:....
8. Major Festivals:....
9. Literacy Rate (Male%, Female%), Education levels (Basic, Secondary, Intermediate/ +2, Bachelors, Masters+)
10. Educational institutions: schools, college, university, technical schools
11. Health and Sanitation Condition (local diseases, health institutions, drinking water, toilet, waste management)
12. Main occupation, employment and income level
13. Out-migration pattern
14. Gender roles, status of women, children, disabled and elderly people
15. Gender based violence status
16. Land holding status and land value (market value and government rate)
17. Agricultural practices and off-farm activities
18. Food self-sufficiency status
19. Non-timber forest products (NTFP)
20. Small and Cottage Industries
21. Market centers and marketing goods
22. Mode of transportation
23. Source of energy (cooking, lighting)
24. Historical cultural, religious places and esthetic sites and values
25. Tourism products and activities
26. Existing economic activities and potential sectors
27. Public and private services
28. Work force available
29. Infrastructure development status and ongoing projects
30. What is the socioeconomic and poverty status of project influence area?

31. What are the causes of poverty?
32. What would be the socioeconomic and poverty reduction programmes of the proposed project?
33. Was the project demanded by the local? Is it necessary for local people?
34. Do you require pedestrian crossing? If required, in which location?
35. Is there a local demand for employment opportunities?
36. Do men and women get equal wage for the same work?
37. Do they get wages and benefits on time?
38. Is the child labour practice prevailing in the project influence area?
39. Are the women, able/ likely to take opportunities/ benefits resulted from the project?
40. How the poor and vulnerable people would get benefit from the project?
41. What are the likely/ potential socio-economic impacts of the project?
42. What would be the possible mitigation measures to minimize the negative impacts?
43. What kind of poverty reduction impacts could be foreseen from the project implementation?
44. What are the project-related interests?
45. What is the climatic condition of the project area? Rainfall and Temperature situation..
46. What are the major river systems and their impacts upon the locations?
47. What are the major pollutants upon the area? Air, water, noise and solid wastes etc.
48. What is the land use pattern? Mainly the agricultural, industrial and housing activities and their impacts?
49. What kinds of forests are found along the project site? What will be the appropriate forest protection plan?
50. What are the major flora and fauna found along the project site?
51. Do you think any endangered species (flora and fauna) are found along the project location?
52. Do you know any animals crossing the road? When and in which section?
53. How can we protect the bio-diversity of the project site while implementing the project?

Health & safety Related:

1. Have you seen labor working condition in any nearby labor camps?
2. Based on the past experience do you suggest anything regarding labor working conditions for this project?
3. Do you for see any risk of gender based violence (GBV) and human trafficking and HIV/AIDS due to the project implementation?
4. What would be the possible measures to avoid the GBV and human trafficking and HIV/AIDS in the project influence area?
5. Who would be the possible partners for assisting in implementing such measures to control GBV and human trafficking and HIV/AIDS?

आदिवाशी/जनजाती समूहमा सोधिने चेकलिस्ट

- १) यस कमला-ढल्केवर-पथलैया सडक सुधार आयोजना आसपासमा कुन कुन आदिवाशी/जनजाती समूह के कसरी बसोबास गरेका पाईन्छन् ?
- २) यस आयोजनाका आसपास बसोबास गर्ने आदिवाशी/जनजाती समूहलाई यस आयोजनाबाट के कसरी बढि लाभान्वित गराउन सकिन्छ ?
- ३) यस आयोजनाबाट आदिवाशी/जनजाती समूहलाई के कस्ता नकारात्मक प्रभाव पर्न सक्छन् ?
- ४) यस आयोजनाका नकारात्मक प्रभावहरुबाट के कसरी जोगाउन सकिन्छ ?
- ५) आदिवाशी/जनजाती समूहका Tangible तथा Intangible साँस्कृतिक संपदा तथा मूल्य-मान्यताहरुलाई के कसरी प्रवर्धन गर्न सकिन्छ ?
- ६) आयोजनाबाट पर्न सक्ने संभाव्य प्रतिकूल प्रभावहरु के के हुन् ? तिनको न्यूनिकरण के कसरी गर्न सकिन्छ ?
- ७) आयोजनाबाट हुने फाईदाहरु र तिनको प्राप्ती आदिवाशी/जनजाती समूहले के कसरी गर्न सक्छन् ?
- ८) आदिवाशी/जनजाती समूहलाई आयोजना तर्जुमा, कार्यान्वयन तथा अनुगमनमा के कसरी सहभागिता बृद्धि गर्न सकिन्छ ?
- ९) आदिवाशी/जनजाती समूहमा यदि कुनै गुनासाहरु भएमा सो को निदान के कसरी कुन प्रकृयाबाट गर्नु उचित हुनेछ ?
- १०) यस समूदायको विकासकालागि आवश्यक के के भौतिक पूर्वाधार विकास गर्न आवश्यक छ ? तिनको पहिचान कसरी गरीन्छ ?
- ११) आदिवाशी/जनजाती समूहको विकास र उत्थानकोलागि उनीहरुको आवश्यकता र प्राथमिकताको आधारमा के कस्ता तालिम, आय आर्जन सम्बन्धि क्रियाकलापहरु संचालन गर्न सकिन्छ ?
- १२) लैंगिक हिंसा तथा यौन शोषण, यौन उत्पीडन एवं कामदारको घुँइचो आदिबाट समुदाय तथा प्राकृतिक स्रोत साधनमाथि पर्नसक्ने नकारात्मक प्रभावलाई कसरी समाधान गर्न सकिन्छ ?
- १३) आयोजनाले जिविकोपार्जनमा पार्ने कुनैपनि प्रभावलाई के कस्तो क्षतिपूर्ती र कार्यक्रम मार्फत पहिलेकै वा सो भन्दा अझ राम्रो अवस्थामा पुर्‍याउन सकिन्छ होला ?

Checklist for asking Indigenous Peoples

- 1) Which are Indigenous Peoples (Nationalities) living along the project attachment areas?
- 2) How and where did they living? What are their livelihood activities?
- 3) What do the indigenous nationalities groups in the project area know/think about the project?
- 4) What could be the potential (negative as well as positive) impacts of the project on their livelihood, and culture?
- 5) How can the potential negative impacts be reduced and the positive impacts promoted?
- 6) How can the tangible and intangible cultural heritage, norms and values be protected?
- 7) What mechanisms, processes, and cultural traditions exist among these groups (indigenous nationalities) with regard to redress mechanism?
- 8) What experience do they have about them participating in similar initiatives locally? What has been their learning from participating/non-participating in project management?
- 9) What could be the appropriate mechanisms and processes to promote the participation of these groups in project management?
- 10) What are the prime necessities of the community to develop physical infrastructures? How can these be identified?
- 11) What are the relevant trainings and income generating activities to these communities?
- 12) How can the negative impact of labor influx, GBV, Sexually exploitation and abuse and the pressure upon natural resources be protected?
- 13) What kinds of compensation schemes would be recommended to mitigate the negative impact and to better up existing situation of them?

Annexure 3.4: Summary of FGD Findings

Table: Summary of FGD Participants

S.N	FGD Location	Participants			Ethnicity						
		M	F	Total	B/C	Indigenous	Madhesi	Dalit	Muslim	Others	Total
1	Chandrapur-4, Hadatole, Rautahat	11	4	15	8	3	1	3			15
2	Chandrapur-4, Hadatole Rautahat	13	3	16	10	3	1		2		16
3	Chandrapur-1, Mangalpur Rautahat	27	5	32	18	8	1	3	2		32
4	Chandrapur-1, Mangalpur Rautahat	5	8	13				13			13
5	Chandrapur-2, Mangalpur Rautahat	7	2	9	3	4		2			9
6	Chandrapur-5 Wodakaryalaya Tole Rautahat	14	1	15	9	2	4				15
7	Nijgadh-8, Bara	12	3	15	8	7					15
8	Nijgadh-7, Bara	10	2	12	7	4		1			12
9	Nijgadh-9, Purbi Tole Bara	16	0	16	13	3					16
10	Nijgadh-9, Paschim Tole Bara	14	3	17	10	4			3		17
11	Jeetpur-1, Dudhaura Bara	9	6	15	1	14					15
12	Bardibas-1, Mahotari	16	2	18	17			1			18
13	Bardibas-14, Mahotari	15	0	15	10	2	3				15
14	Bagmati-1, Milanchowk Sarlahi	15	1	16	10	5		1			16
15	Bagmati-4, Puranochauki Sarlahi	8	1	9	5	3	1				9
16	Bagmati-11, Rayamajhi Tole Sarlahi	12	3	15	12	2		1			15
17	Bagmati-12, Gorkhali Tole Sarlahi	15	1	16	3	11	2				16
18	Hariwan-10, Sukepokhari Sarlahi	9	0	9	7	1		1			9
19	Hariwan-9, Sarlahi	12	3	15	10	4	1				15
20	Hariwan-11, Municipality Office, Sarlahi	15	5	20	8	3	6	1	2		20
21	Hariwan-4, Chhapinikhola Sarlahi	11	1	12	4	4	4				12
22	Lalbandi-01, Bazar Tole Sarlahi	14	0	14	7	4	3				14
23	Lalbandi-6, Lalbandi Bazar Tole Sarlahi	15	1	16	10	5		1			16
24	Lalbandi-7, Lalbandi Bazar Tole Sarlahi	9	2	11	5	3	3				11
25	Lalbandi-9, Bastipur Sarlahi	7	8	15	9	5			1		15
26	Lalbandi-17, Ranigunj Sarlahi	4	15	19	12	6		1			19
27	Ishworpur-5, Sarlahi	3	13	16	6	9	1				16

S.N	FGD Location	Participants			Ethnicity						
		M	F	Total	B/C	Indigenous	Madhesi	Dalit	Muslim	Others	Total
28	Mithila-4, Pushpabalpur, Dhanusa	14	3	17	1	6	10				17
29	Mithila-5, Ramlaxman chowk Dhanusa	13	0	13		1	12				13
30	Mithila-6, Dhalkebar Dhanusa	14	1	15		1	13	1			15
31	Mithila-7, Dhalkebar Dhanusa	15	0	15	3	1	8	2	1		15
32	Mithila-8, Jamunibas Dhanusa	13	1	14		4	10				14
33	Mithila-9, Dhalkebar Dhanusa	12	3	15	2	9	4				15
34	Mithila-10, Lalgadh Dhanusa	12	3	15	8	6		1			15
35	Mithila-3, Lalvitti Dhanusa	10	2	12		1	10		1		12
36	Dhanusadham-6, Maaltole Dhanusa	10	3	13		5	8				13
37	Dhanusadham-8, Bhiman Dhanusha	12	0	12	1	1	10				12
38	Dhanusadham-9, Dharapani Dhanusha	16	0	16		3	13				16
39	Ganeshmaan-4, Birendrabazar Dhanusa	17	0	17	4	2	9	2			17
40	Ganeshmaan-1, Birendrabazar Dhanusa	14	1	15		10	3	1	1		15
41	Ganeshmaan-8, Birendrabazar Dhanusa	12	0	12	1		11				12
42	Ganeshmaan-6, Musaharitole Godarchowk Dhanusa	8	1	9	3	2	4				9
43	Ganeshmaan-7, Bhosaili, Dhanusa	8	0	8	1	1	6				8
44	Jeetpur Simara-1, Thanimai Purbi Tole, Bara	7	3	10	2	3	4	1			10
45	Jeetpur Simara-16, Piluwa Aadarshanagar, Bara	9	2	11	2	2	6	1			11
46	Jeetpur Simara-1, Purbi Tole shyaulipark, Bara	10	3	13	4	9					13
	Total	544	119	663	254	186	172	38	13		663

Source: Field survey 2022

Annexure 3.5: KII Checklist

Interview Questions for KII

1. What is the socioeconomic and poverty status of project influence area?
2. What are the causes of poverty?
3. What would be the socioeconomic and poverty reduction impacts of the proposed project?
4. Was the project demanded by the local? Is it necessary for local people?
5. What are the likely/ potential socio-economic impacts of the project?
6. What would be the possible mitigation measures to minimize the negative impacts?
7. What kind of poverty reduction impacts could be foreseen from the project implementation?
8. What are the project-related interests?
9. What are the project-related barriers to their participation in and benefiting from the project resources?
10. What would be the possible strategies for addressing the concern?
11. What are the reasons behind the vulnerability of at risk groups including their exposure to risks?
12. How can women
13. Participate in project design elements (policy, investment, or implementation) and thus benefit from the project?
14. Have you seen labor working condition in any nearby labor camps?
15. Based on the past experience do you suggest anything regarding labor working conditions for this project?
16. Do you for see any risk of human trafficking and HIV/AIDS due to the project implementation?
17. What would be your or measures to avoid the human trafficking and HIV/AIDS in the project influence area?
18. Who would be the possible partners for assisting in implementing such measures to control human trafficking and HIV/AIDS?

Annexure 3.6: Information of KII Participants

Table: Summary of KII Participants

SN	Name of Key Informant	Organization	Position	Key Issue Raised	Remarks
1.	Ram Dev Yadav	Sub-division Puspapur Forest Office,	Jamdar	Bidders violation of rules, regulation and norms during construction	Strict supervision
2.	Madan Chhaudhary	Sub-division Forest Office, Laalgadh	Assistant Forest Officer	Wild animals' accident	Safe pass way
3.	Min kumar Poudel	Shree Jaanki Secondary School, Lalbandi	Principal	Road crossing	Pass way
4.	Ram Niwas Sah	Janjyoti Secondary School, Lalbandi, Sarahi	Principal	Road crossing	Pass way
5.	Nabin Kumar Yadav	Sub-division Forest Office, Bake, Mahottari	Forest Officer, Head	Violation of regulation during construction	Strict supervision, monitoring
6.	Bhim Bikram Khadka	Sub-division Forest Office, Tuteswor, Mahotri	Forest Officer, Head	Wild animals accident	Safe pass way
7.	Ram Sundar Sah	Sub-division Forest Office, Maithhan, Mahottari	Forest Officer, Head	Wild animals' accident	Safe pass way
8.	Dilip Thapa	Department of Transport Management, Bardibas	Information Officer	Weak diversion No Proper signboard	Construction of strong diversion,
9.	Sambhu Mandal	Nepal Rastriya Secondary School, Pathlaiya , Bara	Principal	Crossing	
10.	Anil Kumar Upreti	Traffic Chandranigahapur, Rautahat	Inspector	Violation of regulation during construction	Proper monitoring
11.	Madan Mohan Singh	Division Road Office, Chandranigahapur, Rautahat	Division Head	Violation of regulation during construction	Proper monitoring
12.	Uday Singh Sigapati	Traffic Office, Nijgadh, Bara	Inspector	Violation of regulation during construction	Proper monitoring
13.	Ram Kishor Yadav	Sagarnath Forestry Development Project	Project Head	Wild animals accident	Safe pass way
14.	Suman Kumar Jha	Irrigation Division Office, Rauthat, Gaur	Engineer	Drainage for passing water	

15.	Ashok Kumar Singh	Agriculture Knowledge Center, Rauthat, Gaur	Agriculture Extension Officer	Drainage for passing water	
16.	Jitenda Yadav	Agriculture Knowledge Center, Bara, Kaliya	Agriculture Extension Officer	Drainage for passing water	
17.	Shyam Kishor Saafi	Irrigation Division Office, Mahottari, Jaleshwar	Engineer	-	Canal re-construction should be maintained by the project
18.	Dev Narayan Chaudhary	Sagarnath Forestry Development Project, Sub-division Office, Sagarnath	Ranger	Wild animal accident	Passing way on basis of their track record
19.	Durga Prasad, Manoj kumar Das	Division Road Office, Janakpur	Engineer, Computer operator	Violation of regulation during construction	Strict Regulation
20.	Ranjit Kumar Yadav	Kamala Irrigation Project, Kamala, Dhanusha	Engineer	Reduction in discharge flow rate during Irrigation months	Canal Should not be disturbed during irrigation months Canal re-construction should be maintained by the project
21.	Basudev Adhikari	Office of The Municipal Executive, Lalbandi Municipality Sarlahi	Mayor	Employment opportunities.	Regular health check up
22.	Hari Maya Ghalan	Office of The Municipal Executive, Hariwan Municipality Sarlahi	Deputy Mayor	Landslide in Bakiya river and Bhamar river.	Footpath for pedestrian
23.	Om Bahadur Karki	Bagmati Municipality Sarlahi	Head Of Language and education	Cycle lane greenery in urban section of road. Human-wild animal conflict issues (Monkey, Nilgai, Dumsi, Babel destroy the agriculture farm)	Coordination with local government, stakeholder, police, traffic police, etc.
24.	Jayamala Kumari Chaudhary	Office of The Municipal Executive, Chandrapur Municipality Rautahat	Deputy Mayor	Issue of land acquisition if the width of road exceed more than 25 m from the central line.	

25.	Babita Shrestha	Wada Office , Nijgadh Municipality, 9 Bara	Women Member	Coordination with local government and stakeholder. Equal wage for equal work. No child labor.	
26.	Saradh Sigdel	Nepal red cross society , Nijgadh Municipality, 9 Bara	Co-Treasurer	Sprinkle the water on dusty road. Restate the displaced public property.	
27.	Salik Ram Dhungana	Wada Office, Nijgadh Municipality, 8 Bara	Ward Member	Reduction in accident rate.	
28.	Man Maya Tamang	Office of The Municipal Executive Nijgadh Municipality, 8 Bara	Municipal Women Member	Environmental and disable friendly road and crossings.	
29.	Mukunda Prasad Neupane	Nijgadh Municipality, 7 Bara	Social Worker	Displaced people from temporary sheds along the road should be saved from being homeless. They must be rehabilitated.	
30.	Kabita Lama	Wada Office , Nijgadh Municipality, 7 Bara	Ward Member	Income generation programs for women and poor people.	
31.	Hari Bahadur Ghorasaini	Jeetpur Simara Sub-metropolitan municipality, 1 Bara	Social Worker / Businessman	6 lane road adds aesthetic value of the place. Dust and noise pollution.	
32.	Manju Devi Baniya	Jeetpur Simara Sub-metropolitan municipality, 1 Bara	Unified Socialist Party District Member	Increase value of land Quality road should be constructed on time.	
33.	Ram Das Dhauju	Jeetpur Simara Sub-metropolitan municipality, 1 Bara	Retired Ward chair Person	Sacred or holy trees, temples, shrines should be managed properly.	
34.	Surya Bahadur Syangtang	Jeetpur Simara Sub-metropolitan municipality, 1 Bara	Local People	Improve economic condition. Opportunity of employment.	
35.	Babu Magar	Jeetpur Simara Sub-metropolitan municipality, 1 Bara	President of Patlaiya Natya Mandali	Employment and business opportunity for local people. Improve transportation, time saving, ease travel, safe travel	
36.	Rakesh Subba	Wada Office, Jeetpur Simara Sub-metropolitan municipality, 1 Bara	Ward Member	Reduce accident due to overhead bridges	Skill training and employment.
37.	Bir Bahadur Tamang	Jeetpur Simara Sub-metropolitan municipality, 1 Bara	Chairman of the School Management Committee	Issue of land acquisition beyond 25m either side. Equal wage for equal wage	

38.	Jeet Lal Shrestha	Sagarmatha T.V, Nijgadh Municipality, 9 Bara	Journalist	Manage irrigation facilities	
39.	Hira Gautam	Bardibas Municipality, mahottari	Chair Persons of Hotel Association	Commercial agriculture Alcohol consumption	
40.	Bijay Kumar Singh	Office of The Municipal Executive , Mithila Municipality Dhanusa	Mayor	Pollution on local environment during construction	
41.	Tulasa Kumari Pandey	Office of The Municipal Executive , Ganeshmaan Charnath Municipality, Dhanusa	Deputy Mayor	Health issues, prostitution, HIV/AIDs,	
42.	Manoj Shah	Parsa National Park, Adabhar, Bara	Chief Warden	Impact on wildlife crossing	Construction of wildlife friendly infrastructure
43.	Manjur Ahamad	Division Forest Office, Bara	Division Head	Impact on wildlife crossing	Protection of wildlife
44.	Amar Dev Yadav	Division Forest Office, Rautahat	Division Head	Impact on wildlife crossing	Protection of wildlife

Source: Field survey 2022

Annexure 4.1: Climatic Data

Table 1: Temperature of the Project Area

Time	Simara Airport (Avg Min)	Karmaiya (Avg Min)	Simara Airport (Avg Max)	Karmaiya (Avg Max)
01/01/1985	18.229	20.462	30.42	30.297
01/01/1986	18.07	20.275	29.908	31.338
01/01/1987	18.486	20.748	30.184	30.908
01/01/1988	18.402	20.839	30.528	30.899
01/01/1989	17.181	20.685	30.227	30.893
01/01/1990	18.025	20.004	30.035	30.246
01/01/1991	17.669	20.776	30.602	30.761
01/01/1992	17.489	20.487	30.505	31.361
01/01/1993	17.85	19.425	29.945	30.568
01/01/1994	17.456	22.325	30.94	32.679
01/01/1995	17.669	20.547	30.621	30.66
01/01/1996	18.176	20.621	30.878	31.163
01/01/1997	17.208	19.88	30.267	30.272
01/01/1998	18.735	20.901	30.977	30.526
01/01/1999	18.425	20.478	30.961	31.641
01/01/2000	17.725	20.17	30.257	30.515
01/01/2001	17.977	19.664	30.391	30.492
01/01/2002	18.563	21.032	29.971	30.641
01/01/2003	18.28	20.804	29.305	29.807
01/01/2004	18.326	20.45	29.703	30.488
01/01/2005	18.484	20.648	30.608	31.53
01/01/2006	18.521	20.748	30.341	31.443
01/01/2007	18.661	20.411	30.008	30.491
01/01/2008	18.586	20.332	30.227	30.982
01/01/2009	18.45	20.836	31.39	31.493
01/01/2010	18.938	22.131	31.249	31.389
01/01/2011	18.59	19.979	30.27	30.593
01/01/2012	17.895	19.925	30.994	31.239
01/01/2013	17.751	20.079	30.948	31.015
01/01/2014	17.653	20.22	30.634	30.66
01/01/2015	18.576	20.347	31.164	30.868
01/01/2016	18.789	20.289	31.152	31.072
01/01/2017	18.297	20.425	30.88	31.666
01/01/2018	17.977	20.022	30.686	31.476
01/01/2019	18.748	20.197	30.796	31.544
01/01/2020	18.815	21.551	29.877	32.168
01/01/2021	19.363	20.404	30.465	31.053
37 Years Average	18.22	20.52	30.49	31.00

Source: DHM 2022

Table 2: Rainfall of the project area (mm)

Time	Simara Airport (Avg annual Rainfall)	Karmaiya (Avg Annual Rainfall)
01/01/1985	2966.4	1604.5
01/01/1986	2169.7	1094.1
01/01/1987	2391.4	1957.5
01/01/1988	1938.3	1579.9
01/01/1989	1386.9	1648.7
01/01/1990	1788.8	1615.2
01/01/1991	1985.9	1620.1
01/01/1992	1450.2	1547.8
01/01/1993	1580.1	1921.6
01/01/1994	1343.1	1210.3
01/01/1995	1338.9	2231.2
01/01/1996	1551.7	1833.6
01/01/1997	1744.4	2133.8
01/01/1998	2797.3	2642.5
01/01/1999	2045.9	1658.4
01/01/2000	2122.5	1819.8
01/01/2001	2296.8	1478
01/01/2002	1948.5	1988.2
01/01/2003	2150.4	1580.9
01/01/2004	1964.9	2915.5
01/01/2005	1864	1826
01/01/2006	1860.5	2096
01/01/2007	2896.9	2144
01/01/2008	1642.6	1737.5
01/01/2009	1312.3	1187.8
01/01/2010	1579.8	1864.9
01/01/2011	1831.5	1952.7
01/01/2012	893.1	1275
01/01/2013	1664.2	1209.3
01/01/2014	1604.2	1859.9
01/01/2015	1335.4	1579.5
01/01/2016	1587.5	1762.7
01/01/2017	1967.1	2214.2
01/01/2018	1717.7	1278.9
01/01/2019	1738.1	1795.4
01/01/2020	2403.62	2590
01/01/2021	2383.09	2255.66
37 Years Average	1871.45	1803.00

Source: DHM 2022

Table 3: Relative Humidity of the project area

Time	Simara Airport (Avg Relative Humidity)	Karmaiya (Avg Relative Humidity)
01/01/1985	74.139	70.618
01/01/1986	76.264	71.213
01/01/1987	72.499	70.311
01/01/1988	71.548	72.366
01/01/1989	68.661	69.428
01/01/1990	70.885	72.504
01/01/1991	68.603	70.998
01/01/1992	69.542	68.636
01/01/1993	72.061	81.6
01/01/1994	69.082	76.052
01/01/1995	69.917	81.6
01/01/1996	70.38	81.6
01/01/1997	71.442	81.398
01/01/1998	73.789	78.649
01/01/1999	72.692	77.237
01/01/2000	79.177	81.595
01/01/2001	79.262	80.376
01/01/2002	80.85	87.302
01/01/2003	81.852	89.863
01/01/2004	79.563	94.853
01/01/2005	83.867	93.425
01/01/2006	83.888	91.484
01/01/2007	73.655	79.921
01/01/2008	72.722	81.963
01/01/2009	68.328	84.139
01/01/2010	70.546	94.615
01/01/2011	71.901	93.106
01/01/2012	69.409	93.903
01/01/2013	79.877	95.295
01/01/2014	73.069	79.846
01/01/2015	73.918	85.826
01/01/2016	76.249	80.72
01/01/2017	78.177	77.678
01/01/2018	74.716	78.118
01/01/2019	73.784	79.447
01/01/2020	74.584	90.615
01/01/2021	74.568	80.777
37 Years Average	74.201	81.600

Source: DHM 2022

Annexure 4.2: Lab Analysis Report for Air Quality



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2020/07/26

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

AIR QUALITY MONITORING REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (s)
Collector:	Shrijana Neupane	Location:	Mithila M.-06, Dhalkebar, Dhanusha
Latitude:	26°55'47.1" N	Longitude:	85°57'25.0" E
Source:	Air	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Hours	2022/10/18-2022/10/19, 24 hrs.	Test Performance Date:	2022/10/31-2022/11/02
Receipt Date:	2022/10/23	Issued Date:	2022/11/03
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results ($\mu\text{g}/\text{m}^3$)	Tolerance Limit (National Air Quality Standard, Ministry of Forests and Environment, 2012) ($\mu\text{g}/\text{m}^3$)	Remarks
Particulate Matter (PM_{10})	118	120	Within the limit
Particulate Matter ($\text{PM}_{2.5}$)	34	40	Within the limit
Total Suspended Particulate Matter (TSPM)	206	230	Within the limit
Sulphur Dioxide (SO_2)	0.13	70	Within the limit
Nitrogen Dioxide (NO_2)	1.09	80	Within the limit

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.

Remarks: Particulate Matter (PM_{10}), Particulate Matter ($\text{PM}_{2.5}$), and Total Suspended Particles (TSP) are found within the limit of the National Air Quality Standard, Ministry of Forests, and Environment, 2012.

Analyzed and Checked By



Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2020/07/26

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

AIR QUALITY MONITORING REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (t)
Collector:	Shrijana Neupane	Location:	Lalbandi M.-06, Lalbandi, Sarlahi
Latitude:	27°03'06.7" N	Longitude:	85°38'14.8" E
Source:	Air	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Hours	2022/10/18-2022/10/19, 24 hrs.	Test Performance Date:	2022/10/31-2022/11/02
Receipt Date:	2022/10/23	Issued Date:	2022/11/03
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results ($\mu\text{g}/\text{m}^3$)	Tolerance Limit (National Air Quality Standard, Ministry of Forests and Environment, 2012) ($\mu\text{g}/\text{m}^3$)	Remarks
Particulate Matter (PM_{10})	80	120	Within the limit
Particulate Matter ($\text{PM}_{2.5}$)	26	40	Within the limit
Total Suspended Particulate Matter (TSPM)	138	230	Within the limit
Sulphur Dioxide (SO_2)	0.09	70	Within the limit
Nitrogen Dioxide (NO_2)	0.24	80	Within the limit

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.

Remarks: Particulate Matter (PM_{10}), Particulate Matter ($\text{PM}_{2.5}$), and Total Suspended Particles (TSP) are found within the limit of the National Air Quality Standard, Ministry of Forests, and Environment, 2012.

Analyzed and Checked By



Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2020/07/26

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

AIR QUALITY MONITORING REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (u)
Collector:	Shrijana Neupane	Location:	Paurahi, Sarlahi
Latitude:	27°07'06.4" N	Longitude:	85°26'39.9" E
Source:	Air	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Hours	2022/10/19-2022/10/20, 24 hrs.	Test Performance Date:	2022/10/31-2022/11/02
Receipt Date:	2022/10/23	Issued Date:	2022/11/03
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results ($\mu\text{g}/\text{m}^3$)	Tolerance Limit (National Air Quality Standard, Ministry of Forests and Environment, 2012) ($\mu\text{g}/\text{m}^3$)	Remarks
Particulate Matter (PM_{10})	51	120	Within the limit
Particulate Matter ($\text{PM}_{2.5}$)	18	40	Within the limit
Total Suspended Particulate Matter (TSPM)	85	230	Within the limit
Sulphur Dioxide (SO_2)	0.04	70	Within the limit
Nitrogen Dioxide (NO_2)	0.08	80	Within the limit

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.

Remarks: Particulate Matter (PM_{10}), Particulate Matter ($\text{PM}_{2.5}$), and Total Suspended Particles (TSP) are found within the limit of the National Air Quality Standard, Ministry of Forests, and Environment, 2012.

Analyzed and Checked By



Authorized By
Er. Lokesh Sapkota



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2020/07/26

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

AIR QUALITY MONITORING REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (v)
Collector:	Shrijana Neupane	Location:	Thado Lane, Nijgad, Bara
Latitude:	27°10'19.5" N	Longitude:	85°12'06.6" E
Source:	Air	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Hours	2022/10/19-2022/10/20, 24 hrs.	Test Performance Date:	2022/10/31-2022/11/02
Receipt Date:	2022/10/23	Issued Date:	2022/11/03
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results ($\mu\text{g}/\text{m}^3$)	Tolerance Limit (National Air Quality Standard, Ministry of Forests and Environment, 2012) ($\mu\text{g}/\text{m}^3$)	Remarks
Particulate Matter (PM_{10})	62	120	Within the limit
Particulate Matter ($\text{PM}_{2.5}$)	21	40	Within the limit
Total Suspended Particulate Matter (TSPM)	122	230	Within the limit
Sulphur Dioxide (SO_2)	0.06	70	Within the limit
Nitrogen Dioxide (NO_2)	0.18	80	Within the limit

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.

Remarks: Particulate Matter (PM_{10}), Particulate Matter ($\text{PM}_{2.5}$), and Total Suspended Particles (TSP) are found within the limit of the National Air Quality Standard, Ministry of Forests, and Environment, 2012.

Analyzed and Checked By



Authorized By
Er. Lokesh Sapkota



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2020/07/26

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

AIR QUALITY MONITORING REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (w)
Collector:	Shrijana Neupane	Location:	Bara (Near Dudhaura River Bridge)
Latitude:	27°11'19.1" N	Longitude:	85°00'39.9" E
Source:	Air	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Hours	2022/10/20-2022/10/21, 24 hrs.	Test Performance Date:	2022/10/31-2022/11/02
Receipt Date:	2022/10/23	Issued Date:	2022/11/03
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results ($\mu\text{g}/\text{m}^3$)	Tolerance Limit (National Air Quality Standard, Ministry of Forests and Environment, 2012) ($\mu\text{g}/\text{m}^3$)	Remarks
Particulate Matter (PM_{10})	95	120	Within the limit
Particulate Matter ($\text{PM}_{2.5}$)	32	40	Within the limit
Total Suspended Particulate Matter (TSPM)	145	230	Within the limit
Sulphur Dioxide (SO_2)	0.12	70	Within the limit
Nitrogen Dioxide (NO_2)	0.34	80	Within the limit

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.

Remarks: Particulate Matter (PM_{10}), Particulate Matter ($\text{PM}_{2.5}$), and Total Suspended Particles (TSP) are found within the limit of the National Air Quality Standard, Ministry of Forests, and Environment, 2012.

Analyzed and Checked By



Authorized By
Lokesh Sapkota

Annexure 4.3: Lab Analysis Report for Water Quality



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (a)
Collector:	Shrijana Neupane	Location:	Bandipur
Source:	Water (Kamala River) (Surface Water)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Appearance	Clear	-	Clear	-
Temperature	20	°C	20-25	2550 B. APHA 23 rd edition
Color	5	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	290	µS/cm	1500 (max)	2510 B. APHA 23 rd edition
pH	8.2	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Dissolved Oxygen	5.2	mg/L	-	4500-0 B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	186	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	26	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	19.29	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.04	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Biological Oxygen Demand	11.3	mg/L	2-500	5210 B. APHA 23 rd edition
Chloride	2.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	0.14	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	166	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	130	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Calcium	36.87	mg/L	200	3500-D. APHA 23 rd edition
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-B. APHA 23 rd edition
Phosphate	<0.02	mg/L	3	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111-B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111-B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
Total Coliform*	1	CFU/100 mL	0	9222 B. Standard Total Coliform Membrane Filter Procedure, APHA 23 rd edition

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks:

Except for Turbidity and Total Coliform, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01



Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (b)
Collector:	Shrijana Neupane	Location:	Dhakebar Chowk, Dhanusha
Source:	Water (Dhakebar D.W.)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Color	5	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	180	$\mu\text{S/cm}$	1500 (max)	2510 B. APHA 23 rd edition
pH	7.4	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	118	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	4	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	<0.1	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.03	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Arsenic*	<0.005	mg/L	0.05	
Chloride	7.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	13.84	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	76	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	54	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	16.03	mg/L	200	3500-Ca D. APHA 23 rd edition
Calcium Hardness	40	mg/L	-	-
Magnesium	3.4	mg/L	-	-

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Magnesium Hardness	13	mg/L		-
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-Cl B. APHA 23 rd edition
Sulphate	2.09	mg/L	250	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
<i>E. coli</i> *	10	CFU/100 mL	0	Eosin Methylene Blue Agar for Rapid Direct Count of <i>E. coli</i> AJPH, 2011

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks: Except for *E. coli*, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (c)
Collector:	Shrijana Neupane	Location:	Bardibas Chowk, Mahottari
Source:	Water (Bardibas D.W.)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Color	5	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	80	$\mu\text{S}/\text{cm}$	1500 (max)	2510 B. APHA 23 rd edition
pH	7.3	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	240	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	8	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	1.54	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.02	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Arsenic*	<0.005	mg/L	0.05	
Chloride	10.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	<0.04	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	34	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	20	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	9.61	mg/L	200	3500-Ca D. APHA 23 rd edition
Calcium Hardness	20	mg/L	-	-
Magnesium	0.97	mg/L	-	-

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Magnesium Hardness	3	mg/L	-	-
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-Cl B. APHA 23 rd edition
Sulphate	5.09	mg/L	250	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
<i>E. coli</i> *	12	CFU/100 mL	0	Eosin Methylene Blue Agar for Rapid Direct Count of <i>E. coli</i> AJPH, 2011

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks: Except for *E. coli*, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (d)
Collector:	Shrijana Neupane	Location:	Bardibas, Mahottari
Source:	Water (Ratu Khola)(Surface Water)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Appearance	Clear	-	Clear	-
Temperature	19.8	°C	20-25	2550 B. APHA 23 rd edition
Color	5	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	70	µS/cm	1500 (max)	2510 B. APHA 23 rd edition
pH	7.6	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Dissolved Oxygen	6.3	mg/L	-	4500-0 B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	10	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	6	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	1.37	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.02	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Biological Oxygen Demand	9.4	mg/L	2-500	5210 B. APHA 23 rd edition
Chloride	7.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	<0.04	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	30	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	18	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Calcium	8.02	mg/L	200	3500-D. APHA 23 rd edition
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-B. APHA 23 rd edition
Phosphate	0.35	mg/L	3	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111-B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111-B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
Total Coliform*	29	CFU/100 mL	0	9222 B. Standard Total Coliform Membrane Filter Procedure, APHA 23 rd edition

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks:

Except for Total Coliform, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (e)
Collector:	Shrijana Neupane	Location:	Chandranigahapur Chowk, Rautahat
Source:	Water (Chandranigahapur D.W.)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/20	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Color	5	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	410	$\mu\text{S}/\text{cm}$	1500 (max)	2510 B. APHA 23 rd edition
pH	7.5	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	182	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	2	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	0.15	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	<0.02	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Arsenic*	<0.005	mg/L	0.05	
Chloride	3.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	1.59	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	86	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	156	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	24.05	mg/L	200	3500-Ca D. APHA 23 rd edition
Calcium Hardness	60	mg/L		-

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Magnesium	23.33	mg/L		-
Magnesium Hardness	94	mg/L		-
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-Cl B. APHA 23 rd edition
Sulphate	12.22	mg/L	250	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
<i>E. coli</i> *	15	CFU/100 mL	0	Eosin Methylene Blue Agar for Rapid Direct Count of <i>E. coli</i> AJPH, 2011

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks: Except for *E. coli*, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (f)
Collector:	Shrijana Neupane	Location:	Lalbandi, Sarlahi
Source:	Water (Lalbandi D.W.)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Color	0	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	180	$\mu\text{S}/\text{cm}$	1500 (max)	2510 B. APHA 23 rd edition
pH	6.9	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	160	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	2	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	<0.1	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.03	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Arsenic*	<0.005	mg/L	0.05	
Chloride	3.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	0.07	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	1.24	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	100	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	66	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	19.24	mg/L	200	3500-Ca D. APHA 23 rd edition
Calcium Hardness	48	mg/L	-	-
Magnesium	4.37	mg/L	-	-

Analyzed and Checked By



Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Magnesium Hardness	16	mg/L	-	-
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-Cl B. APHA 23 rd edition
Sulphate	4.26	mg/L	250	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
<i>E. coli</i> *	3	CFU/100 mL	0	Eosin Methylene Blue Agar for Rapid Direct Count of <i>E. coli</i> AJPH, 2011

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks: Except for *E. coli*, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01



Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (g)
Collector:	Shrijana Neupane	Location:	Sarlahi
Source:	Water (Bagmati River Surface Water)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/20	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Appearance	Clear	-	Clear	-
Temperature	19	°C	20-25	2550 B. APHA 23 rd edition
Color	10	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	250	µS/cm	1500 (max)	2510 B. APHA 23 rd edition
pH	7.6	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Dissolved Oxygen	7.8	mg/L	-	4500-0 B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	160	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	74	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	0.43	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.05	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Biological Oxygen Demand	11.6	mg/L	2-500	5210 B. APHA 23 rd edition
Chloride	9.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	10.19	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	154	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	38	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Calcium	30.46	mg/L	200	3500-D. APHA 23 rd edition
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-B. APHA 23 rd edition
Phosphate	0.17	mg/L	3	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111-B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111-B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
Total Coliform*	0	CFU/100 mL	0	9222 B. Standard Total Coliform Membrane Filter Procedure, APHA 23 rd edition

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks: Except for Color, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (h)
Collector:	Shrijana Neupane	Location:	Sarlahi
Source:	Water (Bagmati Sichai D.W.)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/20	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Color	0	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	360	$\mu\text{S}/\text{cm}$	1500 (max)	2510 B. APHA 23 rd edition
pH	7.8	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	216	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	4	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	0.27	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	<0.02	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Arsenic*	<0.005	mg/L	0.05	
Chloride	8.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	7.16	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	154	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	182	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	48.09	mg/L	200	3500-Ca D. APHA 23 rd edition
Calcium Hardness	120	mg/L	-	-
Magnesium	15.06	mg/L	-	-

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Magnesium Hardness	61	mg/L	-	-
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-Cl B. APHA 23 rd edition
Sulphate	10.87	mg/L	250	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
<i>E. coli</i> *	0	CFU/100 mL	0	Eosin Methylene Blue Agar for Rapid Direct Count of <i>E. coli</i> AJPH, 2011

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks: All the observed values of tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01



Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (i)
Collector:	Shrijana Neupane	Location:	Bara
Source:	Water (Nijgad D.W.)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/20	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Color	5	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	280	$\mu\text{S}/\text{cm}$	1500 (max)	2510 B. APHA 23 rd edition
pH	7.6	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	170	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	8	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	<0.1	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	<0.02	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Arsenic*	<0.005	mg/L	0.05	
Chloride	4.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	1.99	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	138	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	124	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	40.08	mg/L	200	3500-Ca D. APHA 23 rd edition
Calcium Hardness	100	mg/L	-	-
Magnesium	5.83	mg/L	-	-

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Magnesium Hardness	23	mg/L	-	-
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-Cl B. APHA 23 rd edition
Sulphate	8.62	mg/L	250	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
<i>E. coli</i> *	2	CFU/100 mL	0	Eosin Methylene Blue Agar for Rapid Direct Count of <i>E. coli</i> AJPH, 2011

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks: Except for *E. coli*, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (j)
Collector:	Shrijana Neupane	Location:	Chandranigahapur, Rautahat
Source:	Water (Wetland Surface Water)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/20	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Appearance	Clear	-	Clear	-
Temperature	20.7	°C	20-25	2550 B. APHA 23 rd edition
Color	15	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	540	µS/cm	1500 (max)	2510 B. APHA 23 rd edition
pH	7.7	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Dissolved Oxygen	8.0	mg/L	-	4500-0 B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	266	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	10	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	7.11	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.05	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Biological Oxygen Demand	8.6	mg/L	2-500	5210 B. APHA 23 rd edition
Chloride	2.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	<0.04	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	282	mg/L	-	2320 B. APHA 21 st edition

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Total Hardness	160	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	12.82	mg/L	200	3500-D. APHA 23 rd edition
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-B. APHA 23 rd edition
Phosphate	<0.02	mg/L	3	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111-B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111-B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
Total Coliform*	28	CFU/100 mL	0	9222 B. Standard Total Coliform Membrane Filter Procedure, APHA 23 rd edition

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks:

Except for Color, Turbidity, and Total Coliform, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (k)
Collector:	Shrijana Neupane	Location:	Chandranigahapur, Rautahat
Source:	Water (Pond Surface Water)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/20	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Appearance	Clear	-	Clear	-
Temperature	22.2	°C	20-25	2550 B. APHA 23 rd edition
Color	15	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	30	µS/cm	1500 (max)	2510 B. APHA 23 rd edition
pH	7.8	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Dissolved Oxygen	7.3	mg/L	-	4500-0 B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	10	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	4	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	4.71	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.09	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Biological Oxygen Demand	11.2	mg/L	2-500	5210 B. APHA 23 rd edition
Chloride	14.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	0.05	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	<0.04	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	2	mg/L	-	2320 B. APHA 21 st edition

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Total Hardness	<1	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	<1	mg/L	200	3500-D. APHA 23 rd edition
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-B. APHA 23 rd edition
Phosphate	<0.02	mg/L	3	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111-B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111-B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
Total Coliform*	2	CFU/100 mL	0	9222 B. Standard Total Coliform Membrane Filter Procedure, APHA 23 rd edition

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks:

Except for Color and Total Coliform, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (I)
Collector:	Shrijana Neupane	Location:	Bara
Source:	Water (Bakaiya Khola Surface Water)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/20	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Appearance	Clear	-	Clear	-
Temperature	21	°C	20-25	2550 B. APHA 23 rd edition
Color	5	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	230	µS/cm	1500 (max)	2510 B. APHA 23 rd edition
pH	8.1	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Dissolved Oxygen	6.8	mg/L	-	4500-0 B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	66	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	6	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	6.38	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	<0.02	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Biological Oxygen Demand	10.2	mg/L	2-500	5210 B. APHA 23 rd edition
Chloride	1.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	<0.01	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	<0.04	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	138	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	128	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Calcium	32.06	mg/L	200	3500-D. APHA 23 rd edition
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-B. APHA 23 rd edition
Phosphate	0.13	mg/L	3	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111-B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111-B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
Total Coliform*	38	CFU/100 mL	0	9222 B. Standard Total Coliform Membrane Filter Procedure, APHA 23 rd edition

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks:

Except for Turbidity, and Total Coliform, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



WATER ANALYSIS REPORT

Name of Client:	CEG-CIAS-JV	Lab Code:	22/10-831 (m)
Collector:	Shrijana Neupane	Location:	Bara
Source:	Water (Patlaiya D.W.)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date/Time:	2022/10/21	Test Performance Date:	2022/10/31-2022/11/03
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

Parameters	Results	Unit	NDWQS	Method
Physical				
Color	10	TCU	5 (10)	2120 B. APHA 23 rd edition
Electrical Conductivity	130	$\mu\text{S}/\text{cm}$	1500 (max)	2510 B. APHA 23 rd edition
pH	6.9	-	6.5-8.5	4500 H+ B. APHA 23 rd edition
Taste and Odour	Not Objectionable	-	Not Objectionable	-
Total Dissolved Solids	82	mg/L	1000	2540 C. APHA 23 rd edition
Total Suspended Solids	8	mg/L	2000	2540 D. APHA 23 rd edition
Turbidity	<0.1	NTU	5 (15)	2130 B. APHA 23 rd edition
Chemical				
Ammonia	0.03	mg/L	1.5	4500 NH ₃ F. APHA 23 rd edition
Arsenic*	<0.005	mg/L	0.05	
Chloride	4.99	mg/L	250	4500-Cl- B. APHA 23 rd edition
Iron	0.21	mg/L	0.3 (3)	3500-Fe B. APHA 23 rd edition
Nitrate	0.56	mg/L	50	4500 NO ₃ ⁻ B. APHA 23 rd edition
Total Alkalinity	68	mg/L	-	2320 B. APHA 21 st edition
Total Hardness	86	mg/L as CaCO ₃	500	2340 C. APHA 23 rd edition
Calcium	19.23	mg/L	200	3500-Ca D. APHA 23 rd edition
Calcium Hardness	48	mg/L		-
Magnesium	9.23	mg/L		-

Analyzed and Checked By



Authorized By
Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

Parameters	Results	Unit	NDWQS	Method
Magnesium Hardness	47	mg/L		-
Residual Chlorine	<0.04	mg/L	0.1-0.2***	4500-Cl B. APHA 23 rd edition
Sulphate	0.6	mg/L	250	4500-E. APHA 23 rd edition
Manganese**	<0.05	mg/L	0.2	3111B. APHA 23 rd edition
Chromium**	<0.01	mg/L	0.05	3111B. APHA 23 rd edition
Fluoride**	<0.05	mg/L	0.5-1.5***	4500 F-D. APHA 23 rd edition
Microbiology				
<i>E. coli</i> *	0	CFU/100 mL	0	Eosin Methylene Blue Agar for Rapid Direct Count of <i>E. coli</i> AJPH, 2011

NDWQS=National Drinking Water Quality Standard (2062)

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis.

*These parameters are not within the scope of Nepal Standard

**These parameters are outsourced to another Laboratory.

***These values show lower and upper limits

Remarks: Except for Color, all the observed values of other tested parameters are found to be within the limit of NDWQS 2062.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.

Annexure 4.4: Lab Analysis Report for Soil Quality



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



SOIL ANALYSIS REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831(o)
Collection By:	Shrijana Neupane	Location:	Near Kamala Khola
Source:	Soil Sample (S1)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/04
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

S.N.	Parameters	Results	Unit
1	pH	5.72	-
2.	Moisture Content	11.85	%
3.	Soil Organic Matter	6.2	%
4.	Total Kjeldahl Nitrogen	0.17	%
5.	Available Phosphorus	71.22	mg/kg
6.	Total Potassium	1309.23	mg/kg
7.	Sodium	71.23	mg/kg
8.	Oil and Grease	0.09	%

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



SOIL ANALYSIS REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831(p)
Collection By:	Shrijana Neupane	Location:	Bardibas, Mahottari
Source:	Soil Sample (S2)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/04
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

S.N.	Parameters	Results	Unit
1	pH	5.21	-
2.	Moisture Content	3.62	%
3.	Soil Organic Matter	2.21	%
4.	Total Kjeldahl Nitrogen	0.18	%
5.	Available Phosphorus	11.03	mg/kg
6.	Total Potassium	1802.3	mg/kg
7.	Sodium	55.21	mg/kg
8.	Oil and Grease	0.10	%

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



SOIL ANALYSIS REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831(a)
Collection By:	Shrijana Neupane	Location:	Ganeshmaan Charnath M.-07, Dhanusha
Source:	Soil Sample (Raniganj S3)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/04
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

S.N.	Parameters	Results	Unit
1	pH	5.6	-
2.	Moisture Content	12.04	%
3.	Soil Organic Matter	3.4	%
4.	Total Kjeldahl Nitrogen	0.15	%
5.	Available Phosphorus	29.75	mg/kg
6.	Total Potassium	1718.2	mg/kg
7.	Sodium	86.1	mg/kg
8.	Oil and Grease	0.11	%

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01

Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal



SOIL ANALYSIS REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831(q)
Collection By:	Shrijana Neupane	Location:	Bagmati Saptari
Source:	Soil Sample (S4)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date:	2022/10/19	Test Performance Date:	2022/10/31-2022/11/04
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

S.N.	Parameters	Results	Unit
1	pH	6.72	-
2.	Moisture Content	19.18	%
3.	Soil Organic Matter	5.21	%
4.	Total Kjeldahl Nitrogen	0.21	%
5.	Available Phosphorus	20.76	mg/kg
6.	Total Potassium	1725.21	mg/kg
7.	Sodium	96.47	mg/kg
8.	Oil and Grease	0.08	%

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.



SWAT/F/C/04
Version no: 01
Issue no: 02
Revision no: 03
Effective date: 2021/08/01



Soil Water and Air Testing Laboratories Pvt. Ltd.
VAT No: 605928743
Tel: +977-01 4249480
Email: swatlab2017@gmail.com
PO Box: 25752, Kathmandu, Nepal
Sisir Marga 11, Babarmahal, Kathmandu, Nepal

SOIL ANALYSIS REPORT

Name of the Client:	CEG-CIAS-JV	Lab Code:	22/10-831(r)
Collection By:	Shrijana Neupane	Location:	Nijgad, Bara
Source:	Soil Sample (S5)	Sampled By:	Aalekh Bhattarai Suman Basnet
Sampling Date:	2022/10/20	Test Performance Date:	2022/10/31-2022/11/04
Receipt Date:	2022/10/23	Issued Date:	2022/11/04
Project Name:	Kamala Dhalkebar Patlaiya Road Upgradation Project		

S.N.	Parameters	Results	Unit
1	pH	6.48	-
2.	Moisture Content	13.23	%
3.	Soil Organic Matter	5.21	%
4.	Total Kjeldahl Nitrogen	0.19	%
5.	Available Phosphorus	75.65	mg/kg
6.	Total Potassium	2171.66	mg/kg
7.	Sodium	85.62	mg/kg
8.	Oil and Grease	0.08	%

Note: The integrity of the sample and results are dependent on the quality of sampling. The results refer only to the parameters tested of the samples provided/collected for analysis. Statements of conformity have been made without taking Measurement Uncertainty into account except when specifically requested by the customer.



Analyzed and Checked By

Authorized By
Er. Lokesh Sapkota

The report shall not be reproduced except in full, without approval of the laboratory.

Annexure 4.5: Species wise number of Tree Inventory

Number of Poles and Trees to be affected

[illegible]

Annexure 4.6: Quadrature Sample Analysis of Vegetation

Quadrat No.	Side and Distance from CL	Coordinates		Trees Species	Hight	Diameter	Quality	Herbs/ Shrubs	Samplings
		X	y						
1	Right : 200 Mtrs	414121	2973260	Khair	16	109	A	Siru	
				Khair	17	107	A		
				Khair	14	113	A		
2	Right : 500 Mtrs	402579	2978101	Sal	21	132	A	Siru	
				Sal	19	98	A	Kush	
				Sal	21	112	A	Banmara	
				Sal	21	99	A		
3	Left : 500 Mtrs	388421	2985909	Hade	14	100	A	Siru	
				Hade	16	95	A		
4	Right : 200 Mtrs	387640	2986871	Haldu	11	94	C	Banmara	
				Pyari	13	94	C		
				jamun	15	107	B		
				Pyari	12	100	B		
5	Left : 200 Mtrs	386485	2986826	Sal	14	120	A		
				Bhalayo	96	102	B		
				Asna	18	145	A		
				Sal	17	115	A		
6	Right : 100 Mtrs	385764	2987489	Khair	11	94	A		
				Pyari	9	93	C		
				Asna	12	94	B		
7	Left : 200 Mtrs	383599	2987312	khiro	16	107	C		
				kusum	14	102	C		
8	Right : 500 Mtrs	382718	29879	Datringo	12	93	C		
				Sindure	9	112	C		
				Datringo	13	96	C		
9	Leftside : (200 Mtrs)	381635	2987449	Amaro	13	111	B		
				Botdhamero	15	93	B		
				Botdhamero	16	94	C		
10	Rightside : (200 Mtrs)	370935	2987670	khiro	16	129	C		
				Pyari	8	98	B		
				Pyari	11	96	B		
				Kusum	11	109	B		
11	left side : (500 Mtrs)	370930	2989190	Eucalyphis	17	97	A		
				Eucalyphis	16	95	A		
				Eucalyphis	17	95	A		
				Eucalyphis	17	94	A		
				Eucalyphis	17	96	A		
12	left side : (500 Mtrs)	374277	2988655	Eucalyphis	15	94	A		
				Eucalyphis	17	96	A		
				Eucalyphis	17	95	A		
				Eucalyphis	17	57	A		
				Eucalyphis	16	94	A		
13	Right side : (200 Mtrs)	373196	2989687	Kalikath	8	94	C		
				Sindure	12	94	C		
				Sal	11	148	A		
14	Right side : (200 Mtrs)	370130	2990126	Kusum	14	107	B		
				Sindure	12	99	C		
				Satisal	11	94	A		
				Sindure	14	96	B		
15	Right side : (200 Mtrs)	368689	2990221	Eucalyphis	17	101	A		
				Eucalyphis	16	98	A		
				Eucalyphis	17	94	A		
				Eucalyphis	16	97	A		
16	Right side : (200 Mtrs)	361498	2994230	Datringo	11	94	C		
				Sal	19	128	A		

Quadrat No.	Side and Distance from CL	Coordinates		Trees Species	Hight	Diameter	Quality	Herbs/ Shrubs	Samplings
		X	y						
				Sal	21	127	A		
17	Right side : (200 Mtrs)	368895	2990734	Datringo	15	114	B		
				khirro	14	99	C		
				Aule	13	93	C		
				Pithari	12	102	C		
18	left side : (500 Mtrs)	310816	3005786	Sal	19	178	A	Siru	Bhalayo-1
				Harro	19	94	A	Kush	Rohini-2
				Sal	17	126	A		
				Sal	17	113	A		
19	Right side : (200 Mtrs)	310234	3006392	Sal	17	98	A		Sal-6
				Botdhamero	17	119	A	Banmara	Rohini-2
20	Left side : (200 Mtrs)	313443	3006530	Teak	17	110	A	Siru	Khumbi-1
				Teak	17	96	A	Kush	Botdhamero-1
				Teak	12	113	A		
				Botdhamero	17	95	B		
				Asna	20	97	A		
21	Left side : (500 Mtrs)	313443	3006530	Botdhamero	17	169	A	Siru	
				Sal	17	102	A	Kush	
				Jamun	17	113	A		
22	Left side : (500 Mtrs)	314919	3006739	Sal	19	163	A	Siru	Shrub-3, Rohini-1
				Asna	18	104	A	Jibre	
				Sal	21	141	A	Grass	
23	Left side : (500 Mtrs)	317233	3008082	Sal	19	122	A	Niuro	
				Harro	19	104	A	Syaula	
				Sal	19	99	A	Siru	
				Sal	19	94	A		
24	Left side : (200 Mtrs)	315536	3007261	Sal	19	186	A	New Thulo Pat	Rohini-3
				Asna	19	106	A		Kadam-2
				Sal	19	139	A		
				Rohini	13	96	B		
25	Right side : (200 Mtrs)	322612	3006689	Sal	17	143	A	Siru	Sal-3
				Jamun	14	106	A	Syaula	Rohini-Ward 3
				Barro	15	97	A		
26	Right side : (200 Mtrs)	318231	3007244	Kadam	19	186	A	Kathipala	Rohini Ward-1
				Botdhamero	20	157	A	Uniu	Datringo-1
									Jhinkar-1
27	Leftside : (200 Mtrs)	323340	3005632	Bhalayo	9	95	B	Kush	Sal-6
				Sal	19	205	A	Niuro	Rohini- Ward 4
				Bhalayo	14	110	B		Botdhamero-3
28	Rightside : (200 Mtrs)	322612	3006689	Sal	17	143	A	Siru	Sal -3
				Jamun	14	106	A	Syaula	Rohini- Ward 3
				Barro	15	97	A		
29	Leftside : (200 Mtrs)	318231	3007244	kadam	19	186	A	kathipala	Rohini- 1
				Botdhemero	20	157	A	Uniu	Datringo-1
									Jhinkar-1
30	Leftside : (200 Mtrs)	323340	3005632	Bhalayo	9	95	B	Kush	Sal-6
				Sal	19	205	A	Niuro	Botdhamero-3
				Bhalayo	14	110	B		
31	Rightside : (500 Mtrs)	329606	3005129	Sal	14	94	A	Siru	Sal-10
				Sal	17	110	A		Bhalayo-2
				Datringo	10	93	B		Khair-2
									Bhalayo-3
32	Leftside : (500 Mtrs)	325674	3005350	Rajbrikshya	17	97	A	Jibre	Sal-2
				Halude	14	106	B	Shiru	Rohini-3
								wan	
								Aduwa	

Quadrat No.	Side and Distance from CL	Coordinates		Trees Species	Height	Diameter	Quality	Herbs/ Shrubs	Samplings
		X	y						
33	Lefttside : (200 Mtrs)	336973	3000928	Sal	16	117		Siru	Rohini-2
				Bhorla	18	149		kush	Sal-3
									Bhalayo-2
34	Rightside : (200 Mtrs)	330630	3004527	Datringo	16	117	B	Siru	Rohini-3
				Dabdabe	18	149	A	Koiralo	Sindure-1
				Rohini	12	94	B	Kush	
35	Rightside : (200 Mtrs)	306369	3007265	Sindure	14	98	B		
				Aaule	12	94	B		
				Aaule	12	97	B		
				Sindure	15	104	A		
				Sindure	12	102	B		
36	Lefttside : (200 Mtrs)	304531	3008047	Teak	20	160	A		
				Teak	20	158	A		
				Teak	20	165	A		
				Teak	20	142	A		
				Teak	20	159	A		
37	Lefttside : (500 Mtrs)	308028	3006483	Aule	8	94	C		
				Bunji	14	97	C		
				Sindure	15	102	B		
38	Lefttside : (200 Mtrs)	303304	3008536	Sindure	12	101	C		
				Sindure	14	107	C		
				Sindure	14	104	A		
				Bajhi	16	97	B		
39	Lefttside : (500 Mtrs)	302574	3008769	Barro	14	100	A		
				Asna	17	108	A		
				Asna	17	97	A		
40	Rightside : (200 Mtrs)	301989	3009554	Sal	17	135	A		
				Sal	18	146	A		
				Banjhi	18	127	A		
				Sal	16	152	A		
41	Lefttside : (500 Mtrs)	300912	3009106	Karma	17	115	A		
				Sindure	16	105	A		
				karma	14	164	A		
				Banjhi	15	176	A		

S.N	Name of Species	Number of Species in each Quadrat																																							Total No of Trees	Density (No/Ha)	Frequency of Occurrence					
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39				Q40	Q41			
1	Sal		4			2							1				2		3	1		1		1	2							1								3		31	75.61	41.46				
2	Masala										5	5			4																												14	34.15	7.32			
3	Sindure							1					1	2																						3		1						12	29.27	17.07		
4	Teak																				3																	5					8	19.51	4.88			
5	Asna					1	1														1																			2			7	17.07	14.63			
6	Botdhayero								2									1	1		1						1																7	17.07	14.63			
7	Dhatngro																																											6	14.63	12.20		
8	Khair	4					1																																					5	12.20	4.88		
9	Pvari				2	1				2																																			5	12.20	7.32	
10	Bhalayo					1																																						5	12.20	7.32		
11	Jamun				1																1					1																			4	9.76	9.76	
12	Aule																	1																		2		1						4	9.76	7.32		
13	Banjhi																																													4	9.76	7.32
14	Khirro									1								1																											4	9.76	9.76	
15	Kusum						1			1				1																															3	7.32	7.32	
16	Barro																																													3	7.32	7.32
17	Hade																																													3	7.32	7.32
18	Harro																																													2	4.88	2.44
19	Rohini																		1																											2	4.88	4.88
20	Kadam																																													2	4.88	4.88
21	Karma																																													2	4.88	2.44
22	Haldu																																													1	2.44	2.44
23	Amaro																																													1	2.44	2.44
24	Kalikath																																													1	2.44	2.44
25	Satsal																																													1	2.44	2.44
26	Pithari																	1																											1	2.44	2.44	
27	Rajbrikshya																																													1	2.44	2.44
28	Halude																																													1	2.44	2.44
29	Bhorla																																													1	2.44	2.44
30	Dabddabe																																													1	2.44	2.44

Annexure 4.7: Evidence of Presence of Wildlife within Project Area

	
Pugmark of Elephant 250 m from CH:363+100	Elephant movement 250 m from CH:363+500
	
Elephant Dung 400 m from CH:339+400	Elephant movement 300 m from CH:360+800
	
Elephant Dung 150 m from CH:353+500	Elephant Dung 10 m from CH:334+400

Evidence of Elephants along the Project during Primary Survey



Pugmark of Tiger 150 m from CH 353+600



Pugmark of Tiger 2 km from CH 357+400



Pugmark of Tiger 200 m from CH 360+800



Pugmark of Tiger with cubs 450 m from CH 363+700



Pugmark of Tiger 3 km from CH 357+200



Pugmark of Tiger 110 m from CH 334+500



Pugmark of Tiger 250 m from CH 325+100



Pugmark of Leopard 500 m from CH 317+700

	
Pugmark of Leopard 1.5 km from CH 300+600	Pugmark of Leopard 300 m from CH 292+700

Evidence of Tiger and Leopards during Primary Survey

	
Spotted deer 1.8 km from CH 363+300	Nepal Grey Langur at multiple location
	
Rhesus macaque at multiple location	Nilgai Juvenile near CH 236+500

Prey Animal Directing Sightings along the Project Road



Himalayan Griffon Vulture, located 350 m from Chainage 292+700

**Annexure 4.8: Summary of Stakeholder Consultation Regarding Wildlife
Movement**

Summary of Consultation Held with Government Departments & NGOs

No.	Designation	Issues Discussed and Information Obtained	Feedback/Outcome
1	Dr. Maheshwar Dhakal, Director General, Department of National Parks and Wildlife Conservation, Govt. of Nepal	Applicable policies, regulations, Acts, Wildlife Working Plans, frame works and necessary support from Parsa National Park.	The policies related to wildlife and forest and planning carried out by Wildlife and forest department was informed by the officials.
2	Dr. Kanehan Thapa, Head of Wildlife Program, WWF Nepal	Movement and Pattern of tiger and Elephant near the Parsa National Park and along the subproject road. Published data on Tiger movement and Wildlife crossings technical specifications and their efficiency.	The information about type of wild animals, their habitats and probable locations of wildlife movement was informed by officials.
3	Mr. Roshan Thakur, Nepal Biodiversity Research and Conservation Centre, NGO	Seasonal Movement and Pattern of Elephant near the Parsa National Park and all along the subproject road. Prime areas of road crossings used by elephant, man elephant conflict village.	The information about elephant movement was informed during consultation.
4	Mr. Surya Khadka Assistant Conservation Officer, Parsa National Park	Locations of Elephant crossings near the Parsa National Park. Collected few photographs of elephant crossings.	The information about wild animals in Parsa National Parks, elephant movement and parks rules and regulation was informed by officials.
5	Technical Staff, Division Forest Office, Sarlahi	Movement of Elephant and Nilgai near the subproject road.	The information was particularly regarding crop damage and loss done by Elephants and Nilgai during their movement.

Annexure 4.9: IBAT Screening List of Critical Species

Summary of Critical Habitat-Qualifying biodiversity Assessment in the Project area

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Red-crowned Roofed Turtle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. Global Population: A river turtle restricted to mainly to river habitat. Known with certainty only from the Ganga basin of India and Bangladesh. Global Population: is estimated around 500 individuals in Bangladesh (Rashid and Khan 2000) Local Population: Conservation near Karnali River lowlands in western Nepal (more than 50 km distance from the project road). No scientific details were available on local population. As per the IUCN range distribution map, nearest location of Red-crowned Roofed Turtle is more than 50 km from project area. https://www.iucnredlist.org/species/10949/152043133 It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the species.
Three-striped Roofed Turtle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. A river turtle restricted to river habitat. Known with certainty only from the Ganga basin of India and Bangladesh.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✗ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						Global Population: Overall the population continues to decline, often through entanglement in fishing nets (S. Singh pers. comm. 2018). Local Population: No scientific details were available on the status of local population. As per the IUCN range distribution map, Three-striped Roofed Turtle is distributed near the project area. https://www.iucnredlist.org/species/10953/152042542 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the species.
Spotted Pond Turtle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered. <i>This species inhabits the lowlands of the Indus, Ganga and Brahmaputra River basins of Pakistan, India, Bangladesh and Nepal</i> Global Population: The species common in the Brahmaputra floodplains and rare elsewhere, and rated its population as apparently stable in India (Choudhury <i>et al.</i> 2000). Population decline in the past 20 years in Bangladesh (Rashid and Khan 2000) Local Population: No scientific details were available on local population. As per the IUCN range distribution map, Spotted Pond Turtle is distributed near the project area.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						https://www.iucnredlist.org/species/9029/152050337 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Crowned River Turtle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered. A river turtle restricted to mainly to river habitat. Known with certainty Ganga-Brahmaputra basin of northern India and Bangladesh, and the Indus basin of Pakistan, no confirmed records exist from Nepal Global Population: There were good populations across terai 30 years ago, but it is now localized to a few rivers and wetlands and has arguably declined by 80% (Shai pers. comm. 2017). Recent (unpublished) data indicate estimated population declines of about 50–75% overall. Local Population: No scientific details were available on local population. As per the IUCN range distribution map, Crowned River Turtle is distributed near the project area. https://www.iucnredlist.org/species/9696/3152073

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Indian Eyed Turtle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered. A river turtle occurs widely throughout the Bangladesh, and southern Nepal at elevations of between 10 to 100 m above sea level. Global Population: In Bangladesh it was considered uncommon, and populations in decline, by 1999 (Rashid and Swingland 1997, Rashid and Khan 2000). There is a very good subpopulation in the Pilibhit Tiger Reserve in Uttar Pradesh, India (S. Singh pers. comm. 2018). Local Population: Only a single record exists from Nepal (Schleich and Kästle, 2002). As per the IUCN range distribution map, Indian Eyed Turtle is distributed near the project area https://www.iucnredlist.org/species/13874/544248 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Indian Soft-shell Turtle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered. A turtle occurs widely throughout the drainages of Bangladesh, India, Nepal, Pakistan and Afghanistan (Schneider and Djalal 1970) Global Population: Considered the species common throughout its range in India, but possibly in decline (Choudhury <i>et al.</i> 2000) Local Population: No data available As per the IUCN range distribution map, Indian Soft-shell Turtle is distributed near the project area https://www.iucnredlist.org/species/39618/2930943 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Indian Peacock Softshell Turtle	✓	✓	X	X	X	IUCN Red List Category: Endangered. A turtle occurs throughout the drainages of Bangladesh, northern India, southern Nepal and Pakistan (Iverson 1992, Das 1995, Praschag and Gemel 2002, Das <i>et al.</i> 2010).

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✗ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						Global Population: Pakistan, found 69 individuals and considered the population of Indian Peacock Softshell Turtle to be in good condition (Safi and Khan 2014). However, it is rare in Sindh, southern Pakistan (Khan <i>et al.</i> 2015). Local Population: The records from Nepal are from the western, central, and Terai regions (Mitchell and Rhodin 1996; Schleich and Kastle 2002). As per the IUCN range distribution map, Indian Peacock Softshell Turtle is distributed near the project area https://www.iucnredlist.org/species/39619/2931203 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Elongated Tortoise	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. It is widely distributed across South and Southeast Asia. It has localised occurrences in northern and eastern India, Nepal and Bangladesh, Bhutan and much of Myanmar, Thailand and Cambodia. Global Population: A 50-70% decline in population is believed to have occurred in the India/Bangladesh part of the range in the past 20 years (S. Singh pers. comm. 2018). in Bhutan's Royal Manus National Park but abundance is low (Wangyal <i>et al.</i> 2012).

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✗ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						Local Population: Jhapa in eastern Nepal (Tapil et al. 2021) As per the IUCN range distribution map, Elongated Tortoise is distributed near the project area https://www.iucnredlist.org/species/10824/152051190 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Dark Sitana	✓	✓	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. This species is known only from its type locality in central Nepal, GhauriDhara Road Camp 0.8 km north of the road Janakpur-Bardibas (Kastle <i>et al.</i> 2013). Population: There are no data on population size and trends for this species. After the discovery of the species, intensive surveys in the area were not able to find it (Kastle <i>et al.</i> 2013). As per the IUCN range distribution map, Dark Sitana is more than 50 km from project area. https://www.iucnredlist.org/species/127901942/219116426 It is not possible to demonstrate the presence of a population that has significant importance at the national or global level.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Tricarinate Hill Turtle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered. Species distributed in the Himalayan foothill of northern and northeastern India and southern Nepal Global Population: study found 48 specimens in two years India (Choudhury <i>et al.</i> 2000; Das 2009) Local Population: surveys at a protected area in the terai resulted in 36 specimens found in a 3-month survey effort (Participants Red List Workshop Singapore 2011). As per the IUCN range distribution map, Tricarinate Hill Turtle is distributed near the project area https://www.iucnredlist.org/species/13038/511526 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Yellow Monitor	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						This species confined to northern India, Nepal, south central Bhutan, and Bangladesh. Its distribution mainly follows the major river systems of the Indus, Ganges and Brahmaputra (Visser 2004). Population: There are no current data on population size and trends for this species. It is uncommon compared with the other monitor lizards in its range. As per the IUCN range distribution map, Yellow Monitor is distributed near the project area https://www.iucnredlist.org/species/22872/127899602 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Baer's Pochard	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. The species breeds from the Amur and Ussuri basins in Russia southwards to the central and lower Yangtze floodplain in central-eastern China. Global Population: in Bangladesh recent maximum winter total of only 17 individuals, down from 1,000–2,000 individuals (Chowdhury <i>et al.</i> 2012)

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						Local Population: Only one confirmed location in Nepal (Tordoff, 2007) As per the IUCN range distribution map, Baer's Pochard is distributed near the project area https://www.iucnredlist.org/species/22680384/154436811 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Yellow-breasted Bunting	✓	X	X	X	X	IUCN Red List Category: Critically Endangered. This species breed across the northern Palaearctic. Also winter visitor to the South and South East Asia, which includes Nepal and India. Global Population: The European population is estimated to just 120-600 mature individuals (Bird Life International 2015). Local Population: No data available As per the IUCN range distribution map, Yellow-breasted Bunting is distributed near the project area https://www.iucnredlist.org/species/22720966/119335690 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Black-bellied Tern	✓	X	X	X	X	IUCN Red List Category: Endangered. This species majority of its range in India where it remains widespread but in decline. Also distributed in Pakistan, Nepal and Bangladesh Global Population: It is widespread in India but population drastically declining. Only not more than 30 individuals recorded from Pakistan and Bangladesh (Zockler <i>et al.</i> 2020) Local Population: with likely no more than 30 individuals in Nepal (Zockler <i>et al.</i> 2020) As per the IUCN range distribution map, Black-bellied Tern is distributed in the project area https://www.iucnredlist.org/species/22694711/207933556 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Pallas's Fish-eagle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						The species may breed only in northern India (apparent strongholds in Assam and Uttarakhand), Bangladesh and Myanmar, with very small numbers in Bhutan. Global Population:Based on surveys and available data from across the species's extant distribution, the population is estimated to fall well below 2,500 mature individuals (M. Steele and M. Gilbert <i>in litt.</i> 2016). Local Population: No data available As per the IUCN range distribution map, Pallas's Fish-eagle is distributed near the project area https://www.iucnredlist.org/species/22695130/199521572 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Egyptian Vulture	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered. Egyptian vultures are widely distributed across the Old World with their breeding range from southern <u>Europe</u> to northern <u>Africa</u> east to <u>western</u> and <u>southern Asia</u>. Global population: 3,000-4,500 pairs are estimated in Europe (BirdLife International <i>in prep</i>), < 2,000 pairs in central Asia, just a few thousand pairs now in the Indian Subcontinent, ~ 1,000 pairs

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✗ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						in the Middle East, and ~ 1,000-2,000 pairs in Africa (Thiollay 1989, I. Angelov <i>in litt.</i> 2012). Local Population: No data available As per the IUCN range distribution map, Egyptian Vulture is distributed near the project area https://www.iucnredlist.org/species/22695180/205187871 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Saker Falcon	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered. Saker Falcon occurs in a wide range across the Palearctic region from eastern Europe to western China Global Population: The global population was estimated at c.6, 100-14,900 pairs (median c.10, 500) in 2013. Local Population: No data available As per the IUCN range distribution map, Saker Falcon is distributed near the project area https://www.iucnredlist.org/species/22696495/204182473

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✗ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Greater Adjutant	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered. Greater Adjutant prefer forest, grassland, wetlands, also previously widespread and common across much of South and continental South-East Asia (Birdlife International 2001) Global Population: is estimated to number 800-1,200 mature individuals, roughly equivalent to 1,200-1,800 individuals in total. Kamrup District in Assam is known to be a stronghold for the species. Local Population: is not known properly, according to IUCN range distribution map, Greater Adjutant is extinct near the project area https://www.iucnredlist.org/species/22697721/93633471 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Bengal Florican	✓	X	X	X	X	National Red List: Not listed

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						IUCN Red List Category: Critically Endangered. Bengal Florican prefers grasslands (Artificial/Terrestrial). The species has two disjunct populations, one in the Indian Subcontinent, the other in South-East Asia (BirdLife International 2001). Global Population: The population in Cambodia was estimated only 432 individuals (95% CI 312-550) (C. Packman <i>in litt.</i> 2013, Packman <i>et al.</i> 2014). Local Population: Only 75-96 individuals remain in Nepal (Baral <i>et al.</i> 2013). As per the IUCN range distribution map, Bengal Florican is distributed (Possible extinct) near the project area https://www.iucnredlist.org/species/22692015/130184896 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Lesser Florican	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. Lesser Florican prefers grasslands (Artificial/Terrestrial). Breeds in India and Nepal.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						Global Population: The total population has been calculated from a recent survey over most of the range which estimated 340 displaying males (95% CI 162–597, Dutta <i>et al.</i> 2018). Local Population: rare summer visitor to the terai of Nepal, less than <10 birds estimated (Inskipp <i>et al.</i> 2016, C. Inskipp and H. S. Baral <i>in litt.</i> 2012). As per the IUCN range distribution map, Lesser Florican is distributed near the project area https://www.iucnredlist.org/species/22692024/199959007 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Sociable Lapwing	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. Sociable Lapwing is mostly occurs in grasslands, wetlands and deserts. Global Population: The European population is estimated at 0-10 pairs, which equates to 0-20 mature individuals (BirdLife International 2015). Local Population: No data available As per the IUCN range distribution map, Sociable Lapwing is distributed near the project area also probably extinct. https://www.iucnredlist.org/species/22694053/155545788 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
White-rumped Vulture	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. White-rumped Vulture preferring habitat of forest, savanna, shrubland, grassland. Occurs in globally occurs in Pakistan, India, Bangladesh, Nepal, Bhutan.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						Global Population: There are now an estimated c.6, 000 individuals in India (Prakash <i>et al.</i> 2019). The total population is therefore estimated to be c. 6,000-9,000 individuals, equating to 4,000-6,000 mature individuals. Local Population: total of <2,000 individuals recorded in Nepal (DNPWC 2015). As per the IUCN range distribution map, White-rumped Vulture is distributed (probably extinct.) near the project area. https://www.iucnredlist.org/species/22695194/204618615 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Red-headed Vulture	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. Red-headed Vulture preferring habitat of forest, savanna, shrubland, grassland. Global Population: Total of 3,500-15,000 individuals estimated globally. Local Population: still widespread, but has declined significantly such that it is virtually absent from most areas east of Kathmandu (Inskipp <i>et al.</i> 2016) As per the IUCN range distribution map, Red-headed Vulture is distributed near the project area.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						https://www.iucnredlist.org/species/22695254/205031246 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Slender-billed Vulture	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. Slender-billed Vulture preferring habitat of forest, savanna, shrubland, grassland. Global Population: The total population is therefore thought to be c.1,100-1,300 individuals, roughly equating to 730-870 mature individuals. Local Population: The total population in Nepal fewer than 50 individuals (DNPWC 2015) As per the IUCN range distribution map, Slender-billed Vulture is distributed near the project area https://www.iucnredlist.org/species/22729460/204781113 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✗ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Indian Vulture	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Critically Endangered. Indian Vulture preferring habitat of forest, savanna, shrubland, grassland and Rocky areas (inland cliffs, mountain peaks) Global Population: breeds in India and south-east Pakistan. Roughly 5,000-15,000 mature individuals are estimated. Local Population: The species was first recorded in Nepal in 2011 (Subedi and DeCandido 2013). As per the IUCN range distribution map, Indian Vulture is distributed (possible extinct) near the project area https://www.iucnredlist.org/species/22729731/204672586 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Steppe Eagle	✓	X	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered Steppe Eagle preferring habitat of forest, savanna, shrubland, grassland Global Population: Total 50000-75000 individuals are estimated Local Population: Total of 6,166 individuals recorded in 2014 at Thoolakharka, Nepal (Subedi 2014). As per the IUCN range distribution map, Steppe Eagle is distributed near the project area https://www.iucnredlist.org/species/22696038/205452572 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Hog Deer	X	√	X	X	X	National Red List: Endangered IUCN Red List Category: Endangered Hog Deer preferring habitat of forest, savanna, shrubland, grassland. Distributed in India and Nepal - and perhaps Pakistan and Bhutan No data available related to local and global population As per the IUCN range distribution map, Hog Deer is distributed near the project area. https://www.iucnredlist.org/species/41784/22157664 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered nor secondary evidences were recorded. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Honey Badger	X	✓	X	X	X	National Red List: Data Deficient IUCN Red List Category: Least Concern Honey Badger preferring habitat of forest, savanna, shrubland. Distributed in India and Nepal - and Western Cape, South Africa, to southern Morocco and south-western Algeria. The presence of Honey Badger in Nepal is known from only a few areas in Nepal (Jnawali et al. 2011) No data available related to local and global population As per the IUCN range distribution map, Honey Badger is distributed near the project area as recorded in the camera trap study in May 16 2018, Jan 12 2019 & Jan 16 2019. https://www.iucnredlist.org/species/41629/45210107 https://www.discoveryjournals.org/Species/current_issue/2022/v23/n71/A12.pdf As the species is reported in very few locations of Nepal, Hence the species is qualifying as a criterion b species. Therefore, it is identified that the project area is a critical habitat for the particular species and the habitat has significant importance for survival this species at the national level

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Sloth Bear	✓	X	X	X	X	National Red List: Endangered IUCN Red List Category: Endangered Sloth Bear preferring habitat of forest, savanna, shrubland, grassland, artificial/terrestrial, historical distribution includes a large portion of India, Bangladesh, and Sri Lanka, as well as the southern lowlands of Nepal and presumably Bhutan. No data available related to local and global population As per the IUCN range distribution map, Sloth bear is distributed near the project area. https://www.iucnredlist.org/species/13143/166519315 Hence the species is qualifying as a criterion a and b species. Therefore, it is identified that the project area is a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Striped hyaena	✓	X	X	X	X	National Red List: Endangered IUCN Red List Category: Near Threatened Striped hyaena preferring habitat of forest, savanna, shrublands, grasslands, wetlands (India). Species widely distributed from Africa, India, Himalayan foot hills and Nepal No data available related to local and global population As per the IUCN range distribution map, Striped hyaena is distributed near the project area. https://www.iucnredlist.org/species/10274/45195080 Hence the species is qualifying as a criterion a and b species. Therefore, it is identified that the project area is a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Barking deer	X	X	X	X	√	National Red List: Vulnerable IUCN Red List Category: Least Concern Barking deer preferring the habitats such as forest, savanna, shrubland, grassland, artificial/terrestrial. This species occurs in Sri Lanka, most of India, northern Pakistan, Nepal, Bhutan, Bangladesh and southern China No data available related to local and global population As per the IUCN range distribution map, Barking deer is distributed near the project area. https://www.iucnredlist.org/species/136551/22165292 Hence the species is qualifying as a criterion e species. Therefore, it is identified that the project area is a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Spotted deer	X	X	X	X	√	National Red List: Vulnerable IUCN Red List Category: Least Concern Spotter deer preferring habitats such as forests, savannas, grasslands. No data available related to local and global population As per the IUCN range distribution map, Spotted deer is distributed near the project area. https://www.iucnredlist.org/species/41783/22158006 Hence the species is qualifying as a criterion e species. Therefore, it is identified that the project area is a critical habitat for the particular species.
Wild boar	X	X	X	X	√	National Red List: Least Concern IUCN Red List Category: Least Concern Wild boar preferring the habitats such as forest, savanna, shrubland, grassland, wetlands (inland), desert. No data available related to local and global population As per the IUCN range distribution map, Wild boar is distributed in the project area. https://www.iucnredlist.org/species/41775/44141833 Hence the species is qualifying as a criterion e species. Therefore, it is identified that the project area is a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Nilgai	X	X	X	X	√	National Red List: Vulnerable IUCN Red List Category: Least Concern Nilgai preferring the habitats such as forest, savanna, shrubland, grassland. Distributed in India and in the lowland zone of Nepal No data available related to local and global population As per the IUCN range distribution map, Nilgai is distributed in the project area. https://www.iucnredlist.org/species/2893/115064758 Hence the species is qualifying as a criterion e species. Therefore, it is identified that the project area is a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Gaur	✓	X	X	X	✓	National Red List: Vulnerable IUCN Red List Category: Vulnerable Gaur preferring the habitats such as forest, savanna, shrubland, grassland. Distributed throughout mainland south and southeast Asia and Sri Lanka No data available related to local and global population As per the IUCN range distribution map, Gaur is distributed in the project area. https://www.iucnredlist.org/species/2891/46363646 Hence the species is qualifying as a criterion a and e species. Therefore, it is identified that the project area is a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Chinese Pangolin	✓	X	X	X	X	National Red List: Endangered IUCN Red List Category: Critically Endangered Chinese Pangolin occurs in forests, shrub lands and grasslands. Distributed Himalayan foothills of Nepal, southern Bhutan, north and north-eastern India. No data available related to local and global population As per the IUCN range distribution map, Chinese Pangolin is distributed near the project area. https://www.iucnredlist.org/species/12764/45222544 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered nor secondary evidences were recorded. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Red Panda	✓	✓	X	X	X	National Red List: Endangered IUCN Red List Category: Endangered Red Panda preferring habitats such as forest and shrub lands. Distributed in Nepal, China, Myanmar, India and Bhutan Global Population declined by 50% over the last three generations (estimated at 18 years). No data available related to local and global population number As per the IUCN range distribution map, Red Panda is distributed far the project area more than 30 km from the project road. https://www.iucnredlist.org/species/714/110023718 It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Hispid Hare	✓	✓	X	X	X	National Red List: Endangered IUCN Red List Category: Endangered Hispid Hare preferring habitats such as Grasslands and Wetlands (Inlands). Distributed in Bangladesh, India, Nepal, and Bhutan No data available related to local and global population number As per the IUCN range distribution map, Hispid Hare is distributed in the project area https://www.iucnredlist.org/species/3833/45176688 It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Dhole	✓	X	X	X	X	National Red List: Endangered IUCN Red List Category: Endangered Dhole preferring habitats such as Grasslands and Shrublands. Historically, Dholes occurred throughout South and East Asia, to as far north as the southern parts of the Russian Federation. Global Population: likely 949-2215 matured individuals are there globally Local Population: Dhole sightings in Nepal are not common hence species occurred in Rara and Khaptad National Parks, Dhorpatan Hunting Reserve of Nepal.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						As per the IUCN range distribution map, Dhole is distributed in near the project area https://www.iucnredlist.org/species/5953/72477893 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered nor secondary evidences were recorded. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Asian Elephant	✓	X	X	X	X	National Red List: Endangered IUCN Red List Category: Endangered Asian Elephant prefers habitat such as Forest, Grasslands and Shrublands. Distributed in West Asia along the Iranian coast to Indian subcontinent . The Asian elephant is distributed across 13 range countries with a population of about 41,000 to 52,000 (Sukumar 2006; Williams et al. 2020). The number of Nepal's resident elephants is estimated in 227 individuals. Number of elephants known to be present near the project road ranges from 4-8 individuals, however during monsoon season it will be increase from 12-18 individuals. Therefore, the area can be considered as a refuge habitat of the Asian elephant. Nevertheless, prior precautionary measures will be taken to avoid any disturbance to the Asian elephant in the project area.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						https://www.iucnredlist.org/species/7140/45818198 Number of elephants known to be present near the project road ranges from 4-8 individuals, however during monsoon season it will be increase from 12-18 individuals. Therefore, the area can be considered as a refuge habitat of the Asian elephant. From Km 130-100, it was noticed that the elephant movement is mostly seasonal during the larger trans-border migratory herds 12-18 individuals from the Chitwan National Park. From Km 100-50, it was noticed that the elephant movement is mostly due to the Small and isolated populations of wild elephants number ranging from 4-7 individuals. Asper the site investigation studies conducted along reserve forest areas, the water bodies associated with project road, the species encountered at several location. Hence the species is qualifying as a criterion a and b species. Therefore, it is identified that the project area is a critical habitat for the particular species.

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
Indian Pangolin	✓	X	X	X	X	National Red List: Endangered IUCN Red List Category: Endangered Indian Pangolin occurs in Forest, Savanna, Shrubland, Grassland. Distributed in South Asia from northern and southeastern Pakistan through much of India south of the Himalayas. There is very limited information or data on population of this species at any level, and generally there is a lack of research on abundance. There are no quantitative population data available for Nepal. As per the IUCN range distribution map, Indian Pangolin is distributed near the project area https://www.iucnredlist.org/species/12761/123583998 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered nor secondary evidences were recorded. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Himalayan Muskdeer	✓	✓	X	X	X	National Red List: Not listed IUCN Red List Category: Endangered Himalayan Muskdeer prefers the Forest, Shrubland and Grassland. Distributed in Himalayas of Bhutan, northern India

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✗ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						(including Sikkim), Nepal, and China (southwest Xizang) (Groves <i>et al.</i> 1995, Grubb 2005). Little is known of the species' current status. There are very few in China, reflecting the small range there (Yang <i>et al.</i> 2003). As per the IUCN range distribution map, Himalayan Muskdeer is distributed in more than 50 km distance away from the project area https://www.iucnredlist.org/species/13901/61977764 However, as per the site investigation studies conducted along the water bodies associated with project road, the species was not encountered nor secondary evidences were recorded. It is not possible to demonstrate the presence of a population that has significant importance at the national or global level. Therefore, it is concluded that the project area is not a critical habitat for the particular species.
Royal Bengal Tiger	✓	X	X	X	X	National Red List: Endangered IUCN Red List Category: Endangered The Tiger is a keystone species, crucial in maintaining the integrity of the ecosystems in which it thrives. Based on the most recent national estimates, the global Tiger population numbers between 3,726 and 5,578 individuals and is restricted to ten countries. Current surveys estimate a population of 235 tigers in Nepal (July 2022). https://www.iucnredlist.org/species/15955/214862019 With reference to the project road, as per the recent tiger census, it was noticed that range distribution of two Tigers namely FT-79 & FT-78 were reported part of the project road. These locations were

	Critical Habitat criterion qualified					Justification
	a	b	c	d	e	✓ attracting Criterion/ Criteria ✕ not attracting Criterion/ Criteria Criterion as per ESS6: 1. Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches. 2. Habitat of significant importance to endemic or restricted-range species. 3. Habitat supporting globally or nationally significant concentrations of migratory or congregatory species. 4. Highly threatened or unique ecosystems. 5. Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).
						identified between the km 333+100 to 327+700, this section is outside the Parsa National Park. As per the site investigation studies conducted along reserve forest areas, the water bodies associated with project road, the species encountered at several location. Hence the species is qualifying as a criterion a and b species. Therefore, it is identified that the project area is a critical habitat for the particular species.

Annexure 6.1: Cumulative Impact Assessment

Government of Nepal
Ministry of Physical Infrastructure and Transport Department of Roads
Development Cooperation Implementation Division (DCID)
Strategic Road Connectivity and Trade Improvement Project (SRCTIP)
Babarmahal, Kathmandu

Cumulative Impact Assessment of
Kamala Dhalkebar Pathlaiya Road Upgrading and
Associated Project

Prepared by
Consulting Engineers Group (P) Ltd. India
JV with Civil Informatics and Solutions (P). Ltd. Nepal

August 2024

Table of Contents

Abbreviations.....	iii
1. Project Background	1
2. Salient Features of the Project.....	1
3. Study Area	3
4. Methodology for Cumulative Impact Assessment	4
5. Valued Environmental and Social Components (VECs).....	5
6. Projects considered for CIA	7
7. Impact Identification.....	11
8. Prioritized VECs for CIA	15
9. Rivers, Streams and Natural Drainage	19
9.1 General Scenario	19
9.2 Boundaries under Consideration	20
9.3 Baseline Information	20
9.4 Impacts Associated with KDP Road Upgradation and Mitigation Measures Proposed	20
9.5 Cumulative Impacts from other Projects and Mitigation Measures Required	21
10. Elephants.....	22
10.1 General Scenario.....	22
10.2 Boundaries under Consideration	24
10.3 Baseline Information	25
10.4 Impacts Associated with KDP Road Upgradation and Mitigation Measures Proposed.....	26
10.5 Cumulative Impacts from other Projects and Mitigation Measures Required	28
11. VEC-3- Land Resources	29
11.1 General Scenario.....	29
11.2 Boundaries under Consideration	29
11.3 Baseline Information	30
11.4 Impacts Associated with KDP Road Upgradation and Mitigation Measures Proposed.....	33
11.5 Cumulative Impacts from other Projects and Mitigation Measures Required	34

List of Tables

Table 2-1: Salient Features of the Project.....	1
Table 5-1: VECs and Indicators.....	7
Table 6-1: Projects Considered for CIA	7
Table 7-1: Impact Identification	11
Table 8-1: Assessment of Cumulative Impacts of Different Project with respect of KDP	15
Table 10-1: List of Bridges/Under Passes Proposed for Elephant Crossings.....	27
Table 11-1: Land Use Category of Project Area	30
Table 11-2: Currently Migrated Population by Length of Stay in the Current Place	30

List of Figures

Figure 3-1: Location Map of Proposed Road Alignment to be upgraded.....	4
Figure 6-1: Different Projects for CIA.....	10
Figure 9-1: Drainage Pattern along KDP Road Alignment	19
Figure 10-1: Elephants distributed in three sub population namely Eastern, Central and Western groups in Nepal.....	23
Figure 10-2: Location of linear and infrastructure projects near Elephant Central and Western population of Nepal.....	24
Figure 10-3: Forest along the Road Alignment	25
Figure 10-4: Distribution of Elephants along the Project Corridor along with zoomed portion of Pathalaiya section from CH 365+600 to CH 349+100.....	26
Figure 11-1: Google Image of Dhalkebar area on 2003	31
Figure 11-2: Google Image of Dhalkebar area on 2024	32
Figure 11-3: Google Image of Lalbandhi area on 2003.....	32
Figure 11-4: Google Image of Lalbandhi area on 2024.....	33

Abbreviations

AADT:	Annual Average Daily Traffic
AHDS:	Asian Highway Design Standards
CIA:	Cumulative Impact Assessment
CITES:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DBST:	Double Bituminous Surface Treatment
DNPWC:	Department of National Parks and Wildlife Conservation
DoR:	Department of Roads
ESA:	Environmental and Social Assessment
GON:	Government of Nepal
HDD:	Hetauda-Dhalkebar-Duhabi
IUCN:	International Union for Conservation of Nature
KDP:	Kamala Dhalkebar Pathalaiya
MME:	Mechi-Mahakali Electrified Railway
MSA:	Million Standard Axle
SESA:	Strategic Environmental and Social Assessment
SRCTIP:	Strategic Road Connectivity and Trade Improvement Project
USSR:	Union of Soviet Socialist Republics
VECs:	Valued Environmental and Social Component

1. Project Background

East-West Highway also known as Mahendra Highway is one of the major highways of Nepal that runs east to west throughout the country on the southern side just below the chure range. This highway is also a part of Asian Highway (AH2) that originates from Dhaka in Bangladesh and ends in New Delhi in India. Proposed Kamala-Dhalkebar-Pathalaiya road section (130 km) is a part of Mahendra Highway: Chainage 236+698 to 366+887.

The section of Kamala – Dhalkebar (21 Km) of Mahendra Highway was constructed in the year 1970, which was funded by the Government of India. The section from Dhalkebar-Pathalaiya (109 Km) was constructed later in 1974 with assistance from the then USSR. Both of these sections were upgraded to two-lane standards only in 1990. The existing bridges at Kamala- Dhalkebar section are of two-lane standard while the bridges at Dhalkebar -Pathalaiya section are of intermediate lane (5.5 m width) standard. The bridges are the prime cause of the traffic congestion on that section of the highway. The passenger and freight traffic have been increasing as a result of trade enhancement. The recent regional trade agreements with neighboring countries for further enhancement of trade necessitates the standard of road needs to be upgraded to match with the Asian Highway Standards (Class I) and Nepal Road Standards 2070 (Class II). In order to enhance road capacity and efficiency in the road transport, GON, DoR intends to upgrade the KDP section (130 Kms) of the Mahendra Highway under the proposed project from 2-lane to 4-lane road under SRCTIP Project.

2. Salient Features of the Project

The existing 2-lane KDP road has been proposed to be improved into the 4-lane Asian Highway Standard (Class I). The road will be widened to 18 m width (7 m on either side with 4 m centre median). Service roads of width 6.5 m each will also be constructed in either side in urban areas. In addition to road widening, the riverbank protection work will be done for rivers coming across the KDP section. The borrow sites will be operated for soil and aggregates, which will be used for embankment and construction purpose.

Salient features of the Project are given in **Table 2-1**:

Table 2-1: Salient Features of the Project

Name of the Project	Upgrading of Kamala-Dhalkebar-Pathalaiya Road section of Mahendra Highway
Location	
Province	Madhesh
Start Point	Kamala Bridge (Ch: 236+698) 26°52'40.73"N latitude and 86° 8'24.20"E longitude
End Point	Pathalaiya Junction (Ch: 366+887) 27°11'57.66"N latitude and 84°58'50.76"E longitude
Name of District and Municipalities	Siraha District: a) Karjanha Dhanush District: a) Ganeshman Charnath Municipality, b) Dhanusadham Municipality, d) Mithila Municipality Mahotari District: a) Bardibas Municipality, b) Gaushala Municipality Sarlahi District: a) Ishworpur municipality, b) Lalbandi municipality, c) Hariwan Municipality, d) Bagmati Municipality Rautahat District: a) Brindaban Municipality, b) Chandrapur Municipality, c) Gujara municipality

Name of the Project	Upgrading of Kamala-Dhalkebar-Pathalaiya Road section of Mahendra Highway	
	Bara District: a) Nijgadh Municipality, b) Kolhabi Municipality and c) Jitpur Simarasub Metropolitan City.	
Major Settlement	Godar Bazar, Birendra Bazar, Dharapani, Puspapur, Dhakebar, Badahari, Lalgadh, Bardibas, Phuljor, Raniganj, Lalbandi, Nawalpur, Harion, Bagmati, Chandrapur, Nijagadh and Pathalaiya.	
Geographical Feature		
Terrain	Plain	
Geology	Alluvial deposit with deep to very deep, poorly drained, high-water table, and silt to silt loam textures	
Altitude (maximum and minimum)	Maximum 227 at Ch 266+300, Bardibas and minimum 105 at start (Kamala river)	
Climate	Tropical/Subtropical	
	Existing	Proposed
Road Classification		
Classification	Class II as per NRS 2070	Class II as per NRS 2070 and Class I as per AHDS
Length of Road	130 km	130 km
Road Pavement		
Sub-base Material	15 cm	20 cm
Base Material	10 cm	25 cm
Dense Bituminous Macadam	0 cm	9 cm for 40 and 60 MSA and 10 for 75 MSA
Wearing Course	DBST (5-10 cm)	Asphalt Concrete (4 cm for 40 MSA and 5 cm for 60 MSA and 75 MSA)
Cross-section		
Right of Way	50 m	50 m
Carriageway Width	7.0m (Average)	18 m (7.0 m on either side with 4 m center median), further 6.5 m service road width in either side of roads in urban areas.
Formation Width	(10 – 12) m	24 m
Shoulder Width	1.2 m	2.5 m
Side Drain (Width)	Side Drains are available at Dense settlement area	Open drain in rural areas and trench type with cover for footpath in urban areas
Design Standard		
Standard		NRS-2070
Design Speed		100 kmph
Gradient (Maximum and Minimum)		5 %
Minimum Radius of the Horizontal Curve		Maximum as per design and minimum should be at least 870 m as per NRS-2070.
Camber		2.5 %
Super Elevation		7 %
Crossings		
Bridges (Locations)	76	60
Culverts (Locations)	122	157
Causeway (Locations)	23	0
Cut and Fill		
Cut		221,591 cubic meters

Name of the Project		Upgrading of Kamala-Dhalkebar-Pathalaiya Road section of Mahendra Highway	
Fill		5,018,645 cubic meters	
Traffic Data (January 2022, Base Year Traffic)			
AADT, Vehicle/day	13249 at Kamala-Dhalkebar section and 8306 at Nijgadh-Pathalaiya section		
AADT, PCU/day	15386 at Kamala-Dhalkebar section and 12067 at Nijgadh-Pathalaiya section		
Other Project Features			
Bus shelter with Bus bays	49 nos. along the road		
Truck lay bye	5 nos. along the road		
Service roads	19 nos. in total length of 34704 m		
VUP/PUP	5 nos.		
Elephant Underpasses	Total 8 nos. (existing bridges), 4 of them to be dismantle and rebuild		
Medium size animal crossings	10 nos.		
Tractor and Cattle Crossings	18 nos.		
Traffic lights	Urban Section only		
Total Project Cost	NPR 36,924,008,363 (In words: Thirty-six billion nine hundred twenty-four million eight thousand three hundred sixty-three)		

Source: Detailed Design Report, 2023

3. Study Area

KDP road section is a part of Mahendra Highway (Chainage 236+698 to 366+887). The proposed road section starts from Kamala at 26°52'40.73"N latitude and 86° 8'24.20"E longitude and ends at Pathalaiya at 27°11'57.66"N latitude and 84°58'50.76"E longitude. The road stretch lies within Madhesh Province covering 6 Districts (Siraha, Dhanusha, Mahottari, Sarlahi, Rautahat, Bara), 15 Municipalities (Karjanha, Ganeshman Charnath, Dhanusadham, Mithila, Bardibas, Gaushala, Ishworpur, Lalbandi, Hariwan, Bagmati, Brindaban, Chandrapur, Gujara, Nijgadh and Kolhabi) and one sub-metropolitan city (Jitpur Simara).

The Project location along with proposed road alignment is shown in Figure 3-1. The start points of the road section, Kamala is 209 km far from Kathmandu via Kathmandu-Banepa-Dhulikhel-Bardibas (BP-Highway) road and end point of the road section, Pathlaiya, is 110 km far from Kathmandu via Kathmandu-Kulekhani-Hetauda Road. Nearest airport from the road section is at Simara, which is around 6 km far from Pathlaiya. Similarly, Janakpur airport is around 24 km far from Dhalkebar (Ch 257+200).

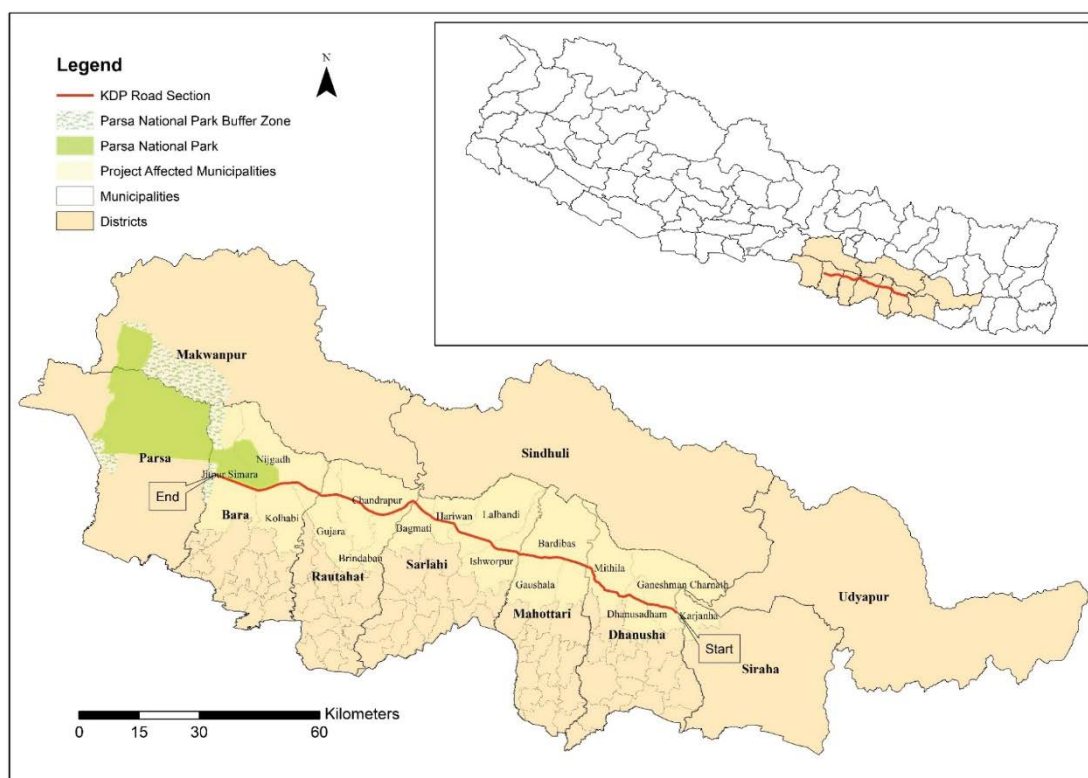


Figure 3-1: Location Map of Proposed Road Alignment to be upgraded

4. Methodology for Cumulative Impact Assessment

Guidance as provided by Strategic Environmental and Social Assessment (SESA) and resultant development of Green and Resilient Strategy for the Upgrading of Nepal's Selected Road Corridors has been adopted for this Cumulative Impact Assessment (CIA)

Identification of Valued Environmental and Social Components (VECs) within the project area was the initial step considered for CIA that was followed by identification of different projects (past, ongoing and planned projects) within the project vicinity of KDP that can have cumulative impacts on identified VECs along with KDP Project. Consultation with different stakeholders including local government and concerned project offices were done for this and further the study team observed the completed and ongoing project within the project vicinity. Environmental and social impacts of different projects (including KDP) on identified VECs were listed and analyzed.

VECs were identified on the basis of previous studies (e.g. ESA of Kakarbhitta Pathlaiya Road, ESIA of KDP, Consolidated report on Services for Green and Resilient Strategy for Nepal's Selected Highway Corridors and environmental and social assessment reports of projects under consideration), field assessment and stakeholder consultation. VECs included in ESA of Kakarbhitta Pathlaiya Road were further cross verified through field observation, consultation and expert judgement during this process. VECs under each domain of physical environment, biological environment and socio-economic and cultural environment were prioritized on the basis of cumulative impacts due to all the projects under consideration. For this sensitivity

analysis was done and most sensitive VEC that will be most affected due to cumulative impacts was prioritized under each domain and considered for the study.

Spatial and temporal boundaries for each VEC considered were delineated. For spatial boundary, possible influence area of each VEC has been considered. For temporal boundary, the construction period of 3 years and design period of 30 years has been considered. Beside this, it is assumed that the impacts within project area prevailed since construction of the road on 1970 and the impact will continue till existence of the road.

Baseline information for these VECs were collected through site observation, consultations and secondary literatures. Associated impacts, mitigation measures proposed in ESIA of KDP and mitigation measures to be adopted from respective projects and cumulative efforts required were proposed.

5. Valued Environmental and Social Components (VECs)

Consolidated report on Services for Green and Resilient Strategy for Nepal's Selected Highway Corridors has identified 15 high level VECs under different themes for selected highway corridors (10 road sample set plus 5 additional linear infrastructure projects) under different themes as mentioned below:

Biophysical Environment:

Species and Ecosystem

- Terrestrial wildlife
- Wetland and aquatic ecosystem
- Forest ecosystem
- Environmentally sensitive areas

Biophysical Components

- Hydrology: water quantity and quality
- Geomorphology, slope stability and erosion
- Airshed and landscape

Sociocultural Environment:

Community

- Community health and wellbeing
- Land use and Livelihood
- Productive land and fixed assets

Ecosystem services and natural resources: Sociocultural

- Community forests and resources
- Timber and non-timber forest products including fodder and fuel wood

Cultural heritage and archeology

- Religious, cultural and sacred sites

Vulnerable populations/communities

- Vulnerable population: indigenous/tribal communities/areas, women headed households

Climate and climate resilience:

- Climate sensitive conditions/features

Road and linear projects considered for this SESA are from different topographical and geomorphological locations including mountains and flat lands. KDP Project locality however lies within flat topography only and hence some of the VECs considered in this SESA like slope stability and landscape are not relevant.

Similarly, the Environmental and Social Assessment Report for Kakarbhitta – Pathalaiya Road Corridor, including Kamala -Dhalkebar– Pathalaiya Road Segment, of Mahendra Highway (MRM) have identified 10 VECs under 3 environmental domains as outlined below:

Physical Environment:

- Topography and Geomorphology
- Natural Drainage and Watershed Management
- Soil
- Ambient Environmental Conditions (Air and Noise Pollution, Solid waste management)

Biological Environment:

- Terrestrial Habitat: Forest areas
- Aquatic Habitats: Wetlands and other water bodies
- Threatened and Endangered Species: Asian Elephant, 14 indicator species

Socio-economic and Cultural Environment

- Land and Resource use
- Population, Infrastructure and Services
- Economy and Well-being
- Community Life

As per this ESIA also, similar VECs have been identified. For VECs to be considered, all the identified VECs were analyzed against the following criteria:

- Confirmed to be valued by stakeholders
- Expected to be significantly impacted by project under consideration
- Expected to be potentially impacted by some combination of other projects

Further, to analyze the conditions and impact on identified VECs various indicators have been identified & analyzed as given in Table 5-1. These indicators helped in identifying the extent of impact on the identified VECs and assist in defining “Cause & Effect” relationship.

Table 5-1: VECs and Indicators

Aspects	Identified VECs	Indicators
Physical environmental services and natural processes	Land (including soil)	Potential changes in land use; change in soil quality; riverbank erosion
	Rivers, streams and natural drainage	Changes in water flow regime, changes in sediment transport regime, riverbank erosion, flood and water logging
	Perennial rivers, ponds and other wetlands	Water quality
	Air	Air quality
	Noise	Noise level (mainly in sensitive locations like schools and hospitals)
Ecological Aspects	Terrestrial Habitats	National Park, Forests and vegetation, protected and endangered species
	Wildlife	Wildlife population, habitat and availability of food and water
	Aquatic biodiversity	Fish and other aquatic species, their habitat
Socio-economic Condition	Land (including Settlements and infrastructures)	Migration and pressure in land resources, increase in settlements and infrastructures, ribbon development
	Population (Demographic features)	Demographic features (population, caste and ethnicity, age groups, household size etc.)
	Economy and well-being (Livelihood)	Economic activities, income and expenditure, poverty level, livelihood, Cost escalation of land and properties
Cultural Aspects	Cultural values	Cultural events and functions, festivals, rituals etc.
	Heritage sites, religious sites and structures	Temples and shrines, Ghats along rivers

6. Projects considered for CIA

Different projects within KDP Road alignment vicinity that can have cumulative impacts on VECs are as follows:

Table 6-1: Projects Considered for CIA

S.N.	Projects	Brief Description
1	The KDP upgrading road project	This is the main project proposed for upgradation from two lane to four lane (salient features given in Table 2-1). It is section of East-West Highway. As mentioned in ESIA earlier, ROW of the road is 50 m (25 m each side from central line) and is under DOR where only a few illegally settlers are encroaching the area.
Other Road Projects		
2	Kamala-Kanchanpur Road Project	It is the continue section of KDP road towards eastern part and is also a section of East-West Highway. Like KDP road, this road section is also proposed for upgradation from two lane to four lane and the project is under construction at present.

3	Pathlaiya-Hetauda-Narayanghat Road Project	It is also section of East-West Highway, western section to KDP Road (its alignment is North-South direction rather than East-West direction). Some of the road section passes through Parsa National Park and can disturb wildlife movement. This road section is also proposed for upgrading from two lane to four lane and is under design phase.
4	Pathlaiya-Birgunj Road Section	It is extended towards southern part towards Birgunj (get way of Nepal) and India Border from end of KDP road at Pathlaiya. This road is of six lane and construction part is almost completed
5	Kathmandu-Terai Fast Track	The road starts from Kathmandu, capital city of Nepal and joins KDP road alignment near Nijgadh, west of the Bakaiya River. The road is under construction phase.
6	BP Highway	The road starts from Dhulikhel (nearby city to Kathmandu) and joins KDP road alignment at Bardibas. The road is already constructed and under operation. The road is of just intermediate lane and can be planned for upgradation to double lane.
7	Madan Bhandari Highway (NH09)	It passes along with the Chure-Bhawar (siwalik range) and is somewhat parallel to KDP road alignment (aerial distance ranging from 10 km to 28 km north from KDP road alignment). Track opening of this highway within project vicinity is completed and some sections are ongoing upgrading works including bridge constructions.
8	The Postal Highway	It is also somewhat parallel to KDP road alignment extended more than 18 km to 35 km south from the KDP project. Some sections of this highway are also undergoing upgradation (construction of bridges and intermediate lane to two lane).
9	Numerous feeder roads and Agriculture roads	All these roads are extended north-south in direction joining with the KDP road inter- sections. These roads are at times upgraded and periodically maintained too.

Railway Projects

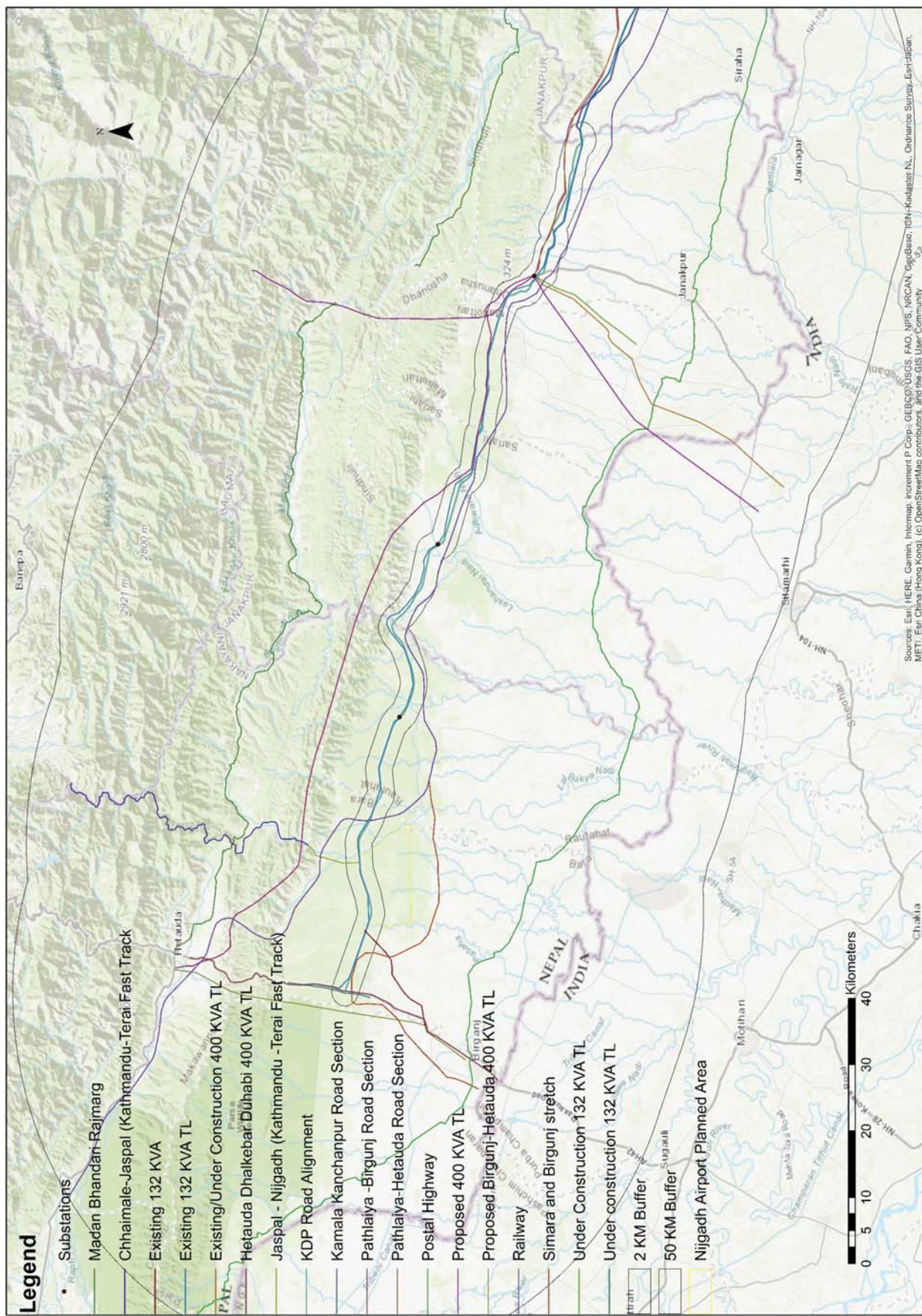
10	Mechi-Mahakali Electrified Railway and Raxaul- Kathmandu proposed railway	Mechi-Mahakali Electrified (MME) Railway project runs more or less parallel to KDP road alignment up to Chocha (300 m to 1.5 km south in average distance). From Chocha, the Chocha- Simara- Birgunj link of railway will pass through south from the proposed Nijgadh International Airport towards Birgunj; and the next Chocha-Nijgadh- Hetauda-Bharatpur section of MME Railway intersect KDP alignment north-east of Nijgadh that bifurcates to Fast Track in the north-west of it. Design of this MME Railway is under revision and bridges at some places are under construction. Besides, the Raxaul- Kathmandu proposed railway is also in design phase which has avoided the proposed Nijgadh International Airport, bifurcates MME railway and KDP road in the east of Nijgadh that also set considering the utility of both railway stations to be nearby location at south-east of Nijgadh where a dense Government's Forest is located. These all-proposed projects located around the Nijgadh Bazar. The landscape of Nijgadh bazar facing of problems of water logging and it is being increased due to the urbanization at the periphery of Nijgadh. There could be more pressure on agriculture land and overall land use on Nijgadh Bazar. Thus to study of changing land use is essential because of chances of environment degradation in future.
----	---	--

Transmission Line along with Substations

11	Hetauda-Dhabhi 400 KVA Transmission Line and other transmission line projects	This transmission line starts from Hetauda (around 20 km north from Pathlaiya Junction) and obliquely reaches towards northern part of Nijgadh after which it runs almost parallel to KDP road alignment. Erection of towers is completed and stretching of wire is also almost completed. There are other 132 KVA Transmission Lines Projects too adjoining and running parallel to KDP road alignment.
12	Dhalkebar 400 KV Substation, Nawalpur Substation, Chandrapur Substation	Under operation and upgradation
Airport		
13	Nijgadh International Airport	It is proposed 5 km south from KDP road alignment west of Bakaiya River inside the forest area and settlements area. This is under planning phase and project is not yet confirm.

Source: Proposed projects inceptions review

Location of these projects is shown in Figure below



7. Impact Identification

As mentioned above, there are different projects within the project vicinity whose activities can have significant impacts on VECs. These impacts are listed in table below:

Table 7-1: Impact Identification

S.N.	Existing/Planned and Proposed Development	Major Project Activities	Impacts	VECs Impacted
1.	KDP Road Upgradation Project and Other Road Projects	Construction Phase		
		Site Clearance	Tree Cutting, removal of vegetation	Terrestrial Habitats
			Dust/Air Pollution	Air
			Damage to private and public structures	Livelihood
			Damage to Temples and shrines, access to Ghats along rivers	Heritage sites, religious sites and structures
		Bridge construction, river bank excavation	River bank erosion, downstream sedimentation	Rivers, streams and natural drainage
		Construction of road embankment	Flooding and water logging	These projects will not impact on new Land basically but needed some lands to enhance as per design improvement.
		Movement of construction vehicles, construction activities	Air Pollution	Air
			Increase in noise level	Noise
		Operation of Burrow Pit	Water logging	Land, Rivers, streams and natural drainage
		Operation Phase		
		Movement of Vehicles	Disturbance to wildlife movement	Wildlife
		Accessibility	Ribbon Development	Land (Minor quantity of land will be acquired as per design improvement.)
2.	Railway Projects	Construction Phase		

		Land acquisition for construction of structures	Reduction in land availability, change in land use	Being a Megha project, -MME Railway alone has required massive land in its railway lines and numerous stations. If we suppose of 130 km railway line with 50m RoW, and further 30m width and 700m length of 10 railway stations that required tentatively 76,10,000 Sqm (671 hectare) of lands acquired. There are other railway alignments are also going to bifurcate the KDP around Nijgadh.
		Site Clearance	Tree Cutting, removal of vegetation	Terrestrial Habitats
			Dust/Air Pollution	Air
			Damage to private and public structures	Livelihood
			Damage to Temples and shrines, access to Ghats along rivers	Heritage sites, religious sites and structures
		Bridge construction, river bank excavation	River bank erosion, downstream sedimentation	Rivers, streams and natural drainage
		Construction of railway embankment	Flooding and water logging	Land
		Movement of construction vehicles, construction activities	Air pollution	Air
			Increase in noise level	Noise
		Operation of Burrow Pit	Water logging	Land, Rivers, streams and natural drainage
Operation Phase				

		Movement of Rail	Disturbance to wildlife movement	Wildlife
		Accessibility	Ribbon development	Land
3.	Hetauda Dhalkebar Transmission Line and Sub-station Projects	Construction Phase		
		Land acquisition for construction of structures	Reduction in land availability, change in land use	Land (The required land does not deteriorate land form rather than forest depletion. The area of private land to be acquired permanently for the construction of sub stations and tower pads is approximately 38.16 ha and for RoW of transmission line is 712.33 ha ¹ The alignment has mostly selected the marginal Government/forest land in general.
		Site clearance	Tree Cutting, removal of vegetation	Terrestrial Habitats
			Damage to private and public structures	Livelihood
		Construction of towers and substations	Obstruction to natural drainage	Land, Rivers, streams and natural drainage
			Cement washout	Land, Rivers, streams, Groundwater
		Construction Activities	Increases in noise level	Noise, Wildlife
		Operation Phase		
		Transfer of electricity	Electrocution	Wildlife (mainly monkeys and birds)
4.	Nijgadh International Airport	Construction Phase		
		Land acquisition for construction of structures	Reduction in land availability, change in land use	The required land for the proposed NIA is extensive. There will

¹ Adapted from approved IEE report of Hetauda-Dhalkebar-Dubabi 400 kv Transmission Line, May 2019

				be pressure on approximately 8,045 ha of land ² due to construction activities. Location of it is in the forest area and also the one of the major elephant movement routes. The estimated land for the NIA can only be calculate after knowing its shape and size which is still unknown. Due to development.
		Site clearance	Tree Cutting, removal of vegetation	Terrestrial Habitats
			Damage to private and public structures	Livelihood
			Damage to Temples and shrines	Heritage sites, religious sites and structures
		Construction Activities	Increases in noise level	Noise, Wildlife
		Operation Phase		
		Movement of vehicles and airplanes	Dust/Smoke, Air Pollution	Air
			Increase in Noise level	Noise, Wildlife
		Construction and operation of structures	Disturbance in surface and subsurface water flow	Land, Rivers, streams and natural drainage
5	Kathmandu-Terai Fast Track	Construction Phase		
		Land acquisition for construction of structures	Reduction in land availability, change in land use	The required land for the proposed construction of Kathmandu-Terai Fast Track project approximately 10 ha ³ . The land will be

² <https://farsightnepal.com/news/46>

³ Adapted from approved EIA report of Kathmandu-Terai Fast Track Project

				converted into infrastructure.
		Site clearance	Tree Cutting, removal of vegetation	Terrestrial Habitats
			Damage to private and public structures	Livelihood
			Damage to Temples and shrines	Heritage sites, religious sites and structures
		Construction Activities	Increases in noise level	Noise, Wildlife
		Operation Phase		
		Movement of vehicles and airplanes	Dust/Smoke, Air Pollution	Air
			Dust/Smoke, Air Pollution	Air
		Construction and operation of structures	Disturbance in surface and subsurface water flow	Land, Rivers, streams and natural drainage

8. Prioritized VECs for CIA

Different projects considered for CIA and their cumulative impacts with respect to KDP road project is summarized in table below.

Table 8-1: Assessment of Cumulative Impacts of Different Project with respect of KDP

S.N.	Projects Considered for CIA	Cumulative Impacts with respect to KDP
1.	Kamala-Kanchanpur Road	This road is under construction and it is expected that the construction period of this project overlaps with that of KDP for at least 1 year (initial phase of construction of KDP). Hence, cumulative impacts from dust/air pollution, water resources (mainly Kamala River) and disturbance to traffic movement during construction phase and cumulative impact in land resources during operation phase is expected.
2.	Pathlaiya-Hetauda-Narayanghat Road	Detailed design of this road is under process and it is expected that the construction period of this project overlaps with that of KDP for at least 1 year (towards completion phase of construction of KDP). Beside dust and hinderance to vehicular movement, as both KDP and this road shares same ecological

		section of Parsa National Park, cumulative impact in forest and wildlife (including elephant) is expected.
3.	Pathlaiya-Birgunj Road Section	Upgradation of the road is almost completed and under operation. Cumulative impact in land resources during operation phase is expected (mainly from Birgunj to Nijgadh).
4.	Kathmandu-Terai Fast Track	This road is under construction and it is expected that the construction period of this project overlaps with that of KDP for at least 1 year (initial phase of construction of KDP). Hence, cumulative impacts from dust/air pollution, water resources (mainly Bakaiya River) and disturbance to traffic movement during construction phase and cumulative impact in land resources during operation phase is expected. Further, cumulative impact in forest (tree clearance, more openness in forest section and disturbance to wildlife including elephants) is also expected during both construction and operation phase. The cumulative impact can be up to 2 km periphery from KDP and KTFT junction at chainage 348+600.
5.	BP Highway	Construction of the road is already completed and under operation. Cumulative impact in land resources due to migration of people during operation phase is expected (mainly at Bardibas, junction at chainage 267+100). If this road is planned for upgradation, then construction activities can have further impact in water resources i.e. rivers, streams and natural drainage (landslides and quarrying activities and muck disposal at upstream section of Ratu River, Bhapsi river and Kamala river).
6.	Madan Bhandari Highway	Different sections of this road are under construction/upgradation and it is expected that the construction period of this project overlaps with that of KDP. As this road lies towards upstream and crosses the catchment of major rivers/streams crossing KDP road section, the cumulative impact expected during construction is on water resources due to landslides (cut slope failure), excavation and disposal of muck down valley and quarrying of river bed materials. Such activities in upstream section can trigger downstream sedimentation, rise in river bed, change in river morphology and flooding. During operation also, landslides and river bank cutting on upstream section can impact on water resources (i.e. rivers, streams and natural drainage).
7.	Postal Highway	Different sections of this road are under construction/upgradation. As this road lies towards

		downstream and crosses major rivers/streams crossing KDP road section, the cumulative impact expected during construction is on water resources (i.e. rivers, streams and natural drainage) mainly due to quarrying/borrowing of river bed materials which may lead to change in river gradient, change in river morphology and enhance river bed scouring and river bank cutting triggering flooding. During operation phase, raised road embankment and narrower rivers due to bridges and river embankment/dykes can create issue of water logging mainly land in between KDP road and Postal Highway.
8.	Other roads joining KDP	Different roads are joining KDP that are undergoing periodic maintenance and upgradation. If construction period of these overlap with construction period of KDP road, then there can be cumulative impact due to noise and dust. Further if such junction and road improvement work lie within forest sections, then they will impact flora and fauna. During operation phase, in forest sections, cumulative impact can occur in wildlife movement (including elephants) and in settlement sections, cumulative impact can occur in land resources.
9.	Mechi-Mahakali Electrified Railway	This railway is under construction and it is expected that the construction period of this project overlaps with that of KDP. Hence, cumulative impacts from dust/air pollution, water resources i.e. rivers, streams and natural drainage (almost all river/stream crossings) and disturbance to traffic movement during construction phase and cumulative impact in land resources during operation phase is expected. Further, cumulative impact in forest (tree clearance, more openness in forest section and disturbance to wildlife including elephants) is also expected during both construction and operation phase. The cumulative impact can be severe in between KDP road alignment and railway alignment. For land the section from chainage 256+300 to 268+200, 293+800 to 296+300 and 298+700 to 315+800 can have cumulative impact due to migration of people and unmanaged settlement development. For cumulative impact in flora and fauna, sections in between chainage 284+800 to 290+900, 315+800 to 324+900, 339+200 to 343+600 and 360+800 to end of the KDP road are noticed to be of greater concern. Further, sections 339+200 to 343+600 and 360+800 to end of the KDP road are crucial for elephant movements too and proposed railway will be

		crossing KDP at 342+500 and one station is purposed just after the crossing.
10.	Hetauda- Dhalkebar-Duhabi 400 KVA Transmission Line and other transmission line projects	Some of the transmission line projects are under construction and some are already completed. Cumulative impacts from these projects and KDP road alignment is associated with dust during construction and land during operation due to land restriction within ROW.
11.	Dhalkebar 400 KV Substation, Nawalpur Substation, Chandrapur Substation	Some of the substation projects are under construction and some are already completed. Cumulative impacts from these projects and KDP road alignment is associated with dust and water resources i.e. rivers, streams and natural drainage (due to quarrying and borrowing activities) during construction.
12	Nijgadh International Airport	This project was planned but rejected by supreme court and ordered to search for alternative location. However, this project if implemented in proposed location, then can share cumulative impact with KDP road project (from chainage 347+500 to 357+100, mainly towards southern side/left side of KDP). Major concern will be on flora and fauna. Trees need to be removed within ROW of KDP road alignment and for this airport project, huge amount of adjoining forest land need to be cleared. Further, the proposed location is prime habitat of elephants and both projects can cumulatively impact on elephants. If both these projects share common or overlapping construction period, then there can be cumulative impact due to increased movement of construction vehicles and equipment, noise, dust etc. impacting in wildlife as well as people and settlements nearby. There may be impact in water resources too due to quarrying/borrowing of river bed materials as construction materials.

From sensitivity analysis as per above table it is noticed though 14 VECs were listed as per ESA report of Kakarbhitta-Pathlaiya road, that most of the cumulative impacts associated with KDP road and other projects within project vicinity are related with dust and air, noise, traffic issue, impact on flora and fauna, impact on rivers, streams and natural drainage and stress on land resources. Issues related with ambient environmental conditions like dust, noise, water pollution etc. can be resolved at each project level through proper mitigation measures at each project level. Similarly, impact on flora mainly loss of trees can be compensated through compensatory plantation. Major residual impacts that needs to be dealt in an integrated way are found to be mainly rivers, streams and natural drainage under physical environment, wildlife movement under biological environment and land resources under socio-economic and cultural environment hence these are prioritized as major VECs to be considered for CIA. VECs to be considered for detail analysis has been prioritized according to sensitivity analysis

where most sensitive VEC under each environmental domain has been selected (as per Table 8-1 above). Prioritized VECs for CIA are as follows:

- Rivers, streams and natural drainage under physical environment,
- Elephants (within wildlife as umbrella species) biological environment and
- Land resources under socio-economic and cultural environment.

9. Rivers, Streams and Natural Drainage

9.1 General Scenario

The KDP road alignment runs almost east to west, and the project area's drainage pattern is north to south. Hence the road alignment has to address cross-drainage structures adequately for efficient flow of natural drainage from the northern to southern side. There are 200 locations within the KDP road alignment to be considered for addressing natural cross drainage structures. Among them, at present there are bridges over 73 locations, different types of culverts over 106 locations and causeways over 21 locations. Hydrological analysis for each drainage was done during design phase and the design has proposed bridges over 60 locations and box culvert over other remaining 139 locations. 1 bridge is under construction at Dudhaura.

Natural drainage along KDP road alignment is shown in figure below:

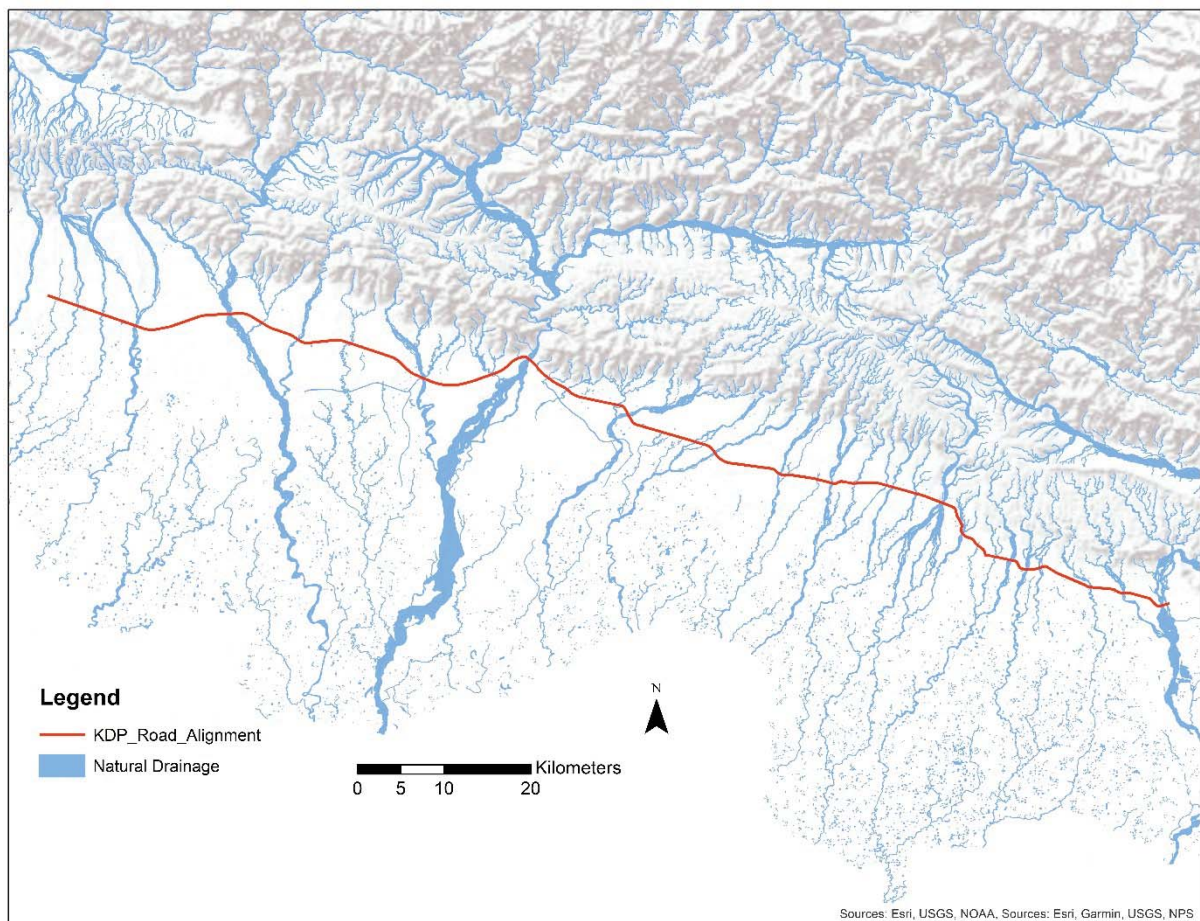


Figure 9-1: Drainage Pattern along KDP Road Alignment

9.2 Boundaries under Consideration

Spatial Boundaries

The whole catchment/watershed area of each river will have influence and the influence can continue in large areas downstream. However, for this assessment, Madan Bhandari Highway towards upstream and Postal Highway towards downstream can be set as upper and lower limits of spatial boundaries. Madanbhandari Highway has been considered as upper boundary level as excavation, muck disposal and quarrying and borrowing activities during construction can impact water resources downstream. Further, during operation phase too, cut slope failures and landslides in this road can impact water resources downstream. Road embankment, bridges and cross drainage structures and river embankments constructed over Postal highway towards the downstream side can cause water logging and flooding issues upstream side. Hence considered as southern limit of spatial boundary.

Temporal Boundaries

The construction period of the KDP project will be 3 years and the operation phase of the project will be 30 years, hence temporal limits considered for the KDP project are 30 years for the operation phase and 3 years for the construction phase.

9.3 Baseline Information

Apart from Bagmati, Kamala River and Bakaiya Rivers, all other ephemeral streams originate from the Siwalik region (Churia) dependent upon rainfall for their runoff. Further, due to fragile geology with loose soil and weak rocks that are easily disintegrated, runoff from rivers and streams from the Siwalik region are laden with sediments which upon entering the flat lands (Terai Plain, as of the project area) deposit these sediments there.

Large alluvial fan deposits occur along the main streams. They are tens of meters thick and extend all over the project area. The fine sand and silt with clays are produced from the surrounding sloping catchment, washed away during past floods and transported due to the moderate to steep gradient of the rivers and deposited in the gentle slopes of the Terai plain due to decrease in the velocity of the flood flows particularly in aggregating rivers.

The Churia range contributes the maximum sediment load to the rivers originating from the southern face (Sharma 1977). According to a JICA study, the annual sediment yield of the Lakhandehi river is estimated as high as 178,000 m³ per year. In some stretches of the Churia rivers, almost two meters of sediment has been deposited in the last 45 years (Dixit 1995). Due to the higher sediment load, the bed level of several rivers is rising significantly particularly in aggregating rivers along KDP. Major siltation problems observed are in Charnath, Baluwa, Jalad, Basai, Ratu, Bhapsi, Gaushala, Bankhe, Betini, Lakhandei, Lamaha, Dhansar, Pasaha and Dudhaura.

9.4 Impacts Associated with KDP Road Upgradation and Mitigation Measures Proposed

Flooding and waterlogging

Increase in road embankment will increase probability of flooding and water logging mainly in Mithila, Lalbandhi and Nijgadh area.

To address this issue, sufficient cross drainage structures have been proposed in design. All the existing causeway will be converted to box culverts. Capacity of side drainage is also increased.

River Bank Cutting

Excavation for abutment and piers during bridge construction can increase the probability of river bank cutting. Further operation and borrow pits within and near river and stream channels can enhance this issue.

To address this issue, adequate river protection structures (river embankments and dykes, wildlife friendly in proposed underpass section) have been proposed in design. Further, quarry and borrow pit will be operated as per national guidelines for the extraction, sale and management of river bed materials. Management plans for operation of quarry and borrow pit have been prepared for the project and will be strictly followed during construction. Excavation works will be halted during rainy season.

Sediment Transport/Downstream Sedimentation

Excavation near and within river bodies, operation of quarry and borrow pits and disposal of spoil/muck can increase sedimentation load in river bodies. Increased sedimentation load can impact water quality and aquatic life too. There will be less water carrying capacity of rivers due to high sediment load in downstream. The depth of river will be less and it will affect the discharge.

It is crucial to avoid dumping sediment and construction materials directly into the rivers during road construction to prevent further environmental degradation. In addition to this, as mentioned above, proper management of quarry and borrow pits, halting excavation activities during rainy season and construction of river protection structures can minimize the rate of sediment transport/downstream sedimentation issue.

Degradation of Water Quality

Degradation of water quality is a major issue mainly during the construction phase. Bitumen bleeding, spillage of other chemicals and haphazard discharge of solid waste and wastewater can lead to water pollution and degradation of water quality (both surface water and ground water). Kamala, Janga Pul-1, Kalinjor – 2, Dumdume, Chapani, Rai Bridge, Bagmati, Lamaha, Kali Khola, Bakeya and Pasaha are major perennial rivers where the impact will be severe. This can impact aquatic life too.

Bitumen and other chemicals will be stored properly and handled with care. If spillage occurs, then it will be removed immediately by using spillage kits. For efficient management of solid waste, proper solid waste management plan has been proposed and will be managed as per this plan.

9.5 Cumulative Impacts from other Projects and Mitigation Measures Required

Beside KDP road project, other projects within the project vicinity will have impact in natural drainage system including rivers and streams. Major ones are crusher and quarry and borrow pit projects (sand and gravel mining) and Madan Bhandari Highway and Kathmandu-Terai Fast Track.

Extraction of river bed materials is major issue within project area and lot of crusher plants and quarry and borrow pit operations can be observed in most of the rivers crossing KDP road alignment. Over extraction of river bed materials, haphazard disposal of waste and waste water is major issue noticed. Proper and controlled extraction of river bed materials without interfering river morphology is recommended. Extraction of river bed materials during rainy season should be strictly prohibited.

Madan Bhandari Highway

Construction activities in Madan Bhandari Highway, Kathmandu-Terai Fast Track and other road projects upstream of KDP road alignment are also increasing sediment load to rivers. These sections lie within chure (siwalik) region with fragile geology. Numerous landslides and cut slope failures can be noticed along upstream roads that have increased sediment load in rivers. Further, disposal of spoil/muck in down valley to these river bodies is also polluting these rivers.

Proper and adequate slope protection measures is recommended in these road sections. Series of check dams are required for sediment control in river and catchment area/basin. Check dam will reduce the velocity of flowing water and settle the sediments in check dam, hence stop the spreading of sediments deposition in agriculture land, forest land and in settlement area.

Also deposited sediments from rivers shall be extracted at regular interval to enhance the river capacity. Before extraction plan there shall be scientific study regarding the extraction of sediments. This will have beneficial impact as there will be revenue generation of local government.

Postal Highway

There are projects like Railway line and Postal Highway (Hulaki Rajmarg) towards the downstream side of the KDP road. These projects are high embankments which are barrier to the flow of river. The river flowing water in the downstream of KDP and before these railway and road way inundate as high embankments of these projects will be barrier for flowing water.

Sufficient number of cross-drainage structures are required for other projects. The KDP project is already providing sufficient no of cross drainage structures.

10. Elephants

10.1 General Scenario

Asian elephant (*Elephas maximus*) is a mega-herbivore. Nationally assessed as Endangered as per both the Nepal Red list series and the IUCN Red list. Asian elephant is also listed on CITES Appendix I species and Nepal's Protected species as per NPWC Act 1973. Asian Elephants are distributed across the Terai region of Nepal and estimated to be present within 22 districts of Nepal. They are present in Bardia National Park, Chitwan National Park, Koshi Tappu, Parsa and Shukla Phanta National Park.

In Nepal Elephants are distributed in three sub population namely Eastern, Central and Western elephant groups. The number of Nepal's resident elephants is estimated in 227 individuals in which 45 elephants are from the East, 53 elephants from Central and 113 elephants from West

(Ram and Acharya, 2020) in preferred habitat of 12,069 km² forest area used by Asian elephants.

Eastern and central elephants have migrated from Jhapa to Chitwan Parsa complex and travelled up to Balmikinagar at Triveni but never crossed the Triveni area towards west Nawalparsari and Rupandehi, though eastern elephant visited eastern Nawalparasi area very frequently.

Present project road falls near Central and Eastern Elephant Population of Nepal part of Chitwan-Parsa complex made up of Chitwan National Park and Parsa National Park which is 2000 km² forest area. Chitwan-Parsa complex elephant population is reported as 45 elephants which are migrating from east west (Jhapa to Parsa and Valmiki reserves to Chitwan) vice versa. Figure 10-1 shows the Elephants distribution map in three sub population namely Eastern, Central and Western groups in Nepal

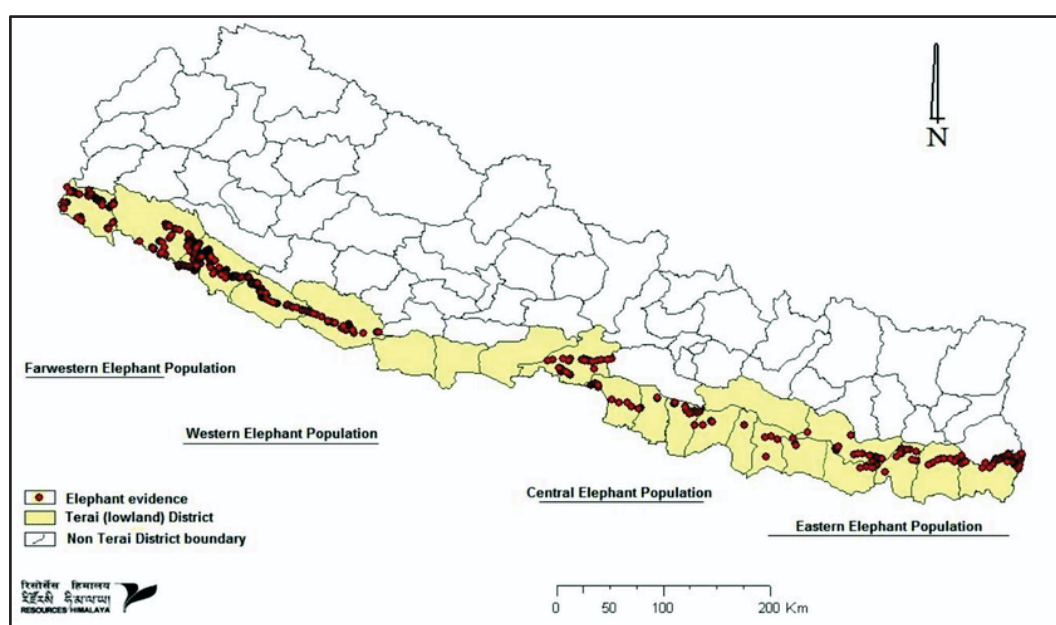


Figure 10-1: Elephants distributed in three sub population namely Eastern, Central and Western groups in Nepal.

Map showing the location of linear and infrastructure projects near the project road and Elephants sub population distribution of Central and Western group population of Nepal are shown in Figure 10-2.

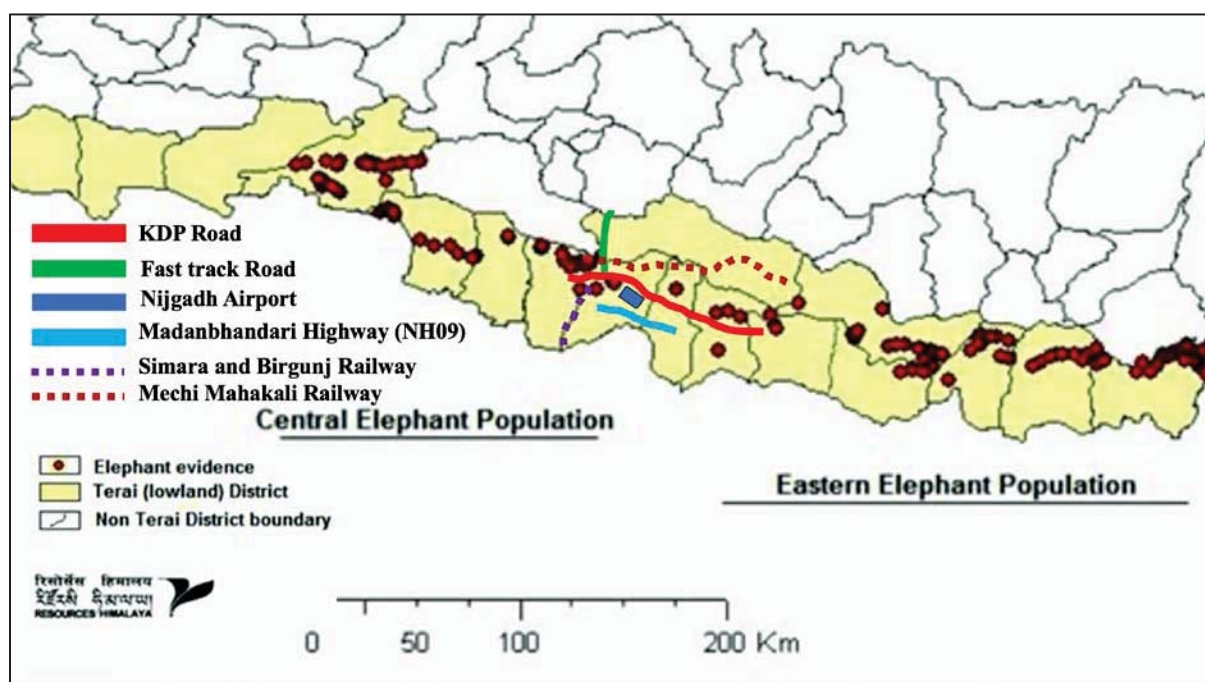


Figure 10-2: Location of linear and infrastructure projects near Elephant Central and Western population of Nepal

KDP Road section falls in the central and eastern parts of the elephant population in Nepal, it is estimated that a population of 25 to 30 elephants are largely resident within the Parsa Wildlife Reserve and Chitwan National Park (ten Velde 1997; DNPWC 2008). Elephants in Parsa National Park are dispersing into Chitwan region in search of water and more suitable habitat during the dry months starting from February-May (Petra Furaha ten Velde 1997⁴). Movement of elephants outside the Parsa National Park and associated wildlife reserve was evident due to unsuitable habitat in all seasons, reduced supply of food and water, and encroachment by human beings (Puja Sharma 2019⁵).

10.2 Boundaries under Consideration

Spatial Boundaries

Though elephant home ranges are estimated to range from 188 sq. km to > 400 sq. km, for this study, a buffer area of 10 km from the central line of the KDP road alignment including Parsa National Park, 21 community forests, 9 collaborative forests, Sagarnath Forest Development Project, and national forest areas is considered.

⁴ A Status Report on Nepal's Wild Elephant Population Petra Furaha ten Velde, 1997

⁵ Sharma, P., H. Adhikari, S. Tripathi, A.K. Ram & R. Bhattarai (2019). Habitat suitability modelling of Asian Elephant *Elephas maximus* (Mammalia: Proboscidea: Elephantidae) in Parsa National Park, Nepal and its buffer zone. *Journal of Threatened Taxa* 11(13): 14643–14654; <https://doi.org/10.11609/jott.4467.11.13.14643-14654>

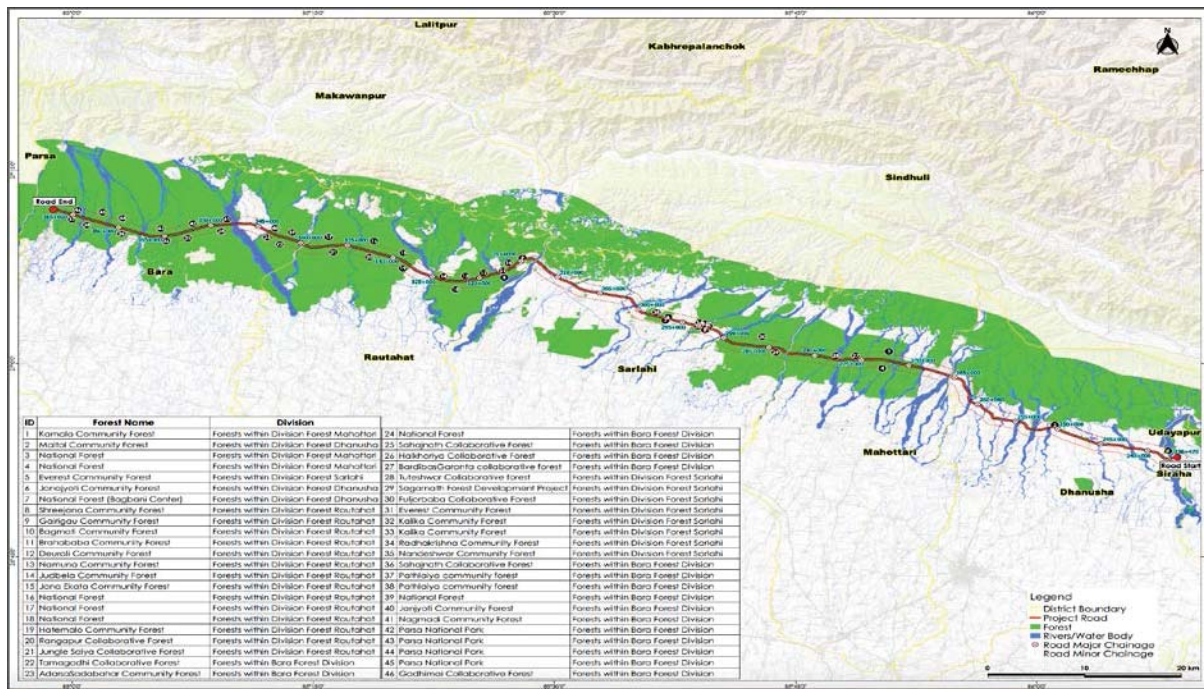


Figure 10-3: Forest along the Road Alignment

Temporal Boundaries

As mentioned earlier, the construction period of the KDP project will be 3 years and operation phase of the project will be 30 years, hence the temporal area of influence consider for KDP project is 30 years for the operation phase and 3 years for the construction phase. However, habitat fragmentation and impact in wildlife including elephant started since 1970 after construction of proposed road for upgradation and the impact will continue till the operation of the road.

10.3 Baseline Information

Based on the primary findings, main elephant crossing points were between the section CH 350 to CH 366 which is near the Parsa National Park and Halkhariya wetland near to CH 358+100 followed by Dhansar river near CH 339+300. As per the consultations elephant movement near this chainage is of refugee population where no migration of the group (2 to 3 individuals) is envisaged. Further, a group of 5-7 elephant movement were recorded as per the primary survey findings supported by consultations with forest, local forest users and road commuters connecting the link between forest-local people and road users. Another pattern of elephant movement was found to be in monsoon season starting from June to September with an estimated group of 12-18 annually. This is a seasonal migration from the Chitwan National Park to Parsa National Park which is connected with the KDP road section from CH 365+600 to CH 349+100 and nearby community and collaborative forests.

Elephants within the project area were found to have conflicts with nearby settlement areas too where they invade and destroy crops mainly paddy, sugarcane, bananas and other products. Movement of elephant was noticed near the village Piluwa Village which is 300 m distance from the km 357+800, Tangia Basti 2.5 km distance from the km 351+000.

List of bridges proposed to additionally serve as elephant crossing are given in the Table 10-1 below.

Table 10-1: List of Bridges/Under Passes Proposed for Elephant Crossings

SN	Chainage (Center of Bridge)	Bridge Name	Existing Bridge		Proposed Structure			LBL (m)	HFL (m)
			Total Length (m)	Span Length (m)	Total Length (m)	No of Span	Vertical Clearance (m)		
1	329+666	Amu - 1	34.02	3*11.34	25	1	6.5	139.97	140.79
2	333+842	Lamaha	66	2*33	66	2	7.5	134.21	137.82
3	339+381	Dhansar	164	8*20.5	164	4	6.5	145.3	147.35
4	347+272	Bakeya	355.2	16*22.2	330	3	6.9	148.84	153.22
5	353+612	Terhakilo	45.6	4*11.4	41	1	6.5	146.48	149.12
6	357+337	Pasaha	165	5*33	165	5	6.5	139.2	141.63
7	361+003	Balganga	67.08	3*22.36	66	3	6.5	147.55	149.53
8	363+687	Dudhaura	90.493	2*45.2465	Bridge under Construction more than 6.5m vertical clearance				

Adapted from detailed design report-2023

Impact due to increased Sound and Light

Artificial light, especially at night, can change animal's perception of resources, foraging, mate selection, and navigation and have cascading ecological and biodiversity impacts. Traffic noise can affect a wide range of birds, herpetofauna, and mammals including Elephants. Human-sourced noise can affect wildlife communication, habitat occupancy, vigilance, predation efficiency, predator avoidance behavior and various other types of behavior. These effects vary among wildlife species, leading to differential responses within wildlife communities, which could affect trophic and other interactions.

To avoid impacts due to sound and light during construction phase, construction works will not be done during night time in areas adjoining to forest and Parsa National Park. For addressing this issue during operation phase, T-top Noise barriers are proposed near the Dudhra River Bridge Ch 363+600, Balganga River Bridge Ch 360+800, Pashah River Bridge Ch 357+070, Bakaiya River Bridge Ch 347+200, Dhansar River Bridge Ch 339+300 where significant movement of elephants and tigers are noticed between the Parsa National Park and associated community reserves.

Human-Wildlife Conflict

Regardless of the specific present road expansion activity, Human-elephant conflict between Pathlaiya (27°11'46.74"N, 84°59'11.56"E), Piluwa (27° 9'38.44"N 85° 3'40.66"E), Dudhara (27°11'17.20"N 85° 0'40.45"E), Gumba (27° 8'46.28"N 85° 7'54.30"E) and Nijgadh (27°11'3.25"N 85°10'21.56"E), mostly in south of the highway is severe. Residential and migratory elephants from Parsa National Park migrate towards the east in Bara and Rautahat and destroy crops massively. Herds of elephants cross Bagmati river and travel to Sarlahi district to raid crops. Road expansion initiatives often escalate conflicts between humans and wildlife due to influx of people during construction period, movement of construction vehicle.

The implementation of the Solar Electric Fencing near 3 village Pathlaiya (CH:365+700 to CH:366+800), Piluwa (CH:357+300 to CH:358+400.), Dudhaura bridge settlement

CH:363+700 LHS around the settlement is recommended. The electric fences are only effective at preventing crop raiding Banikoi et al. (2017). Apart from the implementation of the Solar Electric Fencing near 3 problematic village, bio fencing is also suggested around the settlement as a long-term approach towards addressing the Human Wildlife Conflict near the project road. Bio-fencing is indeed a viable long-term approach to mitigating human-wildlife conflict near project roads or settlements which reserving ecological connectivity and promoting sustainable development. For elephants, bio-fencing technique involves grow cane/rattan (with sharp spines on the stem) on human settlement boundaries to deter elephants from entering human habitations and crop fields. To protect these bio-fences, regular monitoring is essential and crucial.

10.5 Cumulative Impacts from other Projects and Mitigation Measures Required

Construction of linear projects near the Parsa National Park might impact the elephant corridor movement with effects of fragmentation and isolation for elephant populations that may cause increased human-wildlife conflict in the agricultural areas, which is already observed in some areas, adjacent to Patlaiya- Piluwa. Seasonal movement of Asian Elephant herds near KPD section serves as an indicator to assess impact of the road upgrades and extension and possible cumulative impacts, relevant to construction of other linear structures in the area.

Cumulative impacts of the upgrading of this road, when combined with ongoing and future development projects are assessed to be significant as well. Potential cumulative impacts include uncoordinated development of several linear and other infrastructures (adjoining road projects, railway, airport, transmission lines, etc.), land use change and land transformation in the general project area.

In the case of road upgrades and extension, there is a risk of increased elephant – vehicle collisions and human-elephant conflicts in the fragmented and isolated elephant habitats. The ESMP, including the Biodiversity Management Plan, that applies the mitigation hierarchy should manage risks and impacts on wildlife collisions and road kills. Opportunity for elephants to move through landscape development near Parsa National Park to Indian border in Charali Forest Area and in Belbari-Pathari Forest may be defined as threshold for further existence and viability of wild elephant population in Nepal.

The major potential impacts are relevant to construction of several linear structures in the project area and lack of coordination between projects that to ensure crossroad facilities (underpasses and overpasses) for further elephant movement within existing corridors. Among others, more sensitive is noticed for Pathlaiya-Hetauda-Narayanghat Road section followed by Kathmandu Terai Fast Track and Mechi-Mahakali Electrified Railway. As mentioned in Table 6-1, Pathlaiya-Hetauda-Narayanghat road section is also a part of East-West Highway and continuation of KDP road towards western side. The road alignment runs south to north in this section crossing Parsa National Park too and hence being critical for wildlife movement. Also it passes through the Barandabhar forest corridor, buffer zone of Chitwan National Park. The project is under design phase. Kathmandu Terai Fast Track project is under construction and is also aligned north-south. As this road is also near Parsa National Park towards the western side, it is critical for wildlife movement. Adequate wildlife crossings in these two road sections is required for addressing wildlife movement in a cumulative way.

Similarly, Mechi-Mahakali Electrified Railway lies towards southern side of KDP road alignment and also runs east to west. This project should refer to wildlife crossings as proposed for KDP road and develop wildlife crossings in similar sequence otherwise the crossings developed by KDP road will not be effective as expected.

The Nijghad Airport is at the stage of planning, and it has several environmental issues. The decision about its construction already was taken. Thus, at least, three linear infrastructures (highways) and airport with access road might change landscape features may impact the its valued environmental components and their viability.

The cumulative impact mainly noted in forest depletion, pressure on agriculture land and hindrances on movement of wild animals. The lost tree should be planted as per rule and regulation that exist. The deduction of the agriculture land and its reciprocal impact should be mitigated by enhancing intensive agriculture production and the impact of animal movement by project design appropriately.

11. VEC-3- Land Resources

11.1 General Scenario

This sub-chapter illustrated how the social environment of the project areas have developed; The different components involved to develop the socio environment; and the change on land use and pressures on local resources due to urbanization and population increase; and how the proposed projects will bring changes in land resources.

Social environment is the broader perspective which has been developed by numerous components. The center theme is human and its socio-economic behavior in the context of spatial relation. Therefore, the history of project area revealed that the land resource has been changing since long. Before the East- West Highway was constructed, it was almost covered by forest and agricultural land extension. Only few areas were inhabited by Indigenous peoples like Tharus, Danuwar, Majhi, and Yadav nearly primitive nature. As the E-W Highway developed, people of many places started to resettle nearby road head and the settlements extended towards the north and south which tendency is still continue. Now the small hamlets changed into the urban settlements like Dalkebar, Bardibas, Lalbandi, Chandrapur, Harionn, Nijgadh along the KDP project section. The land resource has become vulnerable due to getting pressure tremendously.

The land use change can be studied better by analyzing Aerial photos of the places in different periods. The baseline of the settlement areas and status of changing land use can be quantified by this analysis. Time and cost for in-depth study of the land use change and analysis of various impacts are the limitation of this project. The study has been made on the basis of expert judgement and past project experience.

11.2 Boundaries under Consideration

Spatial Boundaries

For analyzing change in land use pattern within the project area, 2 km distance from central line of existing road towards each side has been considered assuming major migration stress mainly due to KDP will be within this region.

Temporal Boundaries

As mentioned earlier, the construction period of KDP project will be 3 years and operation phase of the project will be 30 years, hence temporal area of influence consider for KDP project is 30 years for operation phase and 3 years for construction phase. However, stress in land resources has been observed since 1970 after construction of proposed road for upgradation and the impact will continue till the operation of the road.

11.3 Baseline Information

As mentioned earlier, stress in land resources has been observed since 1970 after construction of proposed road for upgradation. Land use of the project area is seen as agricultural, forests, water bodies, settlements areas, industrial estate and economic activity zones. Land use scenario of the project area is shown in table below:

Table 11-1: Land Use Category of Project Area

Land Use Category	Impact Zone					
	ROW (50 m)		DIA (300 m)		IIA (2 km)	
	Ha	%	Ha	%	Ha	%
Agricultural	97.14	14.92	949.76	24.28	8218.24	31.23
Residential	56.93	8.75	311.09	7.95	1109.79	4.22
Commercial	29.89	4.59	141.52	3.62	199.78	0.76
Industrial	1.6	0.25	12.42	0.32	112.47	0.43
Forest	317.09	48.71	1989.01	50.85	13890.8	52.78
Mining & Minerals	0.67	0.10	2.94	0.08	3.35	0.01
Public Use (Roads/Railways/School etc.)	124.51	19.13	296.19	7.57	771.47	2.93
Cultural & Archaeological	1.35	0.21	5.96	0.15	8.04	0.03
Riverine & Lake Area (Rivers/Water Body/Wet Land)	19.83	3.05	184.34	4.71	1802.02	6.85
Others	1.9	0.29	18.03	0.46	203.11	0.77
Total (ha/%)	650.91	100.00	3911.26	100.00	26319.07	100.00

Source: Google Map of the project section

The land use pattern has been changing rapidly due to developing economic perspectives of the area. The small market area has been changed into large urban cities like Godar, Birendrabazar, Dhalkebar, Bardibas, Chapur, Lalbandhi, Harion, Nawalpur, Nijgadh and Pathlaiya. The stress in land use can be co-related with migration rate within project area. Migration status of the project affected municipalities as per National Population and Household Census 2021 is given in table below:

Table 11-2: Currently Migrated Population by Length of Stay in the Current Place

Municipality	Total	Length of stay						Length of stay not stated
		Less than 1 year	1 - 4 Yrs.	5 - 9 Yrs.	10 - 24 Yrs.	25 - 49 Yrs.	50 Yrs. and above	
Karjanha Municipality	10311	95	1431	1662	3934	2569	521	99
Ganeshman Charnath Municipality	10451	124	1534	1574	3733	2679	747	60
Mithila Municipality	14477	204	1956	1843	6421	3101	887	65

Dhanushadham Municipality	13271	169	1850	2005	4600	3596	944	107
Bardibas Municipality	23722	513	4292	3637	7728	6079	1389	84
Gaushala Municipality	13164	175	2117	1918	4929	3226	710	89
Ishworpur Municipality	15617	163	1926	1993	6356	4109	959	111
Lalbandi Municipality	21070	296	3265	2853	7200	5716	1339	401
Hariwan Municipality	14137	173	1785	1929	4734	4283	1172	61
Bagmati Municipality	18433	236	3769	2742	6365	4131	1111	79
Brindaban Municipality	8879	133	1252	1318	3379	2188	551	58
Chandrapur Municipality	26250	328	4201	4174	8993	7190	1239	125
Gujara Municipality	10457	94	1427	1429	3811	3137	478	81
Nijagadh Municipality	13898	139	1745	1925	4853	4240	921	75
Kolhabi Municipality	10819	102	1268	1237	4164	3400	609	39
Jitpur Simara Sub-Metropolitan City	33598	576	5224	5221	12580	8726	1079	192
Total	258554	3520	39042	37460	93780	68370	14656	1726

Source: National Population and Household Census, 2021

This can be further illustrated through visual map of two different timeframe. Below is shown google image of Dhalekbar area and Lalbandhi area for reference. As population increase so as to change the land use and settlement development. The policy can govern and regulate the settlement growth before and after.

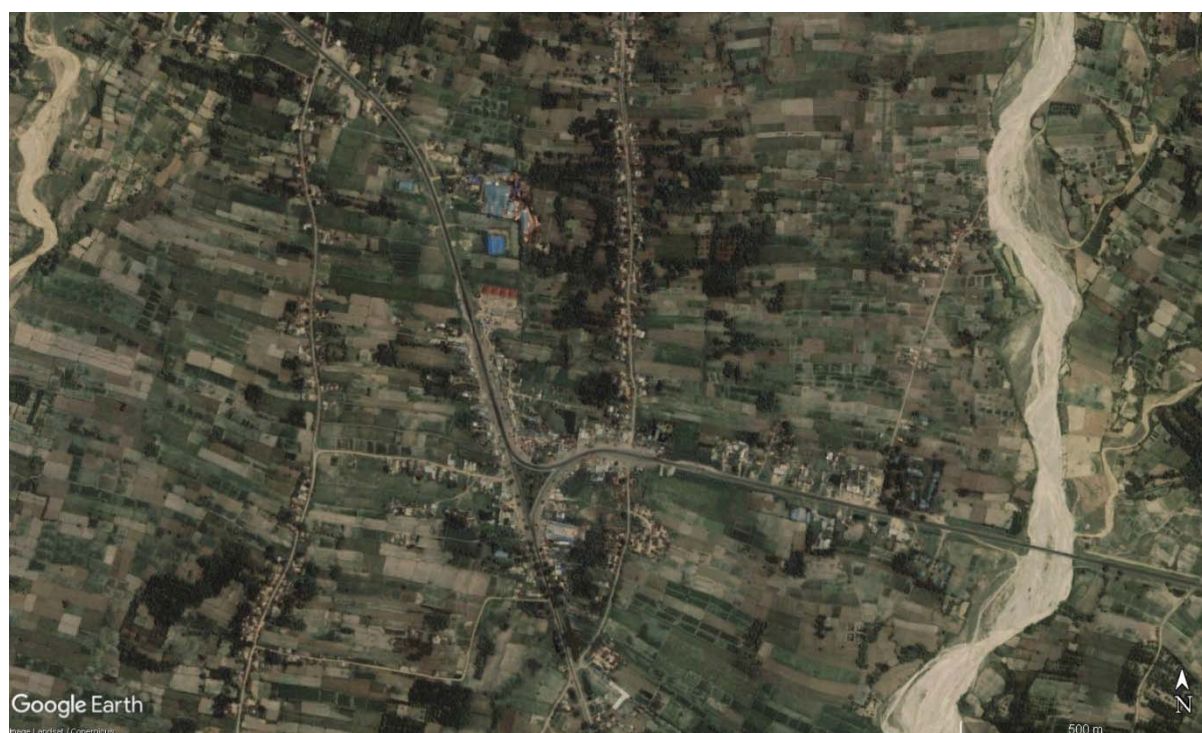


Figure 11-1: Google Image of Dhalkebar area on 2003



Figure 11-2: Google Image of Dhalkebar area on 2024

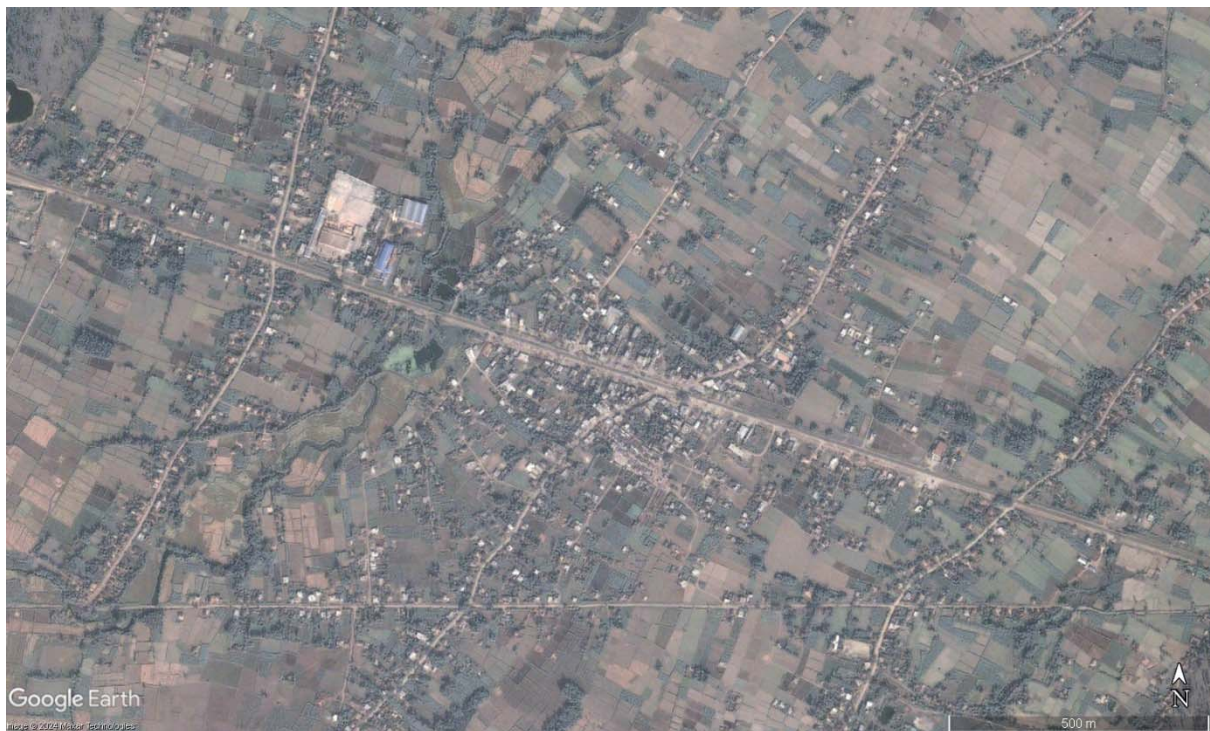


Figure 11-3: Google Image of Lalbandhi area on 2003

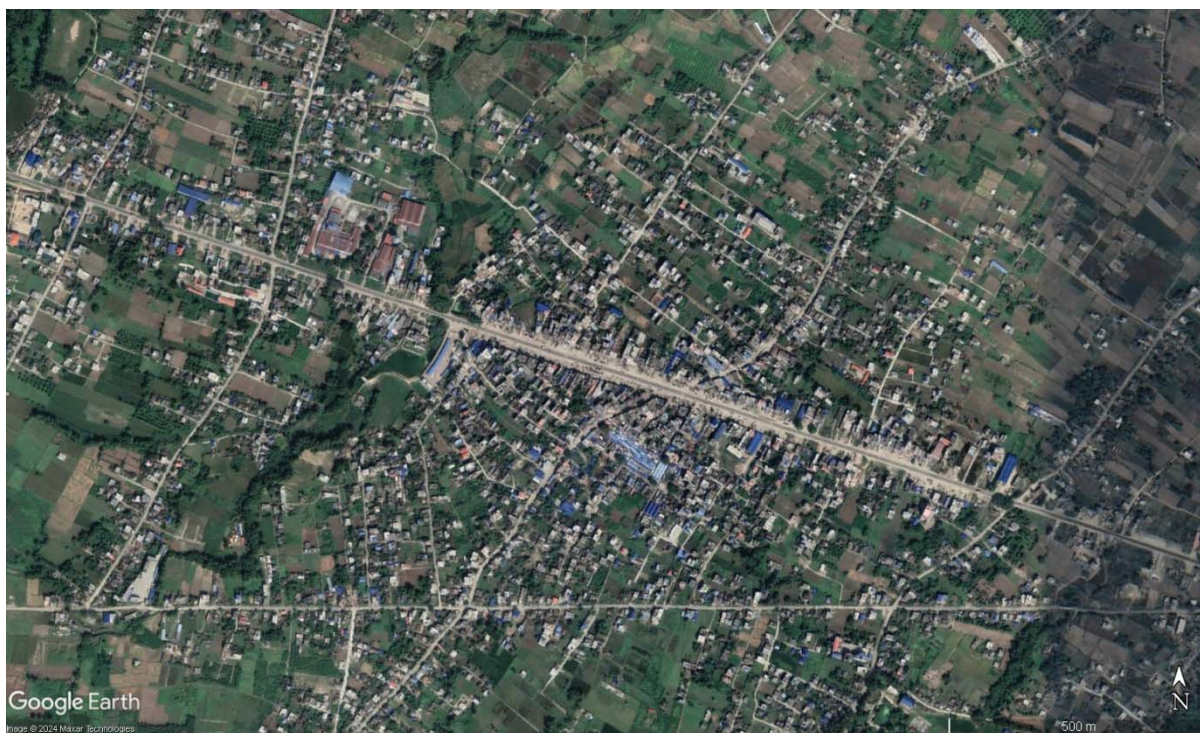


Figure 11-4: Google Image of Lalbandhi area on 2024

Above figure shows the urbanization scenario within project area.

11.4 Impacts Associated with KDP Road Upgradation and Mitigation Measures Proposed

Land Requirement for Project

According to conducted surveys, there will not be land acquisition along existing highway in the RoW area as the land ownership lies with DOR. However, there is a need for temporary renting of land during construction for labour camps, quarry sites, stockpiling and other areas, associated with construction work. Besides, there is a need in acquiring of the public and private structures, situated in the RoW area, including some households, located closely to the road, public structures and other public facilities, which will be destroyed or relocated.

Temporary land required will be taken in lease. For this, the contractor will obtain written permission from landowners and local bodies for establishing auxiliary facilities of the project like labour and construction camps, stockpiling yards etc. on their land. Proper drainage will be arranged around such facilities; floodways, natural drainage paths, water bodies will be avoided; agricultural land and other land will be restored/rehabilitated after use. All the affected private structures will be compensated and all the affected public and community structures will be rehabilitated/relocated.

Change in land use

Due to road upgradation, 303.44 ha (54.01%) of forest/vegetative area, 159.3 ha (28.35%) of agricultural land with houses, 73.90 ha (13.15%) of settlement area, 22.97 ha (4.09%) of river and flood plain and 2.20 ha (0.39%) of other vegetation will be converted to road structures.

The impact in land use is residual impact but can be reduced through confining vegetation clearance only within formation width or only where necessary. Road width has been reduced in forest areas and rural areas from 50 m to 26 m only. Further, compensatory plantation and maintenance of greenery along road embankment (road side) and median will be done. The project will plan and implement greenery enhancement along the road alignment. Unnecessary access roads/diversions will not be constructed.

Immigration and pressure in land resources

After KDP road upgradation and improved transportation and services, people will be attracted to project area, and more houses will be built to accommodate increased population, which is the common phenomena of present day. This increases ribbon settlement along road corridor of major settlements and market centers. The permanent and temporary structures built by informal settlers/ encroachers along the road alignment can cause adverse impacts on the pavements and road side drains. They also obstruct maintenance activities of the roads, views or sceneries for travelers and impact to the movement of pedestrian. This will lead to haphazard urbanization with problem of traffic congestion, drainage, waste and son on.

Project/DRO will conduct awareness to local about RoW encroachment and its legal and safety concerns. With coordination of local government, the project will implement enforcement of law to discourage new settlements adjacent to road, and encourage the plantation of trees for mitigation. Awareness campaigns and proper land use plans will be in place that can carefully tackle the problem of removing encroachers while taking into full account.

11.5 Cumulative Impacts from other Projects and Mitigation Measures Required

The land is one of the major components that determined socio-economic activities of people which have played vital role to contribute as a VEC in the KDP project. The land has given base to all development activities since long where development like roads and railway have been more significant than the others. The extensive use of land has significant impacts on our own environment. Transformation of agricultural land for human habitat will reduce land for crop/ vegetable / fruit production and livestock/ domestic animal rearing needed to survive human beings. Adequate land for crops and livestock farming will not be available in the future.

Also, the change in land cover/ landscape can have profound impacts on the earth system, and global warming. This will bring imbalance in ecosystem and environmental degradation, which will bring devastation on the project area ultimately. The pressures on land due to cumulative impacts of these different projects will bring further impacts on agriculture production due to land acquisition, settlement development in urban areas, road junction areas and railway station areas extremely.

The different projects in the same areas will hamper wild animal's movement, and they may enter into settlements imposing dangers to human beings and domestic animals. All above mentioned situations have determined land use change along the project section. The natural resource- land has been utilizing for agriculture, settlement development and other economic activities that has been changed due to urbanization and in-migration of people in the impact areas.

Settlement within land in between KDP road alignment and proposed railway alignment is expected to be rapidly increase and densely populated. For this, beside adequate design and construction of drainage and cross drainage structures by these projects, concern municipalities and wards also will be made responsible/ liable for proper sewerage management, solid waste management and land use planning.

The proposed Nijgadh International Airport will be made more land use change in the forest area. There will be pressure on approximately 8,045 ha of land⁶ due to construction activities. The existing forest land will be converted into the infrastructures. There will be impact in the private land and forest land throughout the alignment of Hetauda-Dhalkebar-Duhabi (HDD) (400 kv) transmission line. The area of private land to be acquired permanently for the construction of sub stations and tower pads is approximately 38.16 ha and for RoW of transmission line is 712.33 ha⁷.

The Nijgadh International Airport and the Kathmandu-Terai Fast Track both will be played vital role to develop transportation noddle point around Nijgadh. Due to construction of Kathmandu-Terai Fast Track project approximately 10 ha⁸ of land will be converted into infrastructure development. Settlements along the market/ urban areas located nearby those projects will be further developed as per increasing economic activities of the areas new settlement will be established. As the prospective of land use, dense settlements will be established in agriculture and the forest resources will also be more depleted along the KDP road section. overseeing above infrastructures intervention like MME Railway, Nijgadh International Airport, HDD 400 KV and Kathmandu-Terai Fast Track that have great implication of land use change and pressure on land resources and environment degradation. In addition to that pressure on agriculture land have reciprocal impact on crops production. Due to the series infrastructures development projects in terai area, the land use of Terai which is known as “hub of cereal production” may ruins the identical identity. The cash compensation is only one of the measures practiced by the ongoing projects. There are not any initiatives has taken to settle these issues from GoN and other development partners. To mitigate these critical issues further study and long-term planning has to be developed from GoN. The state should develop an appropriate Land Management Policy and strategic plan before launching such mega infrastructure projects. Some of the area which will have cumulative impacts in future such as Nijgadh Bazar, Bardibas are being pivotal place for upcoming infrastructures project intervention.

Forest development fund is responsible for identifying proper locations and compensatory plantation including taking care of these plantation areas. Further, concern community forest and collaborative forest user’s groups and Parsa National Park will be made more responsible for guiding and monitoring anti-fire strategies, implementation of biodiversity management plan and wildlife monitoring during construction phase that will be done by the KDP project and continuing these activities even after completion of the project construction (operation phase) also. Besides KDP Project/, concern projects and stakeholders are recommended to coordinate with other projects and enforce similar activities/measures so that mitigation can be

⁶ <https://jarsightnepal.com/news/46>

⁷ Adapted from approved IEE report of Hetauda-Dhalkebar-Duhabi 400 kv Transmission Line, May 2019

⁸ Adapted from approved ELA report of Kathmandu-Terai Fast Track Project

achieved in cumulative way. The construction of those projects will have direct impact on approximately 10091.25 ha of land. Those impacts are residual and irreversible. In addition to this, after the operation of those projects there could be other developmental interventions by which pressure on land degradation will be continue in future. The cumulative impact is a single issue or result of various projects in the specified area with big challenge. So, it is recommended to put forward this topic to policy level for further study indeed.

Annexure 6.2: Noise Modeling Report

2023

NOISE IMPACT ASSESSMENT STUDY: FINAL REPORT

for

*Up-gradation of Kamala-Dhalkebar-Pathlaiya
Section of Mahendra Highway in Nepal.*



Prepared by



Consulting Engineers Group, Ltd.





Kamala-Dhalkebar-Pathlaiya (KDP) Section of Mahendra Highway: Noise Impact Assessment

1.0 INTRODUCTION

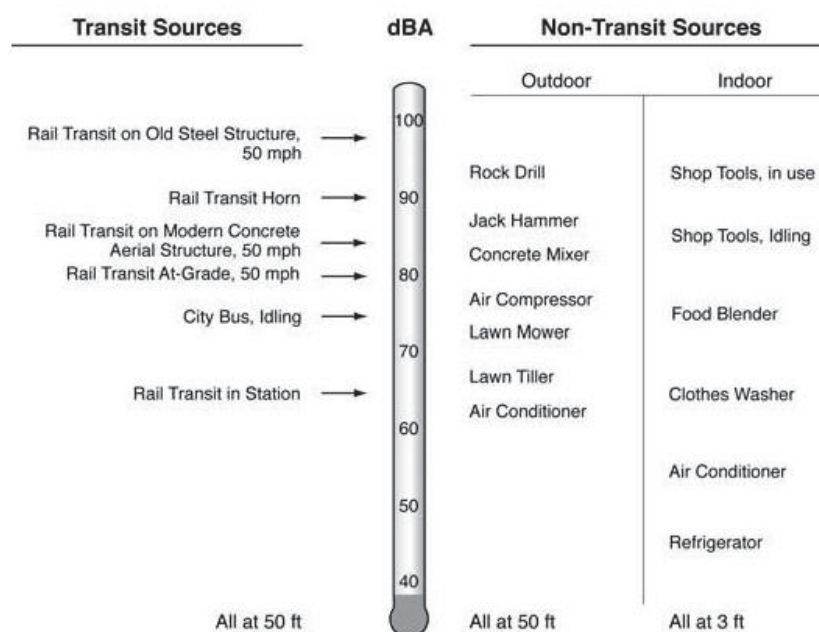
Sound is defined as small changes in air pressure above and below the standard atmospheric pressure. Most humans with typical or average hearing can perceive sounds ranging from approximately 20 microPascals (μPa) to 20 million microPascals (μPa) or more. Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its pitch or its loudness. Pitch is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. Loudness is intensity of sound waves combined with the reception characteristics of the ear. The three parameters that define noise include:

Level: The level of sound is the magnitude of air pressure change above and below atmospheric pressure and is expressed in decibels (dB). Typical sounds fall within a range between 0 dB (the approximate lower limit of human hearing) and 120 dB (the highest sound level experienced in the environment). A 3 dB change in sound level is perceived as a barely noticeable change outdoors and a 10 dB change in sound level is perceived as a doubling (or halving) of loudness.

Frequency: The frequency (pitch or tone) of sound is the rate of air pressure change and is expressed in cycles per second, or Hertz (Hz). Human ears can detect a wide range of frequencies from around 20 Hz to 20,000 Hz; however, human hearing is not as sensitive at high and low frequencies, and the A-weighting system, which measures what humans hear in a meaningful way by reducing the sound levels of higher and lower frequency sounds, is used to provide a measure in A-weighted decibels dB(A) that correlates with human response to noise. **Figure 1.1** shows typical maximum A-weighted sound levels for transit and non-transit sources. The A-weighted sound level has been widely adopted by acousticians as the most appropriate descriptor for environmental noise.

Time Pattern: Because environmental noise is constantly changing, it is common to condense this information into a single number, called the “equivalent” noise level (L_{eq}). The L_{eq} represents the changing noise level over a period of time, 1 hour, or 24 hours, in transit noise assessments. For assessing the noise impact of highway projects at residential land use, the Day-Night noise Level (L_{dn}) is the noise descriptor used; it has been adopted by many agencies as the best way to describe how people respond to noise in their environment. L_{dn} is a 24-hour cumulative A-weighted noise level that includes all noises that occur during a day, with a 10 dB penalty for nighttime noise (10 PM to 6 AM). This nighttime penalty means that any noise events at night are equivalent to 10 similar events during the day.

FIGURE 1.1: TYPICAL A-WEIGHTED SOUND LEVEL



Loud noise may adversely affect people in many ways. For example, noise may interfere with sleep, speech, communication and can cause annoyance and other physiological problems. Occupational noise exposure, is also the most common cause of Noise-Induced Hearing Loss (NIHL), threatens the hearing loss among the individuals exposed to noise pollution for longer periods of time, at a less intense level.

Transit system project that includes up-gradation of **Kamala-Dhalkebar-Pathlaiya (KDP) Section of Mahendra Highway** of length 130 km and homogeneous width of 45 m, a significant symbol of modern civilization, not only brings convenient transportation to the society but also adversely impact environment during construction and operation phases and hence this would need a frame work of environmental aspects to be taken care of while going for such new developments as well as addressing related problems for the proposed KDP section of Mahendra highway, if any. Since the construction period remains limited, the transit systems shall take necessary precautionary measures against environmental impact during construction phase. Therefore, a detailed noise impact assessment was conducted for the proposed up-gradation of KDP corridor during both construction and operation phases. The noise impact assessment and mitigation development was performed in accordance with the guidelines specified in the U.S. Federal Transit Administration (FTA) Transit Noise Impact Assessment guidance manual, referred to hereafter as



Kamala-Dhalkebar-Pathlaiya (KDP) Section of Mahendra Highway: Noise Impact Assessment

“the FTA guidance manual”. The objective of the assessment was to document the potential noise impacts at sensitive and desired locations and identify appropriate mitigation measures, as necessary.

2.0 NOISE IMPACT ASSESSMENT: KAMALA-DHALKEBAR-PATHLAIYA (KDP) SECTION

The assessment of the impacts of noise on the surrounding community depends upon:

- Characteristics of noise source (instantaneous, intermittent, or continuous in nature)
- Time of day at which noise occurs
- Location of noise source with respect to noise receptor

Noise Impact Assessment study during both construction and operation phases of KDP project was carried out in accordance with the Federal Transit Administration (FTA) guidelines. For modeling purpose, terrain is considered flat and there are no sound absorptive materials are present in the direction of the sound wave propagation so as to formulate the worst-case scenario. For predicting noise emissions impacts due to KDP corridor transit system project, the noise emission sources are examined during both construction and operational phases separately.

2.1 CONSTRUCTION PHASE: KAMALA-DHALKEBAR-PATHLAIYA (KDP) SECTION

Noise during the construction period could be bothersome to nearby residences. Construction workers would also be subject to construction noise while working on the site. Construction would take approximately two to three years to complete. Construction would be carried out in several discrete steps along one or more construction areas (i.e. construction would not take place along the entire alignment at one time), each with its own mix of equipment and, consequently, its own noise characteristics. KDP corridor construction would involve cut-and-fill activities and paving. Construction noise is temporary and would vary widely both spatially and time-wise over the course of the project’s construction.

The most prevalent noise source at project construction sites would be internal combustion engines. Mobile equipment operates in a cyclical fashion, but stationary equipment (e.g., generators and compressors) operate at sound levels that are fairly constant over time. Because trucks would be present during most phases and would not be confined to the project site, noise from trucks could affect more receptors.

Construction noise would be intermittent, occurring seasonally during construction at various locations in the project area. Construction noise levels would depend on the type, amount, and location of construction activities. The type of construction methods would establish the maximum noise levels of construction equipment used. The amount of construction activity would quantify how often construction noise would



Kamala-Dhalkebar-Pathlaiya (KDP) Section of Mahendra Highway: Noise Impact Assessment

occur throughout the day. The location of construction equipment relative to adjacent properties would determine any effects of distance in reducing construction noise levels.

Because the means and methods of construction would not be known until a contractor is selected for the project, analysis of construction noise would be based on typical activities and equipment used for demolition, excavation, and erection work phases. Daytime construction activities was analyzed, since it is possible that construction work would occur for normal working hours 8 hours a day. Maximum Environmental Noise Levels (MENL) that would be applicable to construction noise is associated with the project. However, sound originating from temporary construction sites as a result of construction activity can be exempted except in so far as such provisions relate to the reception of noise which include residential properties, multiple family living accommodations, recreational and entertainment facilities [e.g., camps, parks, camping facilities, and resorts], and community service facilities [e.g., orphanages, homes for the aged, hospitals, health and correctional facilities] between the hours of 10:00 P.M. and 6:00 A.M.

Moreover, construction noise levels depend on the number of pieces and type of equipment, their general condition, and the amount of time each piece operates per day, the presence of any noise attenuating features such as walls and berms, and the location of the construction activities relative to the sensitive receivers. The majority of these variables are left to the discretion of the contractor because assessment of construction noise is a professional judgment of the likely means and methods that would be used by the contractor. The construction of KDP corridor requires use of typical construction equipment provided in **Table 2.1** that may likely to be used and generate typical noise when it is operating at full load.

TABLE 2.1: TYPICAL NOISE LEVELS GENERATED FROM CONSTRUCTION EQUIPMENT

Sl. No	Equipment (ref list in email)	Noise Emission Level (15m: dBA)
1	Concrete Mixture	85
2	Poclain	85
3	Jack Hammer	88
4	Excavator	85
5	Loader	80
6	Scraper	85
7	Concrete Pump	82
8	Truck/Tipper	84
9	Transit Mixer	84
0	Generator set	81
11	Air Compressor	80
12	Crane, Mobile	83



Kamala-Dhalkebar-Pathlaiya (KDP) Section of Mahendra Highway: Noise Impact Assessment

13	Concrete Vibrator	76
14	Water Tank	80
15	Pump	77
16	Rock Drill	95

Assuming that all equipment categories operating for 8 hours continuously and simultaneously as worst-case scenario equivalent noise level (L_{eq}) during construction phase was predicted at six desired receptors locations (NQ1-NQ6) on six locations along entire Mahendra Highway alignment from Kamala to Pathlaiya at 30 m from the median and estimated to be 98.3 dB(A). Conservatively predicted noise level, when all the construction equipment operates continuously for 8 hours, exceeds the Permissible Exposure Limit (PEL) 90 dB(A) for work place (Noise Standard-Nepal) from the centroid of construction site. The spatial variation of the predicted noise level $Leq(t)$ at an interval of 5 dB(A) on six different sections of KDP alignment shown in the base map **Figure 2.1**, reveals that incremental noise expected to meet Urban Housing Area (UHA) Nepal standards 55 dB(A) and Rural Housing Area (RHA) Nepal Standard 45 dB(A) at a distance of about 830 m and 1737 m respectively from the centroid of construction site. The noise levels predicted here is without mitigation measures. It is assumed that with the adoption of the mitigation measures noise levels will be further restricted within very short distances from the source. With respect to occupational exposure, the permissible threshold is 90 dB(A) for 8-hour exposure. Thus, based on the modelling results it can be concluded that all sensitive receptors (i.e. labour colonies) should be located beyond 830 meters from the noise generating source location during construction activities. Spatial variation of noise level with distance due to all equipment operating simultaneously with 8-Hours work shift are shown in **Figure 2.2 through Figure 2.7** on all six different corridors. Noise attenuation curve due to simultaneous operation of all 16 typical noise generating construction equipment is shown in **Figure 2.8**. Keeping overall view of special variation noise level due to all 16 typical construction equipment operating simultaneously under conservative noise impact assessment on different proposed upgrading highway sectional corridors in construction phase is also shown in **Figure 2.29**.

FIGURE 2.1: UP-GRADING KAMALA-DHALKEBAR-PATHLAIYA(KDP) SECTION OF MAHENDRA HIGHWAY ALIGNMENT

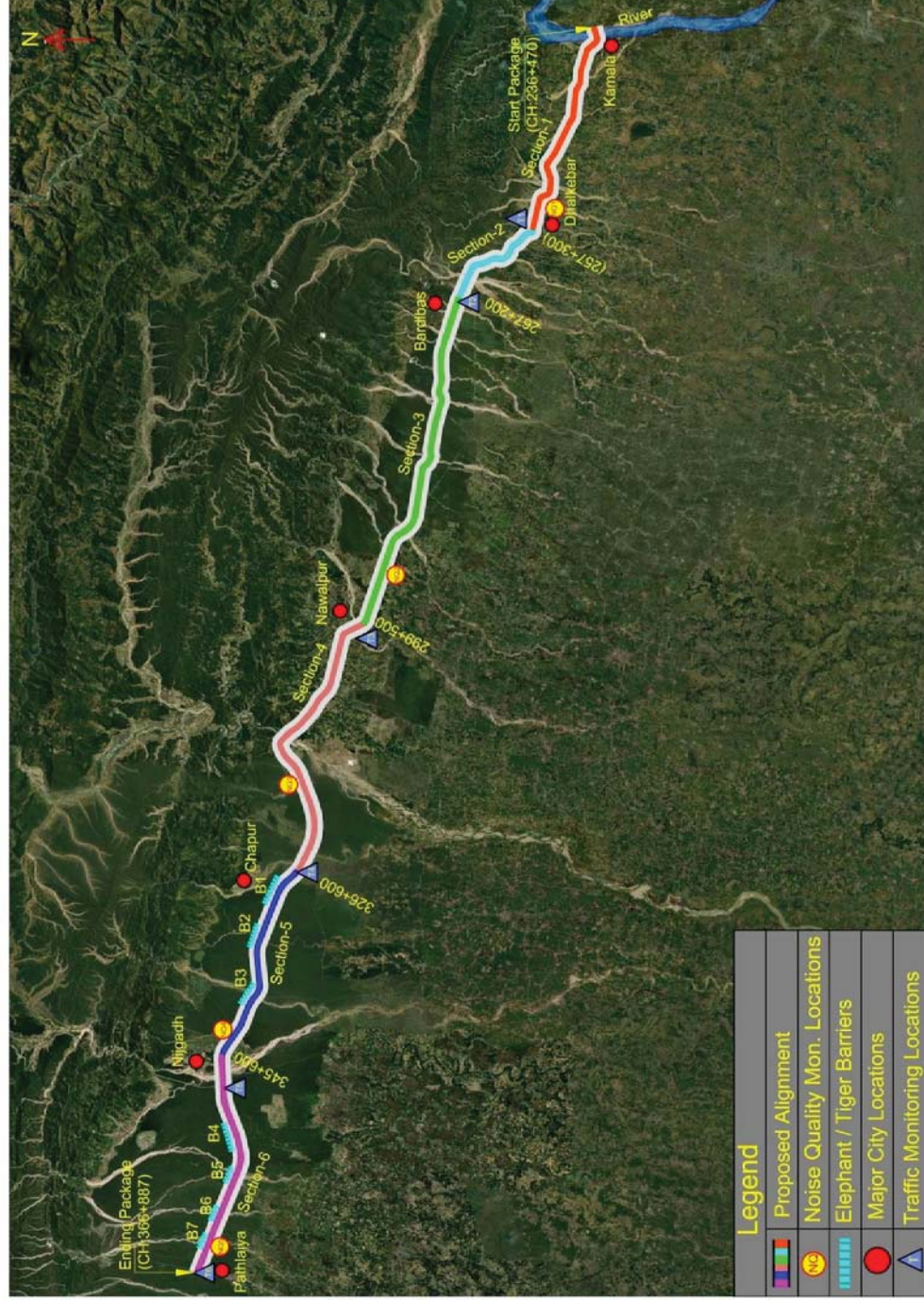


FIGURE 2.2: SPATIAL VARIATION OF NOISE LEVEL DUE TO CONSTRUCTION EQUIPMENT ON KAMALA-DHALKEBAR: CONS. EQUIPMENT



Kamala-Dhalkebar-Pathlaiya (KDP) of Section Mahendra Highway: Noise Impact Assessment

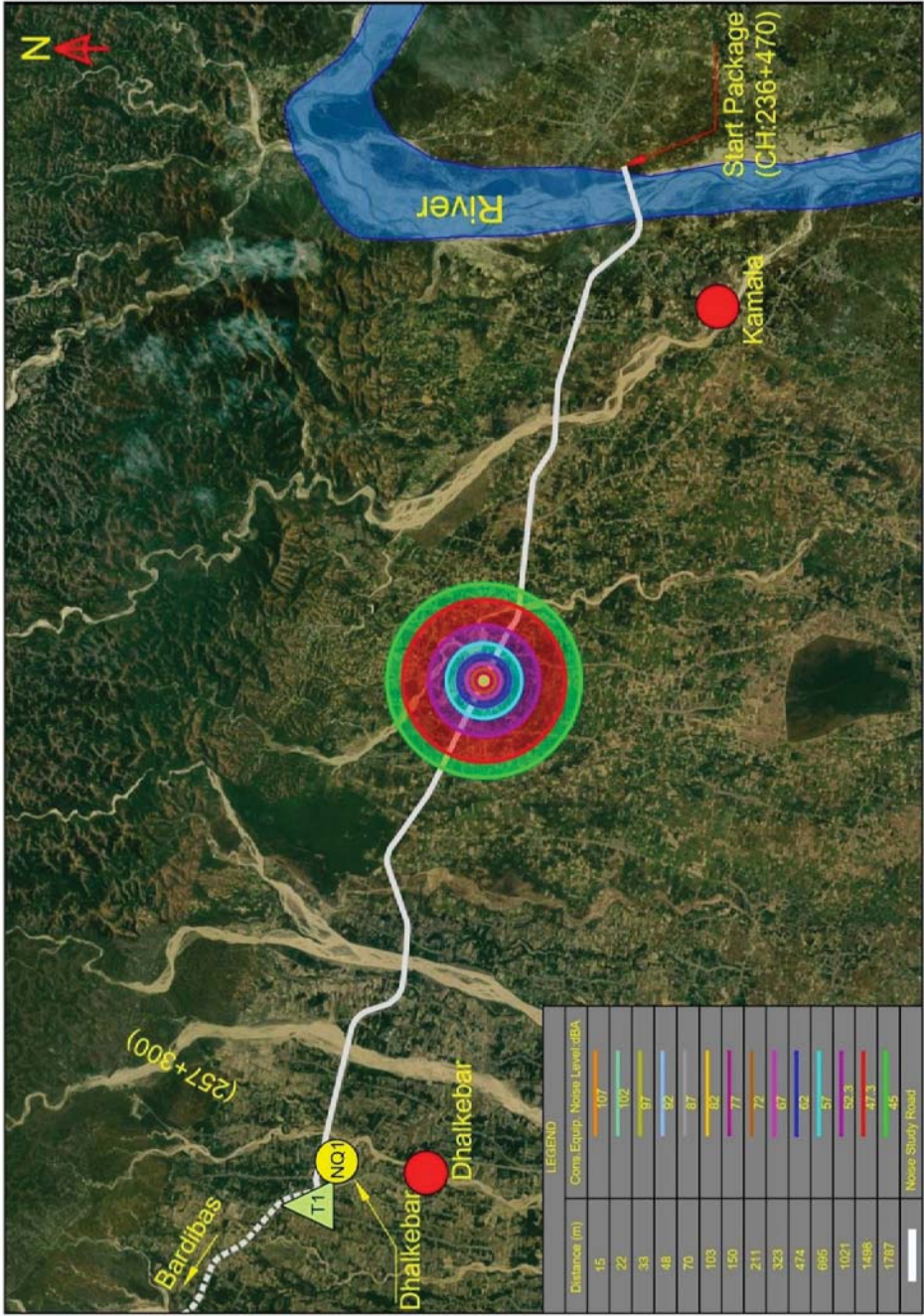


FIGURE 2.3: SPATIAL VARIATION OF NOISE LEVEL DUE TO CONSTRUCTION EQUIPMENT ON DHALKEBAR-BARDIBAS : CONS. EQUIPMENT

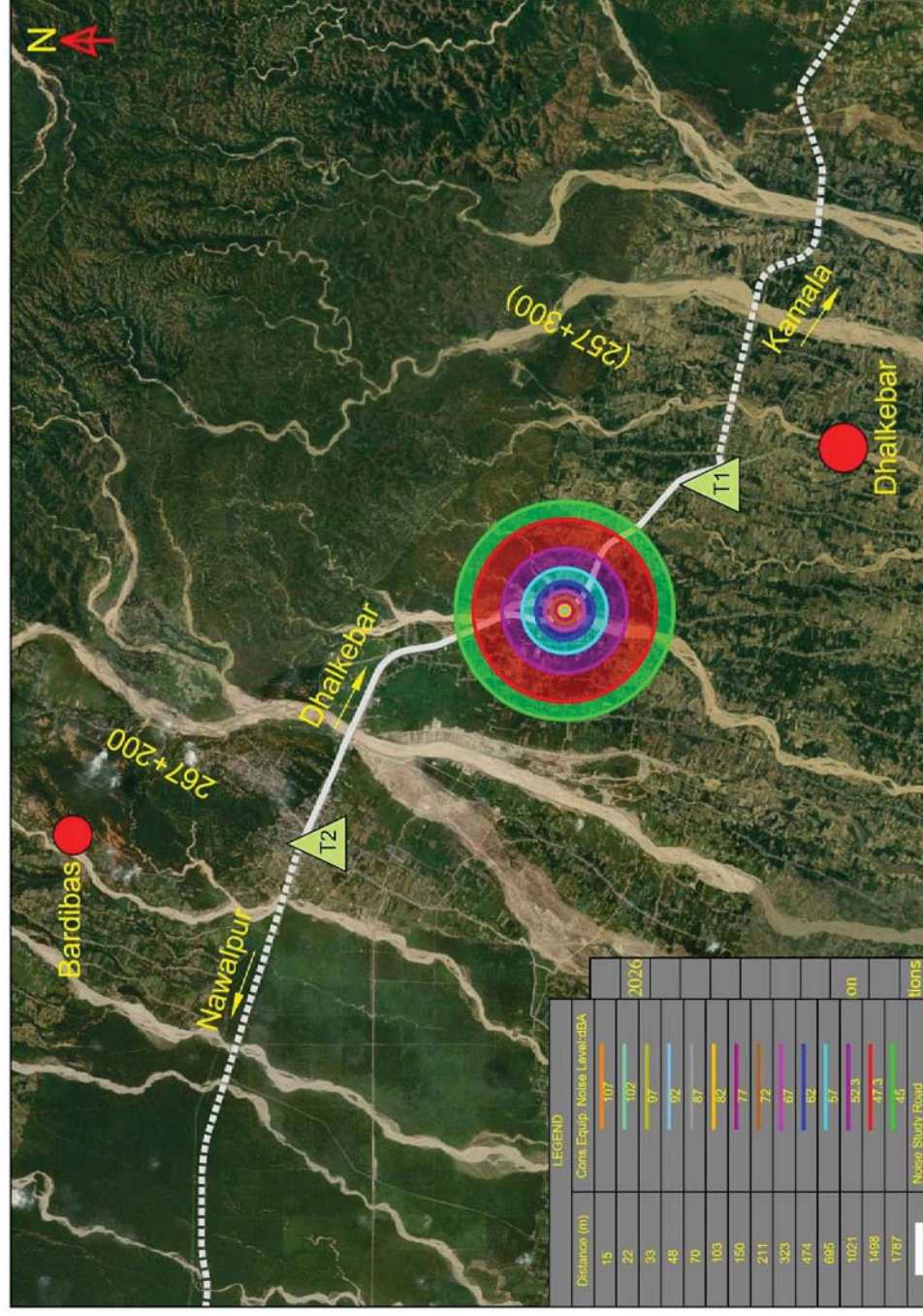


FIGURE 2.4: SPATIAL VARIATION OF NOISE LEVEL DUE TO CONSTRUCTION EQUIPMENT ON BARDIBAS-NAWALPUR: CONS. EQUIPMENT

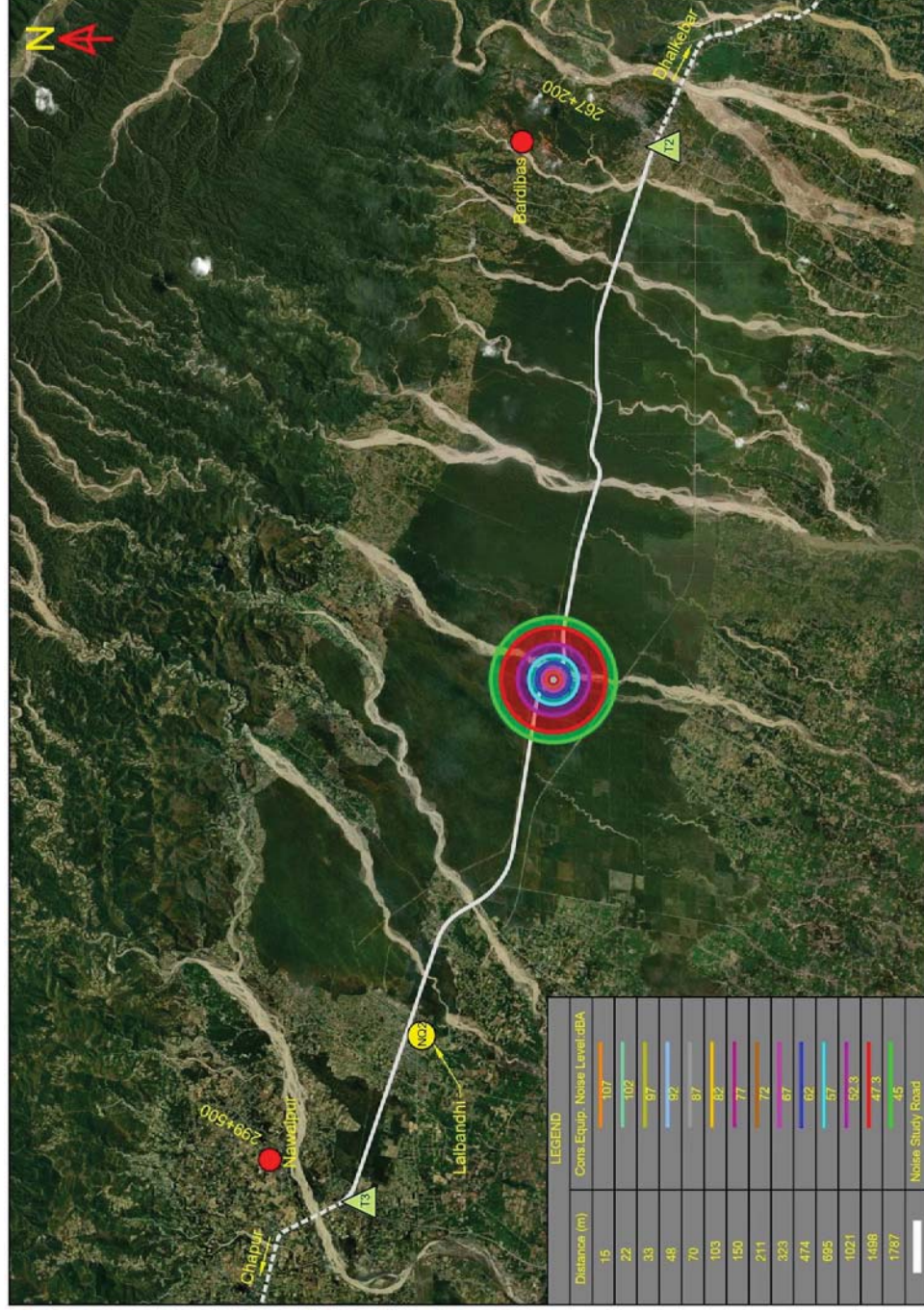


FIGURE 2.5: SPATIAL VARIATION OF NOISE LEVEL DUE TO CONSTRUCTION EQUIPMENT ON NAWALPUR-CHAPUR. EQUIPMENT

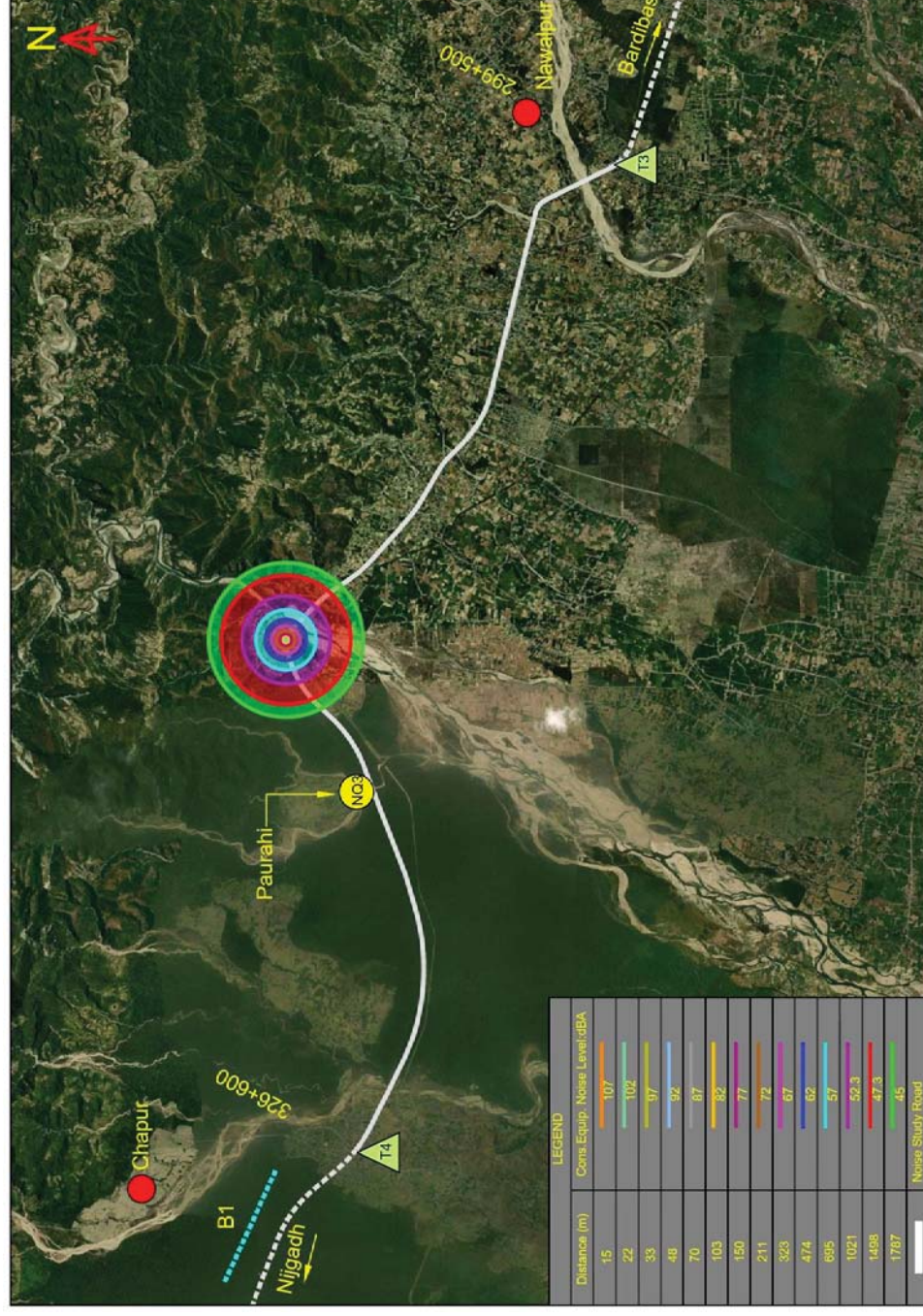


FIGURE 2.6: SPATIAL VARIATION OF NOISE LEVEL DUE TO CONSTRUCTION EQUIPMENT ON CHAPUR-NIJGADH: CONS. EQUIPMENT

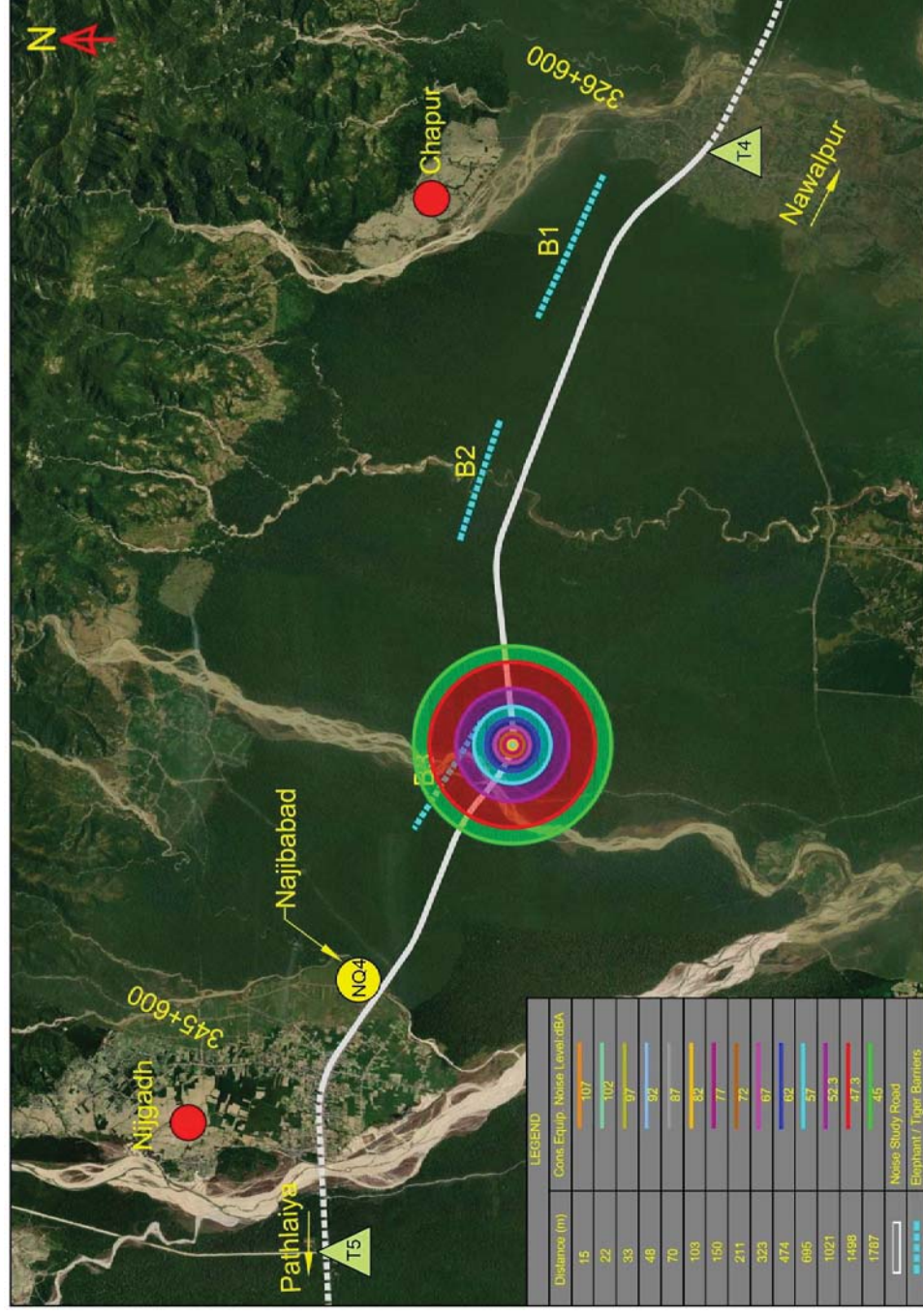
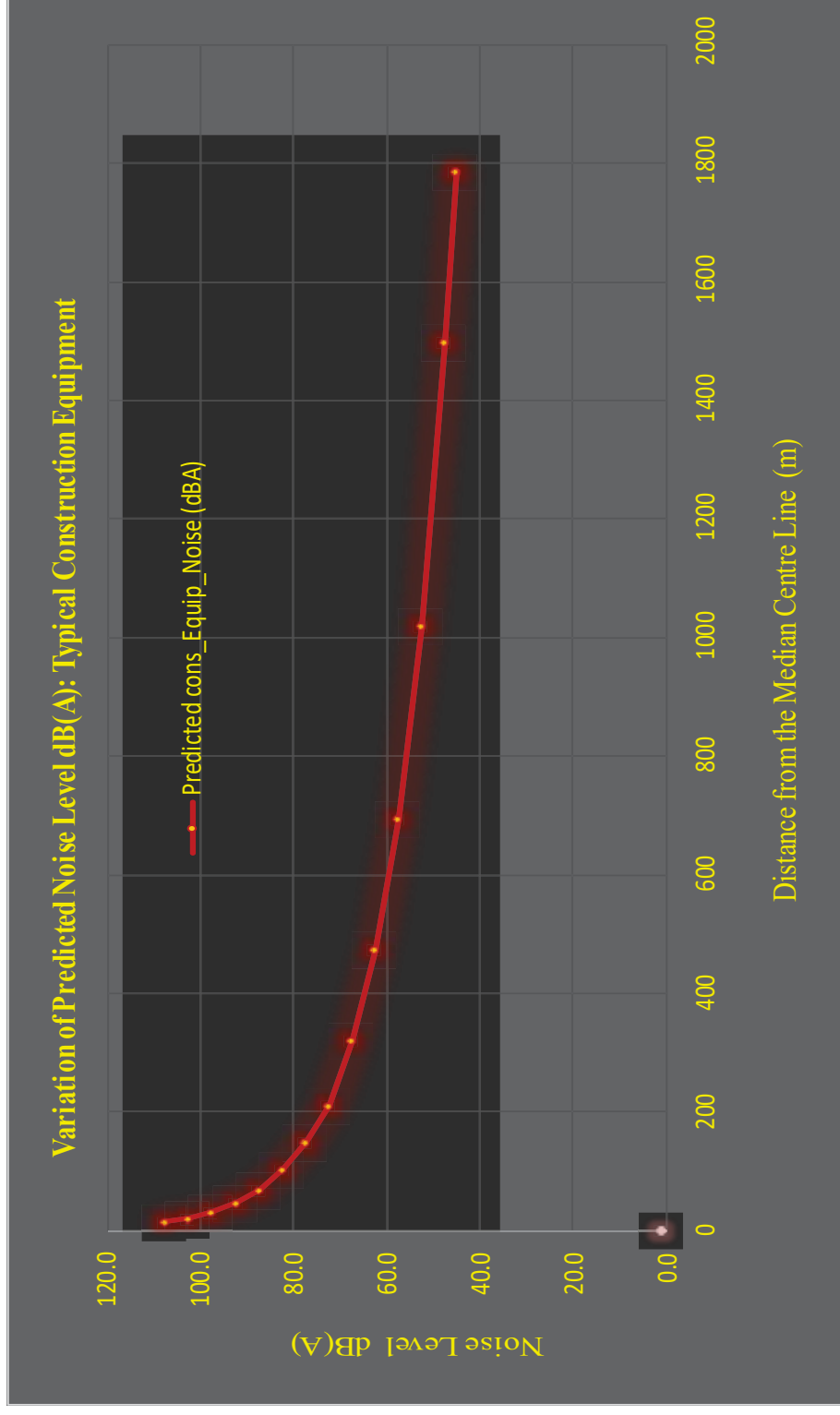


FIGURE 2.7: SPATIAL VARIATION OF NOISE LEVEL DUE TO CONSTRUCTION EQUIPMENT ON NIIGADH-PATHLAIYA: CONS. EQUIPMENT



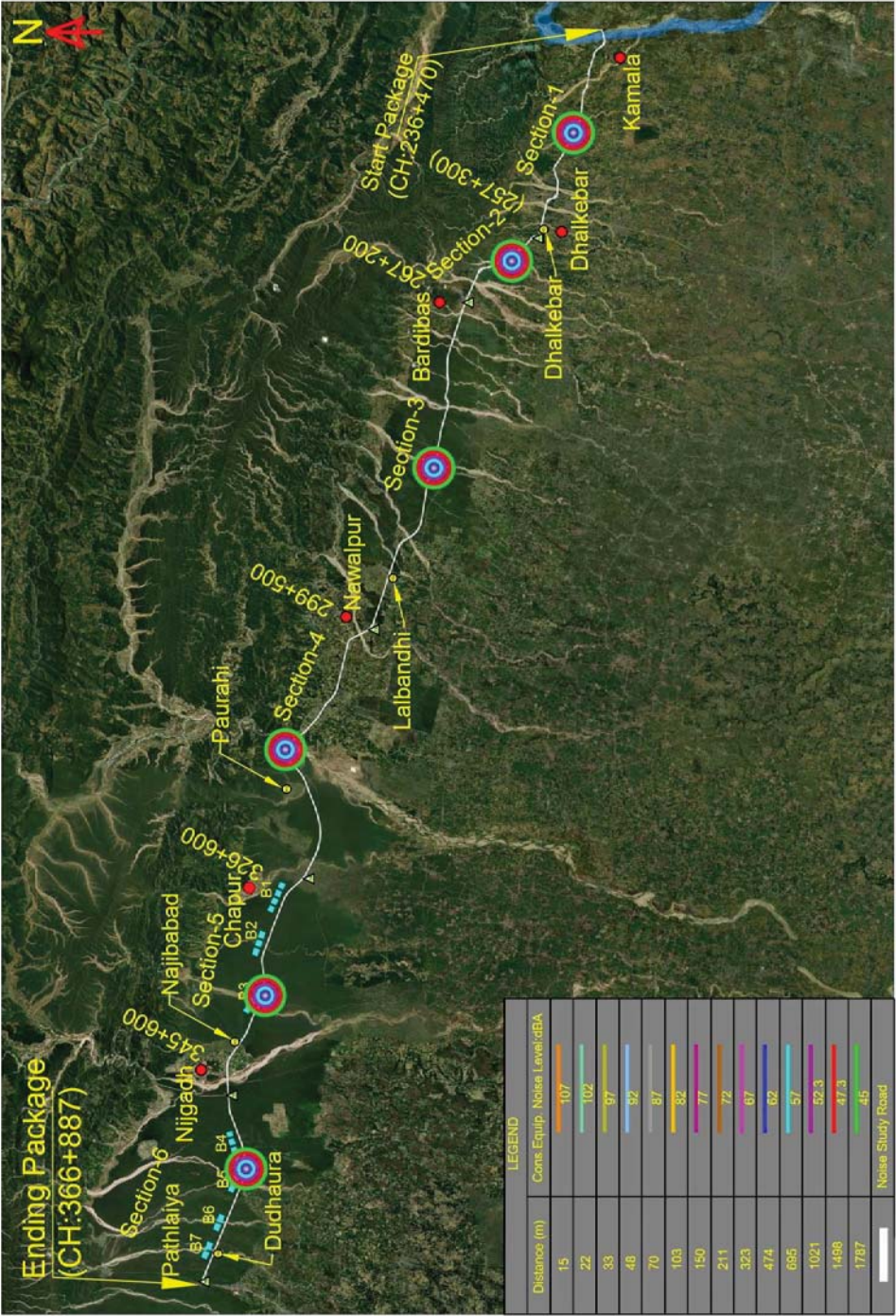


**FIGUR
E 2.9:**

SPATIAL VARIATION OF NOISE LEVEL CONSTRUCTION EQUIPMENT ALONG ENTIRE KDP STUDY CORRIDOR: CONS. EQUIPMENT



Kamala-Dhalkebar-Pathlaiya (KDP) of Section Mahendra Highway: Noise Impact Assessment





3.0 OPERATION PHASE: KAMALA-DHALKEBAR-PATHLAIYA (KDP) CORRIDOR

Noise impact assessment study for the up-grading Kamala-Dhalkebar-Pathlaiya (KDP) section of Mahendra highway during operation phase was carried out using the modelling techniques in accordance with the Federal Transit Administration (FTA) guidelines. Predicted incremental noise levels was further compared to the site-specific observed ambient noise level to assess the impact criteria viz; No Impact, Moderate, or Severe Impact and these three impacts are described as follows.

No Impact: Project-generated noise is not likely to cause community annoyance. Noise projections in this range are considered acceptable and mitigation is not required. In this range, the proposed project is considered to have no impact because, on average, introduction of the project will result in an insignificant increase in the number of people highly annoyed by the new project noise.

Moderate Impact: Project-generated noise in this range is considered to cause impact at the threshold of measurable annoyance. Moderate impacts serve as an alert to project planners for potential adverse impacts and complaints from the community. Mitigation should be considered at this level of impact based on project specifics and details concerning the affected properties.

At the moderate impact range, changes in cumulative noise levels are noticeable to most people, but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation, such as the existing noise level, predicted level of increase over existing noise levels, and the types and numbers of noise-sensitive land uses affected.

Severe Impact: Project-generated noise in this range is likely to cause a high level of community annoyance. The project sponsor should first evaluate alternative locations/alignments to determine whether it is feasible to avoid severe impacts altogether. However, projects that are characterized as point sources rather than line sources often present greater opportunity for selecting alternative sites. Further, environmental impact regulations encourage project sites which are compatible with surrounding development when possible. If it is not practical to avoid severe impacts by changing the location of the project, mitigation measures must be considered, if feasible.

The FTA noise criteria for KDP project compare the project noise with the existing (2023) (not the no-build noise in the project build year) long-term (24-hour) noise level measured at selected 05 monitoring sites along the KDP corridor shown in **Figure 3.1**, which include residences and other buildings where people normally sleep. This is because the comparison is based on what people are experiencing now



Kamala-Dhalkebar-Pathlaiya (KDP) of Section Mahendra Highway: Noise Impact Assessment

(existing noise), and the change in noise due to the project, rather than a comparison with a projection of noise at some future date. Predicted future cumulative noise levels in the vicinity of the project area would be based on existing measured noise level at the desired receptor locations and the incremental noise levels due to the proposed daily transit system operations.

Traffic noise modelling during operation phase was carried out considering three scenarios (i) Daytime (6 AM-10 PM), (ii) Nighttime (10 PM- 6 AM) and (iii) Day-Night time (24-Hour) with reference to traffic survey data on six different sections (section-1 to Section-6) with reference to interested monitoring locations along these six corridors at 30 m from the median of the highway. For the present study, noise quality data monitored in the year 2023 is assumed representing background ambient noise level data in the year 2026 to know the potential noise impact criteria due to the proposed project. To assess the noise impact assessment quantitatively due to the all motorized categories of vehicles on the selected corridor, the motorized traffic was divided into four main categories, namely (i) Light Commercial Vehicles (Cars, Utilities Vehicles, 4-Wheel Drive & Tractors), (ii) Bus, (iii) Heavy Motor Vehicles (Trucks) and (iv) Motorcycles. Based on the projected traffic volume count at six survey sections (i) Kamala-Dhalkebar (T1), (ii) Dhalkebar-Bardibas (T2), (iii) Bardibas-Nawalpur (T3), (iv) Nawalpur-Chapur (T4), (v) Chapur-Nijgadh (T5) and (iv) Nijgadh-Pathlaiya (T6) as shown in the **Figure 3.1**. Diurnal projected traffic count on each section for both directions is provided in **Tables 3.1 to 3.6** was assumed distributed homogeneously on both sides of carriageway for quantitative noise impact assessment study for the projected years 2026, 2031, 2036, 2041 and 2046 with respect to each section.